more@TURCK
The Magazine for Turck Customers Issue 1 | 2025

Special **Intralogistics**

With its smart IP67 portfolio, Turck enables modular and scalable intralogistics solutions – from roller motor control to RFID tunnels

IP67 Block I/Os – Flexible Conveying

Intralox controls its scalable conveyor technology with the decentralized ISC CAM logic module – the smart IP67 technology for this comes from Turck

RFID – Transparent Transportation

KEB expands an AGV automated guided vehicle system with Turck's RFID and sensor technology to create a fully automated material logistics solution

Intralogistics in Focus

The intralogistics sector is facing a fundamental change. Never before have the demands been so great, the challenges so varied. The e-commerce boom, rising and rapidly changing customer expectations, the omnipresent shortage of skilled workers and the call for sustainable solutions are shaping the industry. Increasing cost pressure is forcing companies to achieve greater efficiency and reduce costs, while at the same time flexibility and scalability are becoming increasingly important in order to be able to react to fluctuating demand and new requirements.

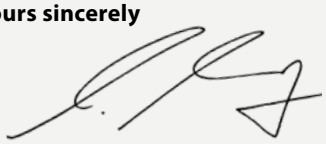
In the face of these challenges, digitalization and networking along the entire supply chain is of crucial importance. Smart automation technology offers promising solutions here. It ensures a significant increase in efficiency by expediting processes, reducing errors and increasing productivity. It also enables flexibility and scalability through the use of modular solutions that can be adapted quickly to meet new requirements.

In this special edition of your **more@TURCK** customer magazine, we focus on the latest trends and developments in intralogistics. We will show you how our customers have been able to make their processes more efficient, more flexible and more sustainable with Turck solutions. In addition to RFID solutions, we also focus on our smart TBEN block I/O modules with ARGEE logic, which, like numerous other IP67 components, consistently support modularization and digitalization. The robust block modules are quickly installed and connected without the use of control cabinets. They also perform control tasks quickly and reliably directly on the system without necessarily having to be integrated into higher-level control processes.

We have presented in eleven case studies a wide range of solutions that we have implemented with and for our customers, from roller motor control to AGV-based material logistics, and the tracking of workpiece carriers to support for manual picking processes using pick-to-light systems. I would particularly like to recommend our cover story from page 8 on the subject of »Digital conveyor lines« and the interview that follows. The article shows examples of how modular conveyor technology can be made flexible, scalable and highly available through digitalization thanks to condition monitoring. Also in focus here: Our IP67 portfolio of TBEN block I/O modules with roller motor control and inputs/outputs for sensors and actuators, power supply units, Ethernet switches, safety modules and RFID.

We at Turck look forward to working with you to implement innovative solutions for your intralogistics that will help you to master the challenges and exploit the opportunities of the future. We hope you enjoy the read.

Yours sincerely



Christian Wolf, Managing Director

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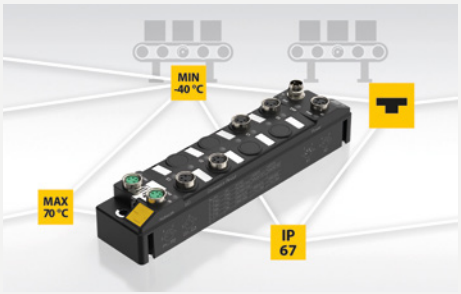
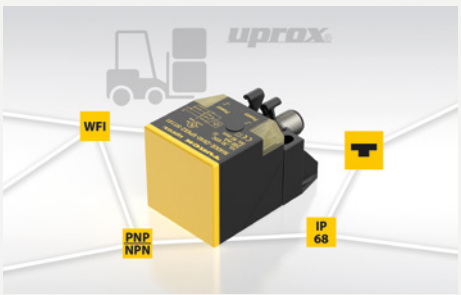
SERVICE

Compact 4-I/O Module for Intralogistics



Specifically designed for use in applications with a low I/O requirement, such as in logistics applications, is Turck's TBEN-S1-4DXP Ethernet I/O module. The compact block module provides four channels that can be used flexibly as inputs or outputs, and in the design of the TBEN-S, which comes as standard with eight channels. With a temperature range from -40 to 70 °C and protection to IP65/IP67/IP69K, the new I/O module has a wide range of uses.

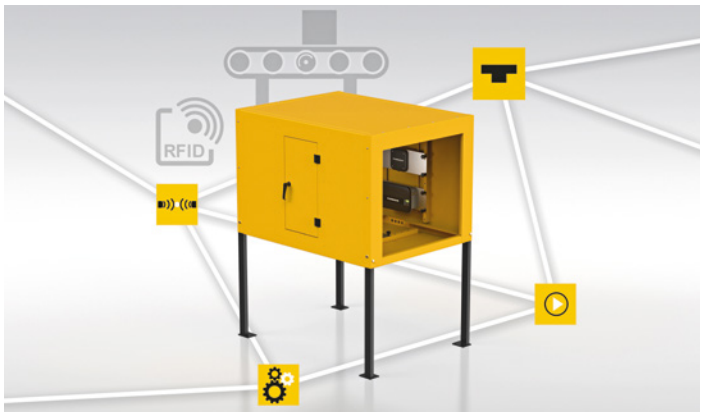
Factor 1 Sensor for Logistics Applications



With the inductive proximity switch NI40UE-QV40, Turck is expanding the proven uprox sensor series. This rectangular Efficiency Line variant has been optimized with a focus on flexibility, short commissioning times and price-sensitive applications in logistics and material handling tasks. The Factor 1 sensor also detects smaller metal targets very well when approached from the side, as is common in target applications. The sensor is magnetic field resistant up to 300 mT and meets the protection type IP68. With these characteristic values and a temperature resistance of -30 to +85 °C, it meets the most demanding requirements with regard to availability and operational reliability.

RFID Tunnel Solution for Intralogistics

Turck's new UHF-TUNNEL RFID tunnel offers a ready-to-use, flexible detection solution for the automation of intralogistics processes. The no-code technology and a standardized interface simplify integration into existing systems and thus accelerate data acquisition and process integration. The RFID tunnel is designed for a wide range of applications in the flow of goods on conveyor belt applications and is ideal for incoming and outgoing inspections as well as bulk detection in production and warehouse logistics. The multi-tag function and the closed housing ensure reliable detection, even with large quantities of goods. The all-in-one solution consists of a UHF reader with four antennas, matching coaxial cables and a closed tunnel housing with all brackets and screws for quick installation.



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UHF RFID Gates as a Complete Package

UHF RFID gates for identification tasks in logistics and intralogistics processes, for example for the secure recording of incoming and outgoing goods, are now also available from Turck as a complete package. All components, including the appropriate middleware and software, are coordinated so that the user can install and commission the gates without any further programming. In addition to the software, the complete package consists of a Q180 UHF reader with four antennas, four coaxial cables, an Ethernet cable as well as the traverse and the side panels for mounting the reader and antennas.

Compact UHF RFID Reader with EtherCAT

The compact Q150 UHF RFID reader with an integrated Ethernet interface communicates directly with PC or PLC systems in Industrial Ethernet networks with the four most important protocols without the need for an additional interface. The Q150-EC is the only reader in its performance class with EtherCAT; the Q150-EN multi-protocol version works in Profinet, Ethernet/IP and Modbus TCP and requires no additional power supply thanks to Power over Ethernet (PoE). Integration in the control environment does not require the programming of a function block. Instead, the reader comes factory fitted with a U Interface as a simple data interface for easy use. RFID apps for visualization in the Turck Automation Suite (TAS) make it easier to select the optimum parameters.

IP67 Power Supply Units with IO-Link

Turck is adding compact power supply units with protection to IP67 to its portfolio of flexible power supply units for 1- and 3-phase applications in modular machine building. The robust PSU67 units operate in temperatures from -25 to +70 °C and can be installed directly at the machine without any protective measures needed. The PSU67 power supply units are available with 15, 20 or 25 A as well as with M12, 7/8" or HAN-Q4 terminals. The decentralized power supply units supply 24 to 28 VDC directly in the field without any loss and offer high fail safety thanks to its electronic no load, overload and short circuit protection.

M12 Power Portfolio

Turck now offers a fully comprehensive M12 Power portfolio in K, L, S and T codings. Besides the already available overmolded M12 Power cables, the M12 Power range now also includes field wireable male connectors, receptacles and junctions as well as M12-to-7/8" adapter cables. In addition to the connection technology, Turck is also offering its customers M12 Power technology in its robust I/O and RFID block modules as well as power supply units with IP67 protection. The wide range of possible combinations enable simple and efficient solutions for a structured and decentralized power supply – from the power supply unit to the control cabinet through to any end devices. Turck's robust M12 Power solutions are a match for the toughest conditions. The compact M12 male connectors are suitable for virtually any application.

3D Radar Scanner with IO-Link or J1939

With the MR15-Q80, Turck presents a robust radar scanner, that captures and outputs three-dimensional environmental data, for example for 3D object detection, collision avoidance, height control or blind spot monitoring. It is the only device with these features that is available with a J1939 interface for mobile equipment in addition to IO-Link. The 60 gigahertz radar scanner detects objects up to 15 meters away within the freely definable detection angles of 120° horizontally and 100° vertically. Thanks to its technology, radar technology is more robust than alternative solutions such as laser or ultrasonic sensors.

HF Read/Write Head with S2 Redundancy

Turck's new HF read/write head with an integrated multiprotocol Ethernet interface adds an efficient solution with unique features in terms of startup time, communication and safety to the existing RFID portfolio. With a startup time of less than 500 ms, the TNSLR-Q130-EN is ideal for highly dynamic applications such as tool changes in which every second counts. Thanks to its multiprotocol interface the device communicates automatically in Profinet, Ethernet/IP or Modbus TCP networks. The integrated S2 system redundancy enables redundant communication between two controllers.

Miniature RFID Tags and Read/Write Heads

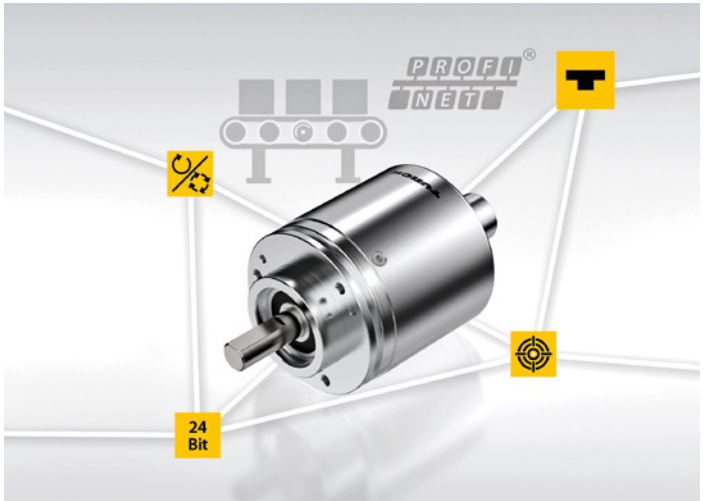
New RFID read/write heads in an M12 housing and in-metal tags in the compact 4 x 3 millimeter format enable the identification of very small metal objects in very restricted spaces. The read/write heads are available for both flush and non-flush installation. In addition, Turck offers variants with RF bus mode that allow multiple read/write devices to be efficiently connected in line topology.

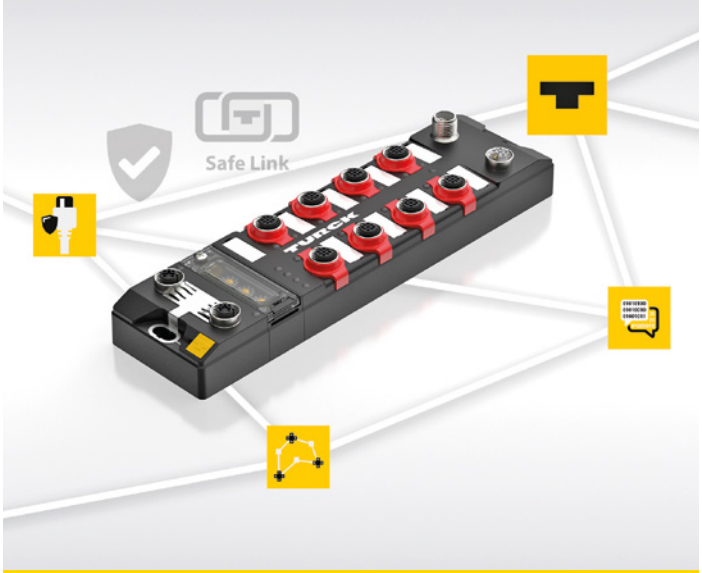
Ultracompact 4-Channel RFID Interface for EtherCAT

As the world's most compact 4-channel RFID interface for EtherCAT, Turck's TBEC-S2-4RFID is ideally suited for confined installation spaces. Each of the four RFID channels enables the connection of up to 32 HF read/write heads in HF bus mode, thus allowing the entire module with dimensions of 32 x 144 x 32 mm to accommodate up to 128 HF read/write heads. This effectively reduces costs for applications with many consecutive read points, such as in intralogistics or on production lines in the automotive industry or in mechanical engineering. Turck's versatile EtherCAT module is compatible with all HF and UHF read/write devices that support connection to the RFID interface. The high degree of protection to IP67/68/69K allows the module to be mounted directly on the machine, which significantly shortens the wiring process.

High-Resolution Profinet Absolute Encoders

Turck's encoder portfolio now also offers encoders with a Profinet interface for real-time applications, particularly in the logistics, food & beverage and machine building sectors. The REM (multiturn) and RES (single-turn) series encoders rely on the latest Profinet encoder profile (version 4.2) and offer 19-bit resolutions for the single-turn devices and resolutions of up to 24 bits for the multiturn devices. All encoders support Profinet features such as the Media Redundancy Protocol (MRP), Link Layer Discovery Protocol (LLDP) and Simple Network Management Protocol (SNMP).





Safety Multiprotocol Modules with Safe Link

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

Bluetooth Connectors Monitor Cable Conditions

With its new M12Plus connectors, Turck is shifting the condition monitoring of cables subject to severe stress directly to the connection technology. The connectors, which come with voltage and current monitoring and a Bluetooth chip, enable measured voltage and current values to be sent wirelessly to a controller. Comparing input and output values enables problems such as cable kinks, cable breaks or power outage to be detected early on. The user can identify in advance any cable that is at risk of failure via the individual MAC address of each connector and replace it immediately. The Turck Automation Suite (TAS) visualizes the measured values of the M12Plus via the Cable Monitor app and thus enables condition monitoring and other IIoT applications.

Photoelectric Sensors

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

IIoT Functions for RFID Interfaces with OPC UA

A free firmware update makes Turck's IP67 RFID interfaces fit for barrier-free communication in IIoT applications, such as for simple product identification and tracking. While the OPC UA server with the AutoID Companion Specification V. 1.01 ensures smooth direct communication with MES, PLC, ERP or cloud systems, Turck's HF bus mode offers cost benefits for applications with many read points. Users also benefit from the negligible integration effort required for HF and UHF systems. The firmware update makes the TBEN-L5-4RFID-8DXP-OPC-UA the first RFID module with an integrated OPC UA server to support Turck's HF bus mode, which allows the connection of up to 32 HF read/write devices to each RFID input.

To The Rollers

Turck's range of products for the modularization of digital conveyor technology is supporting the trend towards flexible intralogistics systems – in focus: the robust TBEN-LL-4RMC roller motor controller

One of the most pressing challenges for industry and therefore also for the intralogistics sector is demographic change. Many skilled workers will retire in the coming years, while the new talent available to replace them will not be enough. According to the ifo Institute, more than 60 percent of companies are already suffering from a shortage of skilled workers. As a result, around a third of logistics specialists have to complete more tasks in the same amount of time. One of the industry's responses to this trend is greater automation, for example through the increasing use of AMR (Autonomous Mobile Robots) or cobots.

Moreover, the industry also faces challenges from the uncertainty of developments in global trade. This

Turck's TBEN-LL-4RMC roller motor controller controls up to four drives directly on the conveyor module via CAN

The TAS Turck Automation Suite promises efficient device management in Ethernet automation networks – with cloud integration for real-time monitoring and troubleshooting

uncertainty means that companies aim to stay flexible so that they can react more easily to changing conditions. Furthermore, consumer behavior has also become more volatile, and this is also driving the trend towards greater flexibility. Global companies must be able to adapt their production and logistics processes in order to minimize at the same time competitive disadvantages caused by customs duties and long supply chains. Production and logistics facilities, including conveyor technology, may have to be relocated or expanded. The ability to react quickly and adapt to changing business conditions is becoming a major competitive factor.

Solution: modular conveyor technology and smart automation

Innovation cycles are getting shorter. Monolithic systems that operators only touch for maintenance and servicing purposes for ten years or more after they were installed are a thing of the past. Modular conveyor lines offer a clear benefit here, as they allow systems to be adapted quickly and efficiently. This not only helps to secure supply chains, but also contributes to the long-term stability and competitiveness of companies in the global market.

By using smart automation technology, processes can be optimized and workflows automated, which ultimately reduces the workload on employees and increases productivity. Turck is responding to these requirements for a greater degree of automation and greater flexibility with decentralized, networked solutions for digital conveyor lines, thus ultimately meeting three objectives of system builders, integration partners and intralogistics OEMs: automation, traceability and scalability.

Manufacturers of intralogistics systems are therefore required even more than in the past to plan systems that are flexible. Their structures must have the ability to be reopened: both mechanically and in terms of data communication, power supply, interfaces and software architecture. The conventional requirements placed on production and logistics technology, such as a long service life and maximum availability, short cycle times,

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Demographic change and the resulting shortage of skilled workers as well as volatile consumer behavior require the availability of more flexible production and logistics processes. Modular conveyor technology and smart automation offer opportunities for intralogistics by making it possible to implement rapid adaptions and high productivity with low staffing levels. Turck supports the trend towards digital conveyor lines with decentralized, networked solutions for flexible, scalable conveyor technology with improved traceability. The TBEN-LLH-4RMC IP67 CAN roller motor controller forms the basis for fully modular and cabinet-free automation of conveyor lines.

i. e. high production efficiency, are still very much needed. An intelligent and predictive evaluation of process and status data aims to further improve maximum availability.

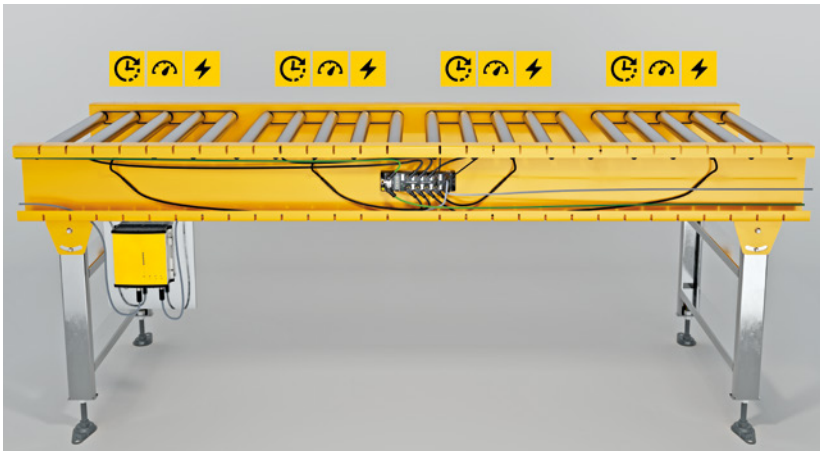
The required modularization of conveyor technology is leading to the increasing use of smaller DC drives which are integrated directly into the roller conveyor as motor rollers. These are replacing large AC drives, which drive entire tracks and multiple rollers simultaneously. There are no longer any protruding motors on the side of the conveyor track or below it, only the control modules. The motor rollers themselves can hardly be distinguished from the passive rollers. When the conveyor technology modules also have to ensure high availability and operation with zero pressure accumulation, there is no way around an efficient digitalization strategy. The trend is moving away from lines that are controlled and driven centrally towards decentralized control modules and roller drives directly in the field.

I/O modules control roller drives directly on the conveyor module

Turck can support users in the digitalization of their conveyor technology with its robust IP67 solutions. The I/O modules of the TBEN-S and TBEN-L series for signal distribution or the TBEN-L-PLC IP67 PLC for autonomous control directly on the line are particularly used in intralogistics systems. Users of Interroll roller motors have been able to use Turck's TBEN-Lx-4RMC for drive control for several years now. It controls motors with a CAN interface and communicates to the controller via one of the three multiprotocol Ethernet languages. The module can now also control roller motors from manufacturers MTA and MPC and other motor manufacturers are set to follow.

Controlling zero pressure accumulation conveying directly via the I/O module

The TBEN-LL-4RMC is also able to establish zero pressure accumulation conveying from the field via its integrated ARGEE control logic as a field logic controller (FLC). The ARGEE program modules required are available. A TBEN block I/O module controls up to four CAN roller motors locally and at the same time integrates sensors and actuators via universal DXP ports. Communication with the system's central controller is implemented via one of the three multiprotocol languages.



Condition monitoring increases availability: The speed, temperature and current consumption of each motor roller are continuously monitored and evaluated

IP67 power supply units bring power to the field

In order to further modularization consistently, as many automation components as possible must be relocated from the control cabinet to the field. Turck is also moving in this direction with its IP67 power supply units. The PSU67s provide 24 and 48 volts while their M12 power supply and snap-on connectors simplify the design and construction of autonomous conveyor technology modules.

Implementing cabinet-free network and safety technology

Ethernet switches are also often found in control cabinets. Turck offers alternatives in IP67, both as a managed (TBEN-Lx-SE-M2) or unmanaged switch (TBEN-Lx-SE-U1), which relocate network management from the control cabinet to the machine.

Safety controllers with IP67 protection complete the IP67 range. Turck's TBEN-LL-4FDI-4FDX offers here a networked machine safety solution that is specially tailored to the requirements of small to medium-sized plants: The combination of the Turck Safe Link safety protocol with the TBEN-LL-4FDI-4FDX safety IP67 block I/O modules enables flexible and cost-efficient safety control through decentralized installation. The multiprotocol-capable modules use the Turck Safe Link protocol for safety communication between each other. The safety-related logic is implemented directly in the modules with safety inputs and outputs.

UHF identification tunnel as a complete package

Identification is an integral part of the processes in almost every intralogistics system – whether optical or with RFID. This can also be implemented completely cabinet-free, for example with Turck's turnkey UHF RFID tunnel. The complete UHF tunnel package consists of a UHF reader with antennas, the appropriate coaxial cables and a closed tunnel housing with all the fixings required for quick installation.

An additional interface or separate middleware is not required. The no-code technology and a standardized interface simplify integration into existing systems and thus expedite data acquisition and process integration. The UHF RFID tunnel is designed for a wide range of applications in the flow of goods on conveyor belt applications and is ideal for incoming and outgoing inspections as well as bulk detection in production and warehouse logistics. The multitag function and the closed housing ensure reliable detection, even with large quantities of goods.

Faster to market with modular solutions

A key benefit of modular conveyor technology is faster commissioning and assembly. Conveyor technology modules can be pre-wired by the manufacturer so that the end user can simply assemble them like building

UHF RFID tunnels as a complete package save the time-consuming assembly of compatible systems

blocks and ideally connect just two cables for the data communication and power supply. If the controller and safety controller are mounted directly on the conveyor system, they can also be tested offline without being connected to the upstream central controller. This significantly speeds up commissioning and the modular conveyor technology is operational sooner. A modular concept also pays off when later expansions of a conveyor system are required, for example if a standard module needs to be replaced by a diverter or sorter.

Condition monitoring

Another solution for systems that will have to be operated by fewer skilled workers in the future is intelligent condition monitoring. Modern automation technology must be able to integrate the application knowledge of experienced specialists. The key to this is data. Almost every automation component from Turck can record and transmit additional data such as the internal temperature, operating hours, switching cycles or current consumption simultaneously with the actual user data. Users can decide whether they want to store and evaluate the data on a service of their choice on their own in-house servers, use a cloud such as Microsoft Azure, Telekom Cloud or AWS, or communicate the data to Turck's TAS Cloud platform via MQTT and evaluate it there.

TAS Cloud: Maintenance Manager and more

TAS Cloud offers apps tailored to industrial applications, such as the Maintenance Manager. With this service, users can use modules to create, schedule, carry out and document maintenance plans for their machines without any programming required. This allows maintenance staff to keep an eye on several systems in less time and identify any problems at an early stage, even across different locations or countries. One might argue that a service technician must be on site at the latest when mechanical faults need to be rectified. This is true, but many defects are indicated early on in the data. Condition monitoring opens up the opportunity for better and more efficient planning of maintenance operations and maintenance resources.

Optical sensors complete the range for logistics automation

As a full-range supplier, Turck also offers numerous sensor variants that are used in intralogistics to detect containers and products. Turck's optical sensor partner Banner Engineering also provides a wide range of LED lights and indicators, also with a pick-to-light function, which can cover almost any requirement in the industry, when combined with Turck's in-house I/O solutions.

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„Flexibility Is The Key"

Turck's compact TBEN I/O modules from its TBEN series not only enable the control of drum motors on roller tracks but also the digitalization of the entire conveying line, while at the same time ensuring transparency in intralogistics. Michael Corban, editor-in-chief of the German trade journal KEM, interviewed the four Turck specialists Frank Morassi, Holger Spies, Frederik Nitsche and Hendrik Schnabel to find out how decentralized automation, modularization and digitalization make it possible to implement flexibly scalable and highly available conveying lines – a particularly efficient approach when combined with RFID technology for conveyed goods identification.

What are the challenges that Turck is meeting with this intralogistics offering?
Frank Morassi (Vertical Sales Manager Intralogistics): In intralogistics, no two systems are the same – flexibility is key. Not only with regard to the components used, but also in order to redesign the conveyor system quickly to meet today's frequently and rapidly changing requirements. On the mechanical engineering side, the answer is modularization; in automation, it is decentralized automation in conjunction with digitalization – and this is where we are at home. In this way we can implement modular and flexibly scalable conveyor lines – offering a high level of availability and operation with zero pressure accumulation if required. With this approach, we can solve a number of tasks that will increasingly arise in the coming years.

If requirements change, scalability is needed in addition to the rapid redesign of a system. Modular design and decentralized automation enable conveyor modules to be adapted and expanded quickly and easily to suit a new line layout. With smart and robust I/O modules on board, the wiring effort stays negligible – the modules also come with control capabilities and connections for actuators and sensors, including a 24 or 48-volt power supply.

Since we have always based our product ranges on modular and holistic concepts,

»Our solutions for intralogistics enable decentralized automation, traceability, condition monitoring, scalability, a fast time-to-market and smart digital services with our Turck Automation Suite TAS.«

Frank Morassi | Vertical Sales Manager Intralogistics

»Decentralized automation enables us to also process real-time applications locally in the field and thus offer total flexibility, from the control and scaling of conveyor lines right through to solutions for predictive maintenance.«

Holger Spies | Project Manager Sales

Turck can offer intralogistics specialists a single source solution – and bring together decentralized automation, traceability, condition monitoring, scalability, a fast time-to-market and digital services with our Turck Automation Suite. Our RFID expertise should also be mentioned here.

Could you expand on this?
Morassi: With the multitude of tasks involved – for example, when something is assembled, welded, soldered, packed, stored, temporarily stored, relocated or repacked – it is important to record exactly which box or assembly is currently where. We can record this very well using RFID – and not just via gates at the incoming and outgoing goods areas. We can initiate entries and withdrawals in the higher-level system at the respective stations. Unlike barcodes, an enormously important advantage of RFID is the ability to not only read the tag but also to write to it. For example, the serial numbers of the installed parts and assemblies can be easily provided during assembly processes – traceability is guaranteed.

You also mentioned the topic of a fast time-to-market...
Morassi: ...because that is one of the advantages of decentralized automation. We can implement a system more quickly because decentralized systems are run and tested autonomously. This makes it possible to implement a new system or even a system expansion more quickly. At the same time, we also have the opportunity to collect and process data very easily. This allows the creation of added value – for example for service tasks, not least through data analysis in the cloud.

This is where our automation software, the Turck Automation Suite (TAS), comes into play. This tool enables us to easily incorporate and integrate all components. Ideally, each element of a conveyor line is provided with one of our I/O modules – so that data can be recorded and passed on to the higher-level control system.

The smart I/O modules also have a controller – how do local and higher-level controllers interact?
Holger Spies (Project Manager Sales): By installing one of our TBEN modules 'at every meter' of the conveyor line, we not only enable full control of the roller motors in the particular conveyor module, but we can also address everything that can be controlled locally – i.e. decentrally – via the integrated controller. I would like to emphasize that we can even process tasks with real-time requirements. The higher-level controller then does not have to perform any detailed tasks on the individual modules and only orchestrates the overall system. Besides the control tasks of the modules, data is also collected and forwarded for predictive maintenance.

Let me briefly illustrate this with an example: Supposing a package is to be ejected at station X. We then record the information locally and pass it on via our module. In other words, we identify the package and control the related ejection unit via the decentralized automation locally. This also applies if it is a real-time application. In this case, no information needs to pass through the central controller. For example, this enables the motor rollers to be controlled locally according to the respective task. The CAN-based communication protocol also allows us

to transmit additional data at the same time and run specific profiles, or conversely, read out values for temperature, current and voltage. The aim is to achieve digital consistency and thus eliminate the limitations of the usual analog interfaces. Digitalization gives us the opportunity to maintain transparency about the state of the entire system – right down to the last meter.

Does this then enable condition monitoring?
Spies: Exactly! This is because we can now determine the required current broken down for each individual motor roller, thus not only opening up the possibility of further control options but also laying the foundation for predictive maintenance. Only with this data transparency can system builders offer their customers, for example, the ability to replace specific motor rollers in advance – such as if they start to draw higher currents after a defined number of operating hours.

In summary, decentralized automation enables us to also process real-time applications locally in the field and thus offer total flexibility, from the control and scaling of conveyor lines right through to solutions for predictive maintenance.

»Our motor control module offers a decentralized automation solution that precisely meets the requirements of intralogistics – and opens up all possibilities for flexible connection to the motor, for coupling to neighboring modules and for system control.«

Frederik Nitsche | Product Manager Factory Automation Systems

What are the other features of the smart I/O modules used?
Frederik Nitsche (Product Manager Factory Automation Systems): We always build our IP67 modules for suitability in severe environmental conditions – vibration resistance is particularly important in intralogistics. In addition, we also allow a 48-volt power supply for the motor – this sounds trivial, but effectively halves the currents, which is particularly important in extensive intralogistics systems. Each Turck module can supply and control four roller motors – and thus a complete conveyor module. As already mentioned, we are of course not just limited to the roller motors in terms of control tasks but can also perform other tasks. All in all, this provides intralogistics specialists with an easy and flexible decentralized logic system that works very efficiently on the conveyor modules and also enables zero pressure accumulation conveying. This is a wonderful way to automate segments of roller conveyor systems.

Am I dependent on specific manufacturers for the motor rollers?
Nitsche: We currently support CAN-based motors from MTA, MPC and Interroll. In line with the core idea of modularization, we incorporate both the actual logic and the digital roller connection. In this way, nobody has to worry about data mapping, and you can control the speed at any time via Profinet or EtherNet/IP or, conversely, read out data for predictive maintenance.

Based on our TBEN-LL4RM-4DI-4DXP I/O module, for example, we have further developed a module for SSI SCHAEFER to create a "Conveyor Control Unit". Digital inputs and outputs for external trigger signals or actuators were an additional requirement here, in addition to the 48-volt

supply for the roller motors and 24 volts for conventional actuators, CAN communication to the motor and Profinet to the controller. Besides four conventional I/Os, four DXP ports are provided on the module, which can be used either as in- or outputs.

Hendrik Schnabel (Product Manager RFID UHF Systems): Very easy – and above all in a scalable way. Our RFID tunnel provides an RFID read point that can be very easily attached to the conveyor system. I emphasize this because the implementation of this kind of read point in surroundings of predominantly metal conveyor technology is not a straightforward task. To achieve reproducible read results, the read point must be well shielded and aligned with the conveyor belt. All this is already included in our RFID tunnel, thus offering the benefit that the user can easily add more tunnels when expanding the system – everything is already pre-assembled. RFID also plays an important role here because, with the high demands placed on identification in intralogistics, we are reaching a technological limit where the conventional barcode is no longer sufficient.

You have already mentioned the metal environment – has a solution been found for the reading of RFID tags on metal or liquids?

Schnabel: This is still fundamentally an issue – but a solution exists in the form of special metal tags, for example. For these kinds of requirements we also offer consulting services – because these cases are usually complex and require close examination. However, intralogistics today mainly involves the use of plastic containers and carriers so that the reading of tags is not a problem.

»By offering a complete turnkey RFID tunnel package that is ready for immediate use, we want to make it easy for intralogistics users to get started with RFID technology, not least through simple integration into automation technology thanks to coordinated components.«

Hendrik Schnabel | Product Manager RFID UHF Systems

Spies: As already mentioned, these modules can also be used to solve real-time control tasks, especially in conjunction with Turck's RFID system – such as our new RFID tunnel. In intralogistics, I often have tasks such as checking whether there really are five tags in a box – if there are only four, I have to be able to eject the box directly and return it. The critical factor is always giving users the ability to decide whether they want to solve these kinds of tasks locally on the relevant module or centrally – we can do both. This is a tremendous benefit, particularly for expansions and conversions.

How easy is it to integrate this kind of RFID tunnel?

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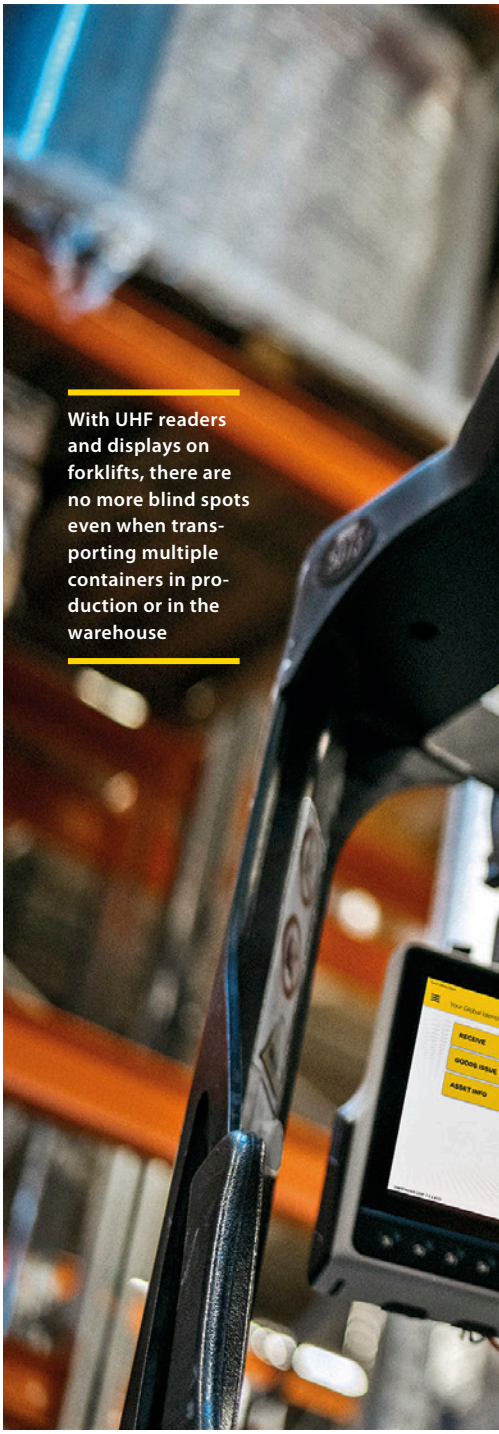
Knowing Where

RFID makes production and logistics processes highly transparent, from incoming goods to production and warehousing right through to shipping – an ideal solution also for the efficient management of returnable transport items (RTIs)



With UHF readers and displays on forklifts, there are no more blind spots even when transporting multiple containers in production or in the warehouse

Complex structures as well as considerable cost pressure present companies in the manufacturing industry and logistics with the same challenge: rapid decision making based on real-time information is becoming increasingly more important in order to stay competitive.

Today, RFID systems are the means of choice to generate decision-critical information. They bridge the gap between the physical world of production (operational technology, OT) and IT-based MES and ERP systems. By linking objects with the data of the IT systems, RFID systems generate the necessary transparency for lean processes and digitalized supply chains. The aggregated information, such as times, locations, users, or processes completed, allow smart functions such as automated production and ordering processes, the identification of error sources or the accurate forecasting of potential bottlenecks. RFID information enables your systems and decision-makers to make the right choices.

Transparency from incoming goods to shipping

RFID based information provides countless processes in production and logistics with transparency, from the incoming goods department to production and warehouse, right through to shipping. The returnable transport items (RTI) such as pallets, grid boxes, plastic boxes or metal tubs play a major role here. Returnable transport items are a key factor for ensuring the quality of production processes.

RFID-based container management ensures that returnable transport items are always present at the right location, in the correct quantity and quality, and at the right time. The costs for an RFID system are therefore paid back very quickly thanks to the enormous savings achieved since no missing containers need to be procured at short notice and made available at the place of use.

Benefits compared to barcodes

RFID offers key benefits for RTI identification compared to comparable technologies, and compared to barcodes in particular. There are thus hardly any restrictions in the use of RFID-based systems, since a suitable RFID tag is available for virtually every situation and environmental condition. Moreover, the reading of large quantities can be automated easily in an RFID-based system without any tedious and error-prone manual steps.

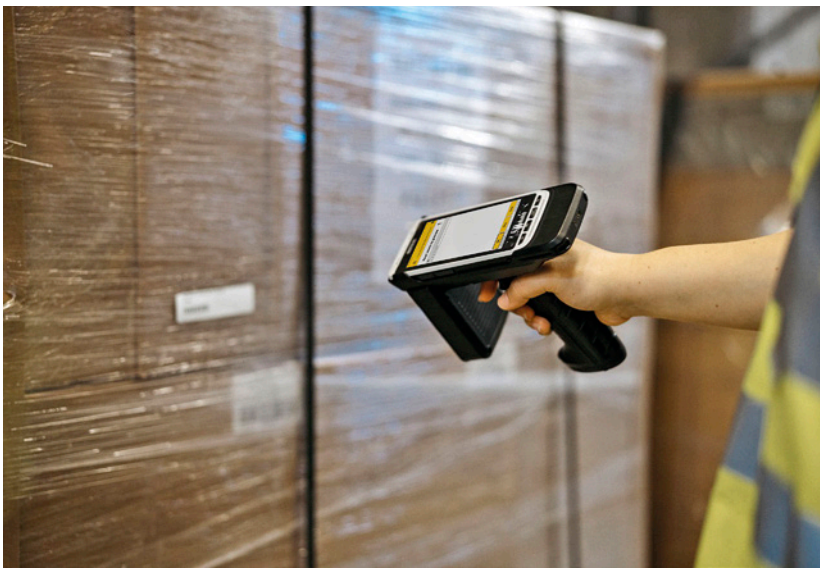
To ensure a smooth running RFID-based container management system, special management tools make

it possible to display all RTI information on a single platform. This therefore bridges the gap between the physical world of production and IT-based MES and ERP systems. By linking objects with the data of the IT systems, RFID systems generate the necessary transparency for lean processes and digitalized supply chains. This information enables both the systems and the decision makers to draw informed conclusions, thus enabling greater efficiency in RTI management and a high level of adaptability in response to seemingly unforeseeable events in the RTI circulation.

Efficient container management saves costs
It goes without saying that reusable containers must not be treated like disposable items. Only efficient pool

QUICK READ

Returnable transport items, such as pallets, grid boxes or plastic boxes are the pack horses of many production and logistics chains. However, logistics systems are not transparent if the movements and positions of RTIs are not continuously recorded. This results in excessive costs due to the buildup of spares and buffer stocks as well as expensive shipping. The use of RFID technology ensures the efficient management of an RTI pool over the entire process chain of production. An end-to-end tracking concept improves transparency and control in load carrier management and thus creates added value in production logistics, which increases pool transparency and minimizes shrinkage and loss.



RFID handheld readers are ideal for reading tags on the move and in processes that cannot be easily automated with conveyor belt, gate or forklift readers

The forklifts equipped with RFID readers allow reliable and fast identification of pallets and containers

management can turn RTIs into a powerful instrument for the creation of sustainable supply chains. Shrinkage, damage or inefficient management often lead to the necessary procurement of additional RTIs in order to prevent bottlenecks and downtimes, so that the actual total stock exceeds the optimum quantity. It is often the case that nobody knows how many RTIs are in use in the entire process chain.

It is therefore particularly important to keep the number of RTIs in circulation as low as possible in order to tie up as little capital as possible. However, a sufficient number must be kept available at the same time in order to avoid breakdowns in the supply chain. The worst case would be the standstill of the just-in-sequence or just-in-time line because of the absence or lack of reusable containers where they are required.

Tracking on the RTI

An investment as large and constantly moving as reusable containers should therefore be efficiently controlled to match supply and demand. Seamless tracking requires the unique identification of each container as well as real-time communication with all participants within the circuit.

For this, it may be useful to capture several containers at the same time. If a pallet contains several containers with RFID tags, for example, multitag reading is required, i.e. the simultaneous reading of several RFID tags. This is usually done via RFID gates, which are equipped with multiple antennas and thus reliably detect the tags without requiring direct visual contact.

Selecting the right type of reusable container is also an important task. Container sizes range from shoe boxes to pallets for larger goods. They should be reliable, sustainable and durable. However, each industry also has its own requirements for reusable containers, and so the range of variants is very large. To ensure seamless reusable container tracking, all container types must be detectable using RFID. It is therefore important that the RFID tags used can be read consistently and reliably on all base surfaces – for example, on plastic, metal and ESD (electrostatic discharge) materials, as well as on folded reusable containers.

The choice of the appropriate RFID tag is fundamental to the architecture of an RFID solution and depends on the application. If the tags selected are unsuitable for the application, not sufficiently robust or powerful, the read rate of the RFID system will be too low and the entire system may fail. The technical requirements and demands of the process in question must therefore be understood in as much detail as possible.

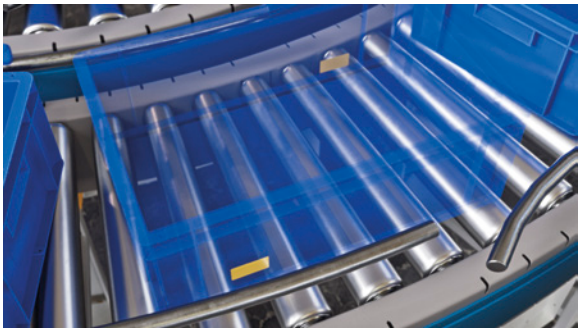
Turnkey RFID solutions

Besides the RFID tags that can be attached to or embedded in the RTI to be identified, a turnkey RFID solution typically consists of the RFID reader points and their antennas, RFID server applications for data analysis, system monitoring and maintenance, includ-

WHITEPAPER: MANAGING RTIS IN REAL-TIME

The white paper details how enormous potential savings can be achieved by using radio frequency identification (RFID) technology to manage RTI pools. It also discusses the various identification technologies that can be used to uniquely assign RTIs – and which ones are best suited for specific application scenarios.

Barcodes are a relatively inexpensive identification technology, but they are more difficult to automate – especially if several containers are to be read simultaneously



RFID tags stuck diagonally on opposite sides ensure that at least one tag is within range of a reader, resulting in consistently optimal reading results

ing an integration layer to support the most common business systems such as ERP and WMS, integration with the customer's back-end system, and an implementation plan.

Turck can cover the complete range for turnkey RFID solutions through its subsidiary Turck Vilant Systems TVS. TVS has been designing and implementing turnkey RFID system solutions including its own middleware and ERP integration for intralogistics, asset tracking and inventory management for 20 years. Coupled with Turck's many years of experience with RFID for production control, both companies offer complete solutions, which cover the entire supply and production chain – from the supplier to production right through to shipping.

Five phases to success

An RFID project with Turck Vilant Systems is divided into five phases. The first phase of the project is about developing an understanding of the customer's needs and familiarizing the customer with RFID. The starting point for customer engagement is the site survey to obtain an expert analysis of the customer's plans and processes. Based on the site survey, the expert prepares a proposal on how RFID technology can be deployed and where the ROI might be. These services are free of charge for the customer.

In the second phase, specific RFID feasibility studies will then be conducted. For customers with no experience with RFID, this starts with a proof of concept. This means that RFID equipment is tested at the customer's site to ensure that tags, readers or applications will work in the intended application.

The RFID readers are designed to read multiple RFID tags simultaneously, for example, a pallet of RTIs moves through a gate

In the third phase, everything is prepared for the rollout in a pilot project. Before it is put into operation across the board, the RFID system is tested on a production line or plant. The customer's use of the system can help uncover sources of error that may not have been previously considered.

Rollout and commissioning take place in the fourth phase. The customer installs the RFID readers, with a Turck Vilant Systems technician on site to set up the software and make sure everything works correctly. All processes are tested live and customer employees are trained, optionally in English, French, German, Swedish or Finnish.

The fifth phase is started once the system is ready for operation – the support. Continuous system operation must be guaranteed, around the clock – even during holiday periods. Turck Vilant Systems meets this customer expectation and provides worldwide service and support 24 hours a day, seven days a week.

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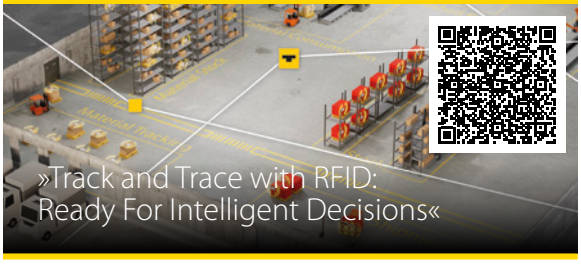


IIoT Control Center

The TAS Turck Automation Suite promises efficient device management in Ethernet automation networks – now with other cloud integration for location-independent real-time monitoring and troubleshooting

With the Turck Automation Suite, or TAS for short, Turck has developed a powerful IIoT and service platform that is increasingly establishing itself as an efficient toolbox for a host of different applications. The variety of functions goes hand in hand with a high level of user-friendliness, which makes it easier for users to manage and configure Turck devices in industrial Ethernet networks. With TAS, Turck is combining for the first time the configuration and parameterization tools of its smart sensor technology with the network management functions of its Ethernet devices centrally in a single software. The batch functions in particular speed up many operations since they can be run simultaneously for multiple network devices. This saves time, for example with firmware updates or the assignment of IP addresses. Even Codesys control programs can be managed via the network and easily loaded, saved, executed and stopped using batch processing.

Vendor-neutral support and monitoring of Profinet devices

The functionality of the IIoT and service tool increases with every update. For example, the latest release includes the Discovery and Configuration Protocol (DCP). This extends the capabilities of TAS by enabling for the first time the automatic detection and configuration of Profinet devices in a network, regardless of manufacturer, which further simplifies the setup and management of industrial automation systems. This open approach allows users to integrate a wide range of devices into their automated systems and also benefit from the advantages of the Turck Cloud.

Clear diagnostic view

The new Diagnostic View feature offers TAS users significant added value when monitoring and diagnosing faults in their systems. Specially designed for Turck devices, the Diagnostic View provides a comprehensive overview of the status of the network and displays all status messages clearly in a single view. Instead of manually checking individual devices, a single scan is all it takes to find out immediately which devices have problems. The clear display of all devices and their status messages in a single view simplifies troubleshooting considerably, especially in complex systems with many devices. With just one click, users can create a comprehensive diagnostic report that brings together in a PDF all the relevant information about a device. This report can then be sent to support for analysis and troubleshooting, further speeding up and simplifying the whole process of fault diagnosis and rectification.

Light Curtain Monitor and Radar Monitor

Similar to other monitor apps that are accessible via the TAS platform, the Light Curtain Monitor focuses specifically on the visualization and monitoring of light curtains on site at the customer's premises. It has been specially developed for the products of Turck's optical sensor partner Banner Engineering, reliably indicates blocked light beams and allows individual configuration for optimum system performance. This function allows users to monitor the status of their light curtains in real time and quickly identify potential problems. The Light Curtain Monitor offers efficient system monitoring with functions such as light curtain alignment and the option to hide or invert certain light beams, and thus makes a significant contribution to safety and efficiency.

The Turck Radar Monitor offers similar benefits: It graphically displays the measured values of the Turck radar sensors and simplifies setup with a real-time display of the signal curve – especially when setting filters to suppress interference signals or in complex mounting situations. Users can adjust filters, measuring windows and other parameters very easily to their particular application requirements.

QUICK READ

With the latest release of the TAS IIoT and service platform and the launch of TAS Cloud, the Turck Automation Suite has reached the next level. The easy-to-use toolkit for the installation, service and management of Turck devices in automation networks now also enables manufacturer-independent support and monitoring of Profinet devices thanks to new features such as the Discovery and Configuration Protocol (DCP). Profinet View allows users to recognize and configure their devices. The addition of TAS Cloud now enables continuous monitoring functions as well as cloud-based data storage and processing from any location.

TAS efficiency booster: The Turck Automation Suite becomes a comprehensive solution for device management and operation of automation solutions with TAS Cloud

Next step: TAS Cloud

TAS Cloud now complements the existing TAS desktop solution. As part of the TAS platform, TAS Cloud offers continuous monitoring functions as well as cloud-based data storage and processing. Integration with other TAS modules and tools creates a comprehensive solution for device management, commissioning and the efficient operation of automation solutions.

The functionalities of the new solution include remote access via VPN, condition monitoring and a maintenance manager. These functions enable users to parameterize, configure and monitor their systems and devices remotely, detect maintenance requirements at an early stage and minimize downtimes. With the integration of cloud technologies, users can benefit from increased flexibility and scalability, as they can access their data anywhere and anytime.

The tenant structure of the TAS Cloud forms the foundation for highly secure and efficient data management. With up to five levels, it enables the flexible organization and categorization of data according to individual user requirements. The clear hierarchy ensures clear and organized management, allowing users to structure their data in a way that best suits their business processes. The data is physically separated strictly by client, which enables granular access control so that clients can be given specific authorizations to access their data. This protects sensitive information from unauthorized access and ensures compliance with data protection and industry-specific regulations.

TAS Cloud in the corporate design of the OEM

Machine builders and other OEMs who integrate TAS Cloud into their machines can design the look of the user interfaces to match their corporate design or adapt it to the corporate design of the machine purchaser. The domain and thus the URL can also be adapted to the customer's wishes.

ARGEE and BEEP View

The ARGEE logic software turns Turck's Ethernet I/O modules into IP67 logic controllers for cabinet-free operation directly in the field (field logic controller). This enables conditions and actions to be programmed very simply without any software installation required. ARGEE will not be able to replace every PLC, but the engineering software opens up new avenues in control technology, as it can relieve local networks and higher-level controllers by executing simple logic tasks. This function is unique on the market to date. TAS allows

you to load ARGEE programs conveniently on a group of devices in a batch process and manage them centrally.

Backplane Ethernet Extension Protocol BEEP
TAS also simplifies the management of BEEP configurations. Turck's smart tool BEEP (Backplane Ethernet Extension Protocol) reduces the number of IP addresses required in industrial networks and simplifies the use of the TBEN and FEN20 multiprotocol block I/O modules. BEEP makes it possible to connect networks with up to 33 TBEN modules to the PLC via a single IP address in Profinet, Ethernet/IP and Modbus TCP networks. Through the reduction of the IP addresses, the user can quickly create high density I/O networks and also connect them with low cost controllers.

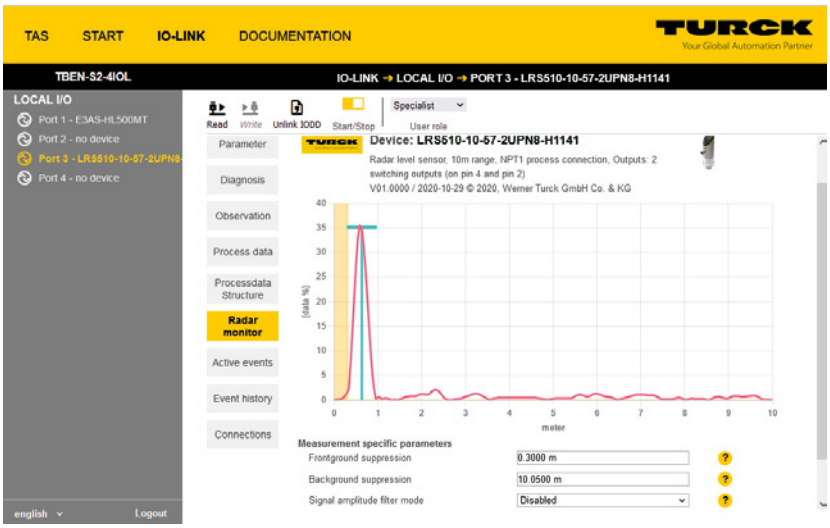
IO-Link apps: IODD Configurator and more
TAS also promises commissioning and management support for Turck's IO-Link apps such as IODD Configurator, Radar Monitor, Vibration Monitor, etc. The user can call up and execute the respective app directly in the special IO-Link View. The IODD Configurator, for example, can be used to parameterize IO-Link devices from all manufacturers. The app displays IO-Link process data in a graphical history curve, which is very helpful during setup. The user also has access to the plain text of all relevant parameters of the IO-Link devices used.

The Turck Radar Monitor offers similar benefits: It graphically displays the measured values of the Turck radar sensors and simplifies setup with a real-time display of the signal curve – especially when setting filters to suppress interference signals or in complex mounting situations. Users can adjust filters, measuring windows and other parameters very easily to their particular application requirements.

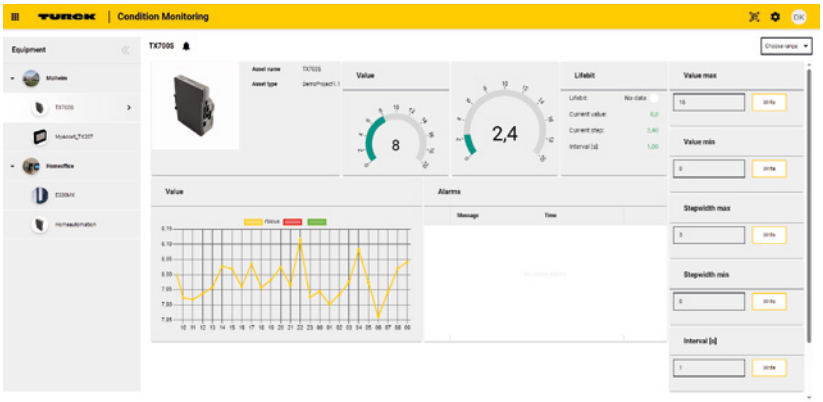
RFID apps: UHF demo tools
TAS also offers various tools for Turck's RFID devices, including three UHF demo tools. **Gate Applications** simulates bulk reading, in which several tags are read simultaneously in gate applications. The application ensures the reliable capture of all tags, saving time and effort that would normally be required for manual assessments. **Tag Trace** enables the determination of optimum start and stop times for read and write processes in moving applications. **Tag Population** measures the read and write performance at different positions of static objects. The UHF reader continuously increases its performance and displays the minimum power required to reliably detect the tag.

For HF RFID solutions, the **Tag Actions HF** function promises particularly convenient handling of RFID tags. This allows a user to test and execute various functions with an HF reader. This includes creating a list of read HF tags, reading information from the tag memory and the simple editing, reading and writing of data in a user-defined memory area of the tag.

There's more to come: TAS Edge
The future of Turck's IIoT and service platform TAS promises a seamless integration of TAS Desktop, TAS Cloud and the upcoming TAS Edge, which will be launched later this year. This innovative triad will enable users to make their industrial processes even more efficient and gain comprehensive control over their devices. TAS Edge will add powerful edge computing capabilities to the platform, enabling local processing of data for faster responsiveness. With this integration of desktop, cloud and edge functionalities, users have a powerful toolkit to actively shape the digital transformation of industrial automation. To meet the requirements of an IIoT platform, TAS will also support the transfer of data via MQTT and OPC UA to higher-level systems, automatic configuration routines for service tasks and many other features. TAS will considerably increase the connectivity of your production system and thus combine OT data and IT data without any barriers.



TAS Desktop: Radar Monitor simplifies sensor setup through the real-time visualization of the signal curve



The values on the dashboard provide important insights into the system status monitored by the TX700S

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Precision work: the radar scanner at the top of the stacker also records the height of the roller conveyor

Full Speed Ahead!

Turck's MR15-Q80 3D radar scanner ensures reliable object detection and collision avoidance – from mobile equipment to intralogistics

We usually associate radar technology either with speed checks in road traffic or with devices for flight monitoring. But since the 2000s, the technology has also been increasingly used in cars themselves. Active adaptive cruise control (ACC) systems use radar to determine the distance to cars in front and their speed. Radars have also become increasingly popular in industrial automation in recent years. Especially in level and conventional distance measurement, the advantages over ultrasonic, optical sensor or media-contacting technologies pay off in many applications.

In 2020, Turck had already presented its first radar sensors for level measurement with the LRS series, followed by the DR-M30 radar sensors for distance measurement in 2021. Both device series operate in the 120 GHz range, which is particularly beneficial in terms of range and resolution, i.e. the accuracy of the signal. Turck is now launching the MR15-Q80 radar sensor as the third member of its radar portfolio. The shape of the housing alone shows that a new device type has been added to the product range. Unlike the cylindrical devices for distances and levels, the MR15-Q80 has a flat, cuboid design. The underlying technology is also different: A 60 gigahertz antenna operates inside the robust IP69K housing. Compared to the 120 GHz frequency band, the lower frequency provides a lower resolution, but the beam angle is significantly wider. The MR15-Q80 detects objects with an opening angle of 120 degrees horizontally and 100 degrees vertically.

The sensor achieves a range of up to a remarkable 15 meters, although this maximum value can also be reduced depending on the material, angle and surface properties of the objects. However, users do not have to worry about a lack of range as the target

QUICK READ

Many radar sensors for collision avoidance are limited to detecting the distance and thus only output one dimension as a measured value. Turck's new MR15-Q80 radar scanner, on the other hand, delivers genuine 3D data and thus significantly improves the mapping of objects and spaces, giving developers and system engineers a greater degree of freedom. Thanks to its robust design, which can withstand shocks of up to 100 g, and the SAE J1939 interface, the scanner is particularly suitable for use in mobile equipment, but also for AGVs or conventional industrial trucks in intralogistics.

Turck's MR15-Q80 radar scanner is currently the only device with an SAE-J1993 interface for the CAN bus; an IO-Link version is also available

applications are primarily object detection and collision avoidance.

Collision control and object detection for mobile equipment

Turck's new radar scanner offers maximum IP69K protection against water and dust ingress and meets all requirements here in terms of robust component design for the mobile equipment sector. The M15-Q80 also stands out in terms of mechanical resistance, as it can withstand shocks and impacts of up to 100 g. This is where radar technology differs significantly from laser-based lidar technology. Lidar systems require movable mirrors to direct the laser beams into every corner of the area to be scanned. These moving mirrors are naturally susceptible to mechanical damage caused by impact and vibration.

Radars are therefore not only less sensitive to interference factors such as dust, fog or light reflections, but are also much more robust mechanically. Besides its resistance to severe shocks, the MR15-Q80 can also withstand supply voltages of 12 or 24 volts, which are used in the vehicle electrical systems of mobile equipment – the sensor can also withstand possible voltage peaks without damage. Turck is positioning the MR15-Q80 as a sensor for collision avoidance and object detection for all non-safety related tasks. It detects objects in its surroundings and – unlike comparable devices – outputs measured values for all three dimensions. For mobile equipment, the new radar scanner is currently the only device on the market that can output a three-dimensional measurement via the SAE J1993 communication protocol for the CAN bus.

Realistic space mapping thanks to 3D data

The MR15-Q80 provides distance and speed values for objects on all three spatial axes. This means that the surroundings and all the objects in them can be depicted much more precisely. Machines in particular with arms or booms at different heights receive valuable additional information about their surroundings. Thanks to the 3D information, the control system not only knows where an obstacle begins, but also where it ends and where the machine can operate with its arms. There are many other application areas where precise knowledge of the space in front of machines can be helpful, for example when recording topography and rocky outcrops in mining.

Identifying animals and objects in the field

Another application in the mobile equipment sector is the detection of animals and objects in fields. Turck's radar scanner can be mounted on the combine harvester directly on the threshing unit to monitor the field in front of it. Due to the different reflective properties of animals or objects and grain stalks, the sensor can detect foreign objects in the field that would either get damaged themselves or could damage the threshing unit. Thanks to the large opening angles of 120 degrees horizontally and 100 degrees vertically and a range of up to 15 meters, the radar scanner can reliably detect whether the field in front of the combine harvester can be harvested without any problems.

Six adjustable warning radii and three signal spaces

For these and other applications, users can define warning radii that trigger a switching signal as soon as an object is located within them. Switching signals can also be reliably triggered by certain intensity thresholds, which are important for distinguishing objects. However, the controller can also fully evaluate the IO-Link signal in order to utilize the entire information density. Up to six freely definable warning fields and three three-dimensional signal spaces can be taught and linked to one of the two switching outputs. If one of these warning fields is in the radar shadow because there is an object between the sensor and the field, the sensor also recognizes this and outputs an appropriate message.

Another possible application on mobile equipment is blind spot warning, i.e. the monitoring of areas on the machine that are difficult to see. The vehicle may be damaged if there are any objects located there. The warning radii and signal spaces are also helpful for these tasks in order to output warning signals in good time.

Collision avoidance in intralogistics

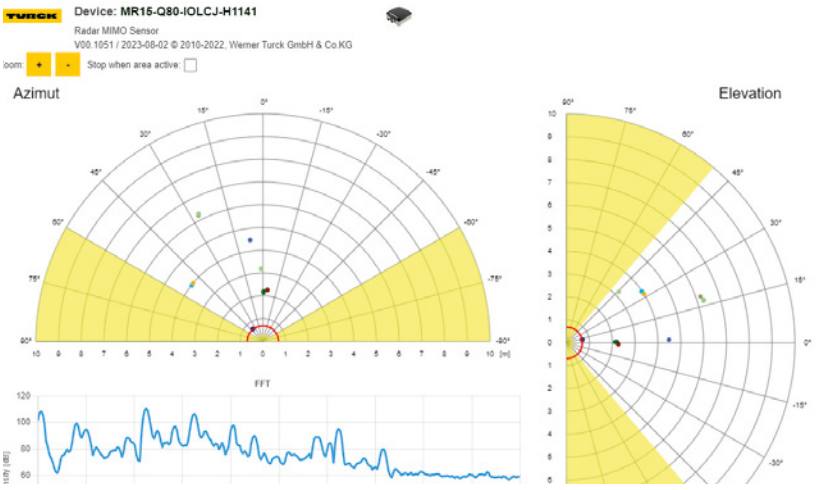
Alternative application fields are also emerging in intralogistics. Industrial trucks and automated guided vehicles (AGVs) in particular require sensor technology to navigate and avoid collisions. Lidar scanners are normally used for safety-oriented environment monitoring. However, they are only suitable for the vertical monitoring of lift paths on autonomous forklift trucks to a limited extent, as they usually detect a small vertical opening angle. Special safety radars and scanners would also be oversized and therefore too expensive for the non-safety relevant function of height control.

Height control

Turck's 3D radar scanner provides the necessary information for all three spatial dimensions and thus detects obstacles and surroundings in their entirety. This information also facilitates the precise and safe control of lifting movements. The scanned data can also be used to ensure clearance heights and prevent damage to vehicles, goods and plant elements. Camera systems are often used for these tasks, but they are more expensive and usually much more complex to set up.

Simplified commissioning and real-time visualization in TAS

The parameterization of such complex sensors, which output more than just an analog signal or one or two switching signals, is often a challenge. Turck supports users with its TAS (Turck Automation Suite) configuration and IIoT software. The toolkit makes commissioning and optimum setting of signal and intensity filters, detection angles or warning radii much easier. The software visualizes all raw data from the sensor in virtual real time in the web browser. Objects



The TAS Turck Automation Suite supports the user in parameterizing the scanner via the "Radar Monitor" app, which displays the raw signal in three graphs

are displayed as points and point clouds on two graphs, one for the vertical data and one for the horizontal detection angles.

Turck offers two variants of the 3D radar scanner: one with IO-Link and one with an SAE-J1939 interface, which is primarily used for mobile equipment. Besides the interface for the 3D data, both devices have two classic switching outputs that can be triggered by different threshold values.

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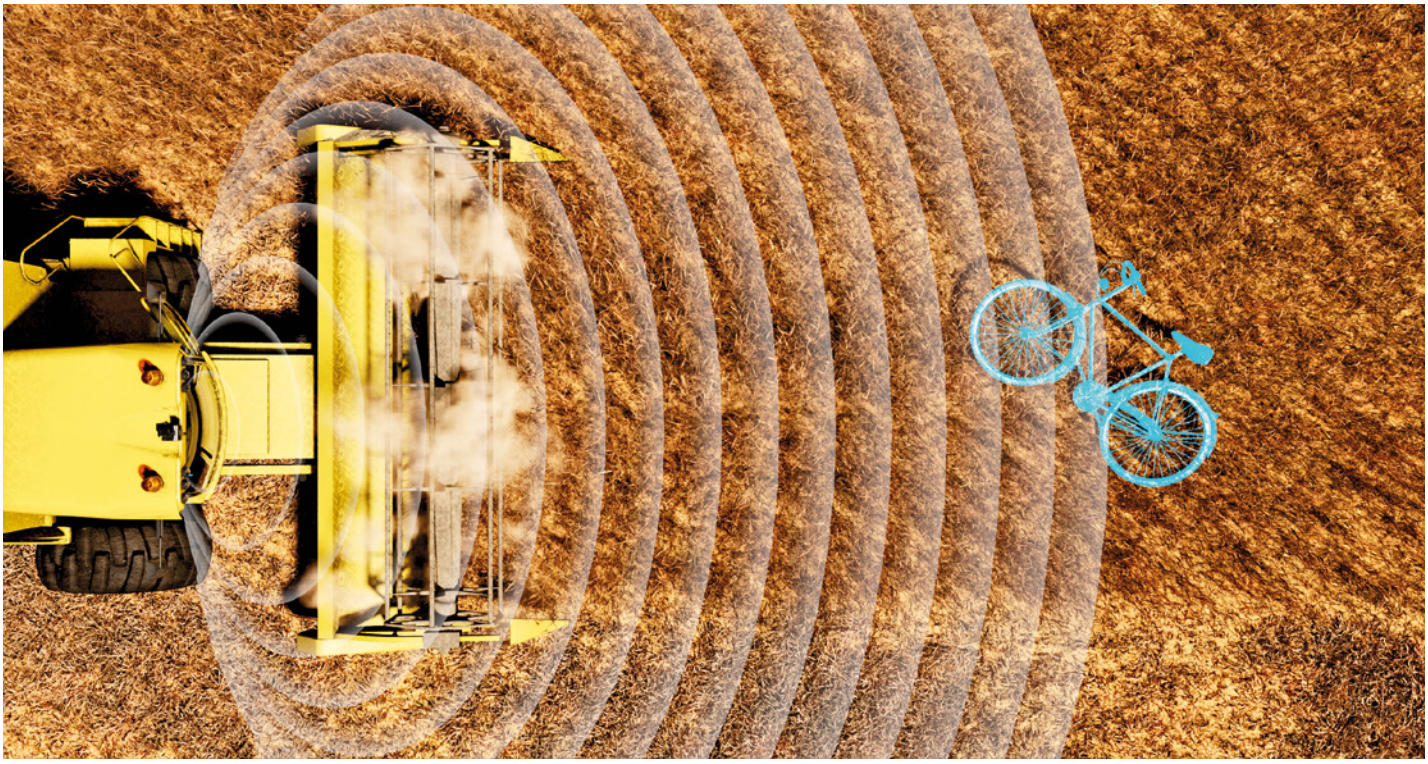
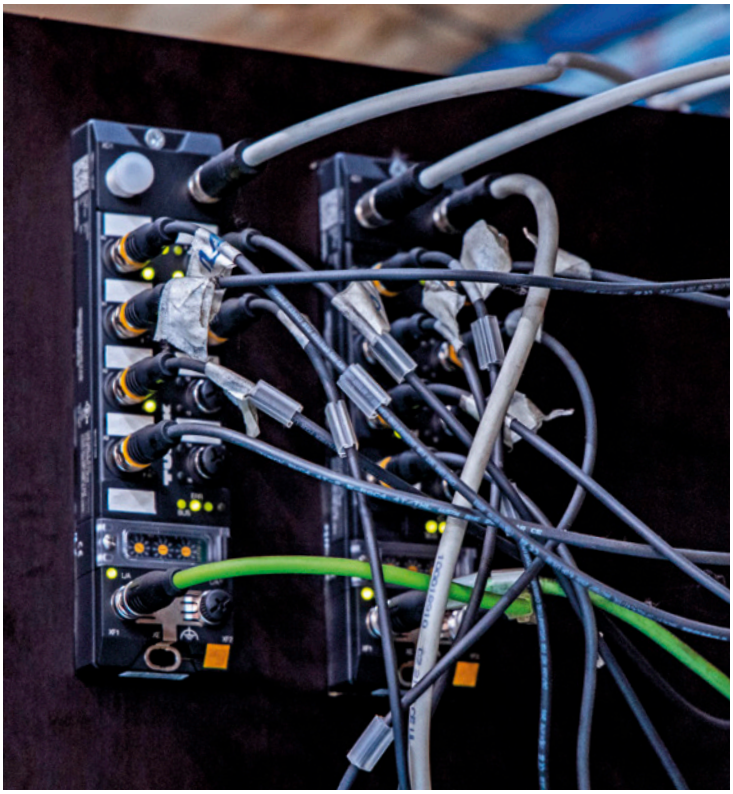
Foreign objects in the field can be detected better by radar than by alternative technologies



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

Fit for Purpose

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



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

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

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

Robust solution for dusty environments

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

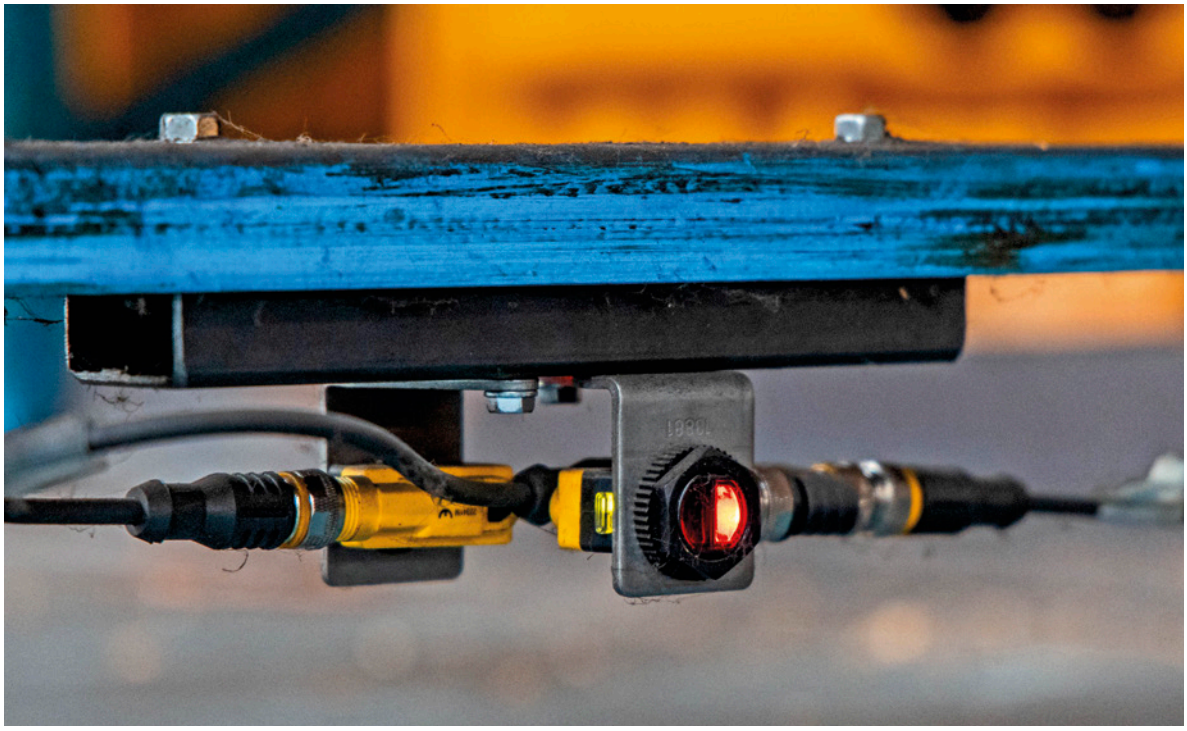
"Our aim was an automated logistics solution that would enable just-in-time delivery of parts to the machines in the neighboring production plant," says Mathieu van Den Berghe, transformation manager at Proferro when describing the task. "A fully automated high-bay warehouse ensures that the required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

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

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

QUICK READ

As one of the leading specialists for high-precision metal castings, Proferro supplies OEM manufacturers worldwide in various market segments, such as agricultural machinery, earth moving equipment, compressors, textile machinery or mechanical engineering in general. To optimize ergonomics and safety for employees and make production and logistics processes more efficient, the Belgian company has introduced a fleet of automated guided vehicles (AGVs). Turck Multiprox developed a sensor-based complete solution for autonomous and reliable round-the-clock control of the AGVs.

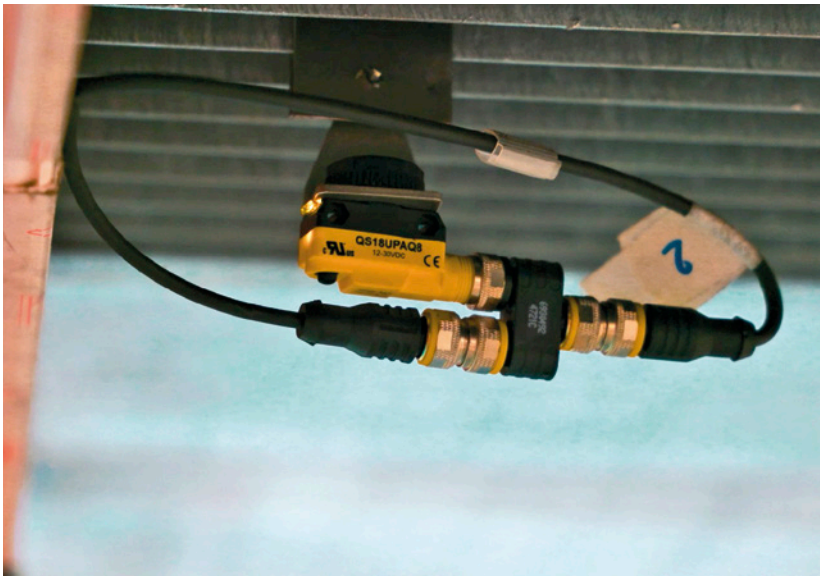


The QS18 photo-electric sensors react reliably to the light reflected by the object

be particularly effective, as this prevented the accumulation of dust deposits. Light barriers and lasers were also used to detect pallets on the shelf.

Real-time transmission and flexibility thanks to multiprotocol

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



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

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

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

Robust network infrastructure and efficient data transmission

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

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

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

Mathieu van Den Berghe | Proferro

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

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

Autonomous AGV control round the clock

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

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

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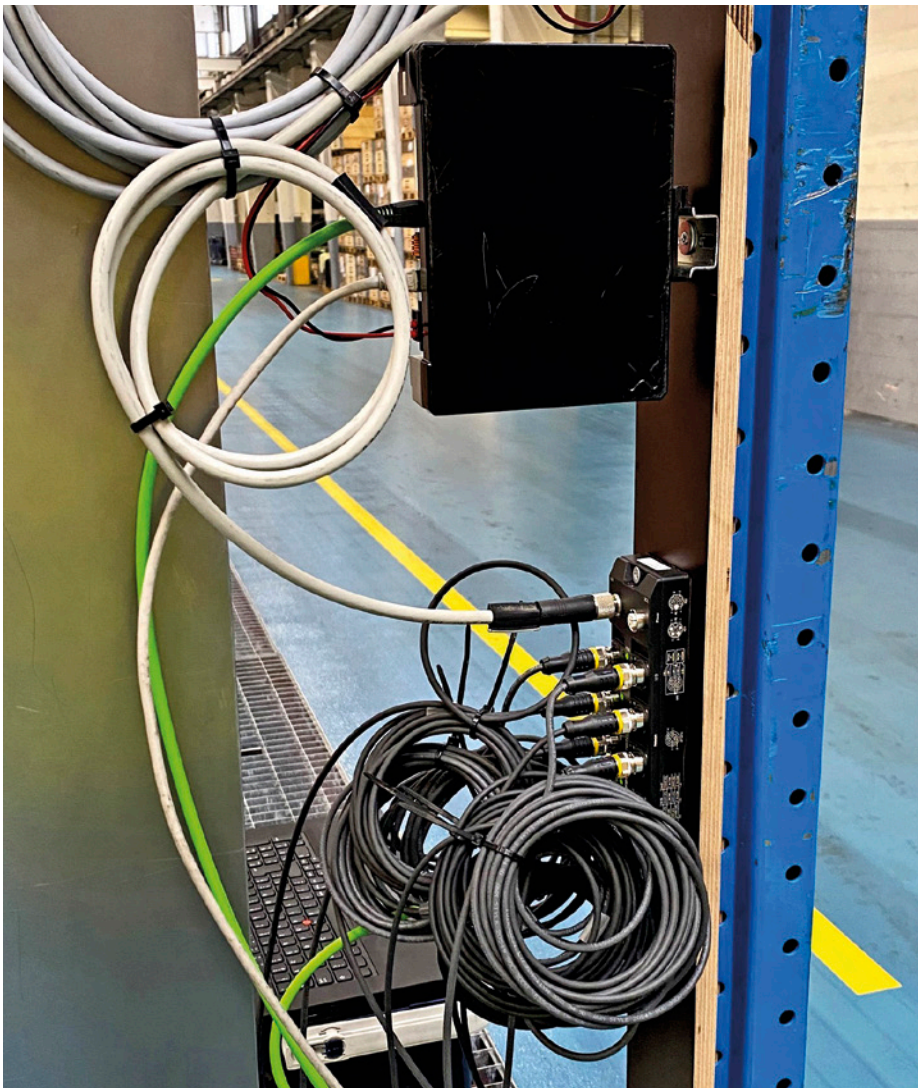

The TX7000Q IIoT gateway not only acts as an interface between the sensors and the higher-level system, but also as a PLC

»By using this RFID solution, we can intentionally allow a certain amount of chaos at this point to enable efficient work. As soon as a pallet leaves the area, the pallet and its destination are automatically recognized.«

Phillip Hannesen | KEB Automation

Autopilot

KEB Automation is expanding its automated driverless transport system with RFID technology into a fully automated and fail-safe material logistics solution

Efficient material logistics requires much more than simply managing material flows related to production. The primary objective is to optimize processes, reduce costs and ensure smooth operations. Transparency plays a crucial role in managing and controlling transport movements efficiently and flexibly. This calls for a solution that seamlessly combines as many aspects of material logistics as possible. The flows of information accompanying material must be ensured to achieve the maximum possible productivity and efficiency and prevent bottlenecks. KEB Automation faced this challenge with the intralogistics in the electronics plant.

QUICK READ

To optimize material logistics for assembly, drive and automation technology, specialist KEB Automation relies on RFID technology on conveyor lines and driverless transport systems. Turck's RFID solution supports the automation of logistics processes and enables full transparency in the material flow of frequency inverter production – without any time-consuming manual effort. The solution also helps to optimize the use of resources and the efficient utilization of warehouse capacity by ensuring fast and reliable assignment to destinations through automated pallet tracking.

As specialists for drive and control technology, KEB Automation develops, produces and sells drives as well as engines, gearboxes, brakes, clutches and IIoT solutions worldwide. At the production plant in Barntrup, the company wanted to automate all non-value-added warehouse processes as much as possible. The specific occasion to do this came with the move into a new production hall, in which it was possible to carry out detailed planning right down to the production areas. From the start, the aim was to replace the use of forklifts in the production area with a driverless transport system.

Warehouse control and pallet tracking using RFID technology

"We wanted to fully automate the identification and tracking of all pallets on the routes in the production area using RFID tags," Viktor Derksen, head of industrial engineering at KEB, describes the main requirement of the application. The labels have a unique handling unit number (HU), which gives the load carriers their identity in SAP EWM. The additional labeling of the number as a barcode and plain text makes who identified a pallet, and where and how it was identified unimportant. A transport order always therefore refers to an HU, also between cross-system warehouse locations, whether executed by the DTS or by conventional industrial trucks. The information exchange between

After the transport order is generated, the DTS picks up the pallet at the warehouse location

the different systems and SAP is coordinated via middleware. At the automated warehouse, the picked pallets are prepared for the DTS using a conveyor system. From this start point, the pallets are transported to all electronics production halls. The route includes several individual sections and intermediate buffers, depending on the destination. The individual transport orders are carried out not only by the DTS, but also by manually operated industrial trucks and stationary materials handling equipment. In this mixed operation of different intralogistics systems, the accurate tracking of pallets and precise control of their movements present challenges that RFID technology is designed to overcome.

Optical ID solution unsuitable

The DTS always requires instructions or position information to determine the route. "For a simple pallet transport from one workstation to another, this is quite straightforward," explains Phillip Hannesen, digital transformation manager for production at KEB in Barntrup. "It becomes problematic in zones in which multiple pallets are temporarily stored to be picked up later by another vehicle and taken to another location. When there is a mixing of load carriers, consistent HU-to-location assignment is no longer assured, so vehicles must always be able to identify the loaded pallet."

In order to ensure reliable identification of the load, the possibility to do this is important regardless of the orientation and positioning of the pallet. Turck's UHF RFID technology provides a solution for all installation situations of the application and achieves a read rate of almost 100 percent. The versatility and flexibility of the system is demonstrated by a look at the various use cases at KEB.

Pallet identification at the transfer point

The presence of the pallets at defined storage locations is checked at a transfer point for forklifts and DTS. The Q5X laser distance sensor from Turck's optical partner Banner Engineering is used for this. 20 Q5X sensors with a range of 5 meters are used to detect 20 pallets. The Q5X sensors, mounted at a height of 3 meters, determine whether there are pallets at the transfer point that can be transported. As soon as the distance sensor has detected the presence of a pallet, a transport order is generated for the DTS. This picks up the pallet, passes through the RFID gate and finally receives the HU information from SAP EWM.

The system checks whether the destination may already be occupied before a transport order is generated. Before Q5X sensors were used, the DTS first had to move to the destination to determine this. In this case, the DTS waited in front of the blocked storage location until an employee cleared it. Today,

the vehicle receives information in advance about whether the destination is occupied and only starts the journey if it is free – this prevents empty runs and wait times and ultimately improves performance.

A sensor initiates standardized communication between the controller and DTS by sending a 24-volt signal to the controller when it detects the transport system. The PLC in turn transmits the information to the DTS via the TCP/IP network.

Pallet identification at full speed

External antennas are mounted on each side of a hall door and connected to the UHF RFID reader. The external antennas ensure reliable detection of the RFID labels on the pallets, regardless of the orientation of the respective pallet on the DTS. As the DTS approaches the door, it sends a signal to the Q300 via the network to start the recording.

A store order, i.e. the order to transport the load carrier from A to B, is present in SAP EWM for the HU that the Q300 detects. Once the DTS has passed the gate, it sends a request to the middleware. This retrieves the pallet information from the antenna and then asks the SAP system for the destination of the pallet. The data captured is then transferred to the DTS.

Efficient identification even in the near field

Two production halls are connected via a bridge with stationary pallet conveyor technology, which was also equipped with RFID technology. Unlike the application at the hall door, where RFID labels have to be detected over long distances, the challenge in this application is to only read RFID labels in the immediate vicinity, i.e. at a distance of up to about 10 cm. This is achieved with near-field antennas positioned to the left and right of the pallet conveyor. These near-field antennas only detect the RFID label of the pallet that is directly in front of them.

At the transfer points, the conveyor system communicates with the DTS to ensure a smooth transfer process. When the pallet is placed, the DTS sends a request to the middleware to identify the pallet via the near-field antennas of the Q300 reader. This information is returned to the middleware, which determines the warehouse tasks for this pallet from the SAP EWM data. After the pallet has been placed at the transfer point, the conveyor system transports the pallet to the next hall, where it is again detected using RFID.

Full transparency

The RFID solution offers KEB the key advantage of end-to-end transparency. The location of a pallet can be seen at any time – whether it is still on the conveyor system, has been picked up by the industrial truck or has already arrived at its destination. In some situations, it is possible to automate the acknowledgment of EWM warehouse tasks using RFID. This is supplemented by the manual operation of mobile devices. "Turck's solution gives us the transparency we wanted without any time-consuming manual effort," Derksen said. "The capture of the RFID tags is fully automated, allowing warehouse tasks from the SAP Extended Warehouse Management system to be completed or processed at the same time."

Agile warehouse management allows controlled chaos

Another benefit of the RFID solution is that it allows mixed traffic in the production hall. This means that both DTS and employees with lift trucks or forklifts could load and unload simultaneously in the staging area. Separate storage space management is not required, as each pallet can be identified at each fork. "By using this RFID solution, we can intentionally allow a certain amount of chaos at this point to enable efficient work. As soon as a pallet leaves the area,

External RFID near-field antennas on the conveyor system only detect the pallet directly in front of them

»Turck's solution gives us the transparency we wanted without any time-consuming manual effort. The capture of the RFID tags is fully automated, allowing warehouse tasks from the SAP Extended Warehouse Management system to be completed or processed at the same time.«

Viktor Derksen | KEB Automation

the pallet and its destination are automatically recognized," explains Hannesen, who also emphasizes the good cooperation with Turck: "Turck's service and short communication channels enable efficient cooperation, and we are happy to rely on this trusting and well-established partnership."

Outlook

The successful use of the DTS with Turck's RFID technology has led to the planning of further expansions. Waste disposal was also successfully integrated into the system: Containers in which used cardboard is collected are picked up by the DTS. It is planned for these containers to be transferred directly to a new waste compactor, which would mean fully automated disposal.

The laser distance sensors will also be equipped with Turck IO-Link modules in the future, which will independently perform control tasks through the use of Turck's ARGEE logic software. This includes, for example, the acquisition and evaluation of sensor values. They will also autonomously and efficiently manage the required communication with middleware or DTS, resulting in an extremely lean overall solution.

The Q5X laser distance sensors mounted at a height of three meters determine whether pallets are present at the transfer point

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After the transport order is generated, the DTS picks up the pallet at the warehouse location

Building Block Boom - Full Modularity Along the Line

Smart Automation developed a modular production line with decentralized control for an automotive supplier – using a wide range of products from the Turck portfolio – from sensors to multiprotocol I/O modules, pre-assembled connection technology, LED lights right through to RFID

Modern production plants for industry require increasingly more flexible solutions. Whether it's changing production volumes, dynamic demands placed on the shape and size of the parts to be produced, and the need for rapid changeovers for new products, manufacturers in many industries are faced with the task of efficiently mastering the new challenges. The challenges are also causing machine builders to rethink their approach. Hierarchically structured machines with a central control system had been state of the art for a long time. Today, many requirements can usually be implemented much more efficiently with modular machine and system concepts, which make it possible to decentralize the control of individual modules.

Polish system integrator Smart Automation is a specialist in the automation of industrial processes and has many years of experience in various industries, including the furniture, food, chemical, pharmaceutical or automotive sectors. The company, headquartered in Olsztyn, Poland, relies on innovative approaches for its customer-specific solutions based on Industry 4.0 technologies. Smart Automation developed a production line for valve covers for a tier 1 automotive supplier, based on modular machines and decentralized control. This modular concept enables more flexible and efficient production, allowing a faster response to changing market conditions and customer needs.

Modularity on multiple levels

The development of the modular production line was a particular challenge, because of the customer's need for flexibility on the one hand and its size on the other. Never before had Smart Automation designed and implemented a production line on such a scale. The

The supplier's extensive production line has a modular design and can therefore be flexibly adapted to future requirements

QUICK READ

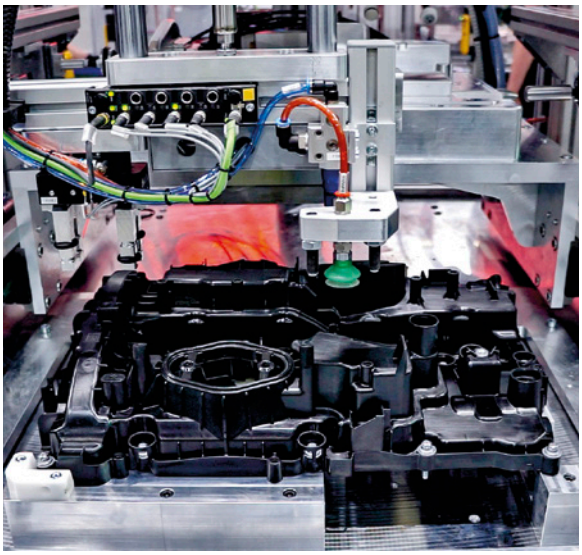
Polish system integrators Smart Automation developed and implemented a new production line for valve covers for a tier-1 automotive supplier. The modular concept of the production line and the decentralized control was able to meet all the customer's requirements. Components from the Turck portfolio, which boasted a host of features including Ethernet multiprotocol functionality and the ARGEE decentralized onboard logic, provided the flexibility and reliability of the dynamic line.

»Turck's extensive portfolio enabled easy handling of a wide variety of signals, from standard digital and analog signals to RFID, which have been used for both operator logging and process tracking. By working with Turck, we were able to achieve a high level of modularity along the entire line.«

Cezary Zakrzewski | Smart Automation

line combines modules for numerous tasks, including the UV laser printing of data matrix codes for traceability, induction heating, assembly and measurement of aluminum inserts, and robot-based deionization and surface cleaning for rubber sealing. Numerous measurements and leak tests also had to be carried out, from diameter and roundness to leakage, flow and pressure drop tests. Each workstation consists of three submodules for transport, process and construction. With the modular structure of the workstations, Smart Automation was able to achieve standardization at the design, assembly and programming levels, which

The RFID read/write devices in the line record all goods carriers and thus allow seamless process documentation



Turck's Ethernet multiprotocol I/O modules ensure efficient data communication along the plant

greatly simplifies any changes that may be necessary later in the life cycle of the machine. To implement this highly flexible line, the system integrator chose Turck as its automation partner. "Turck was already involved in the concept phase of the project," recalls Cezary Zakrzewski, sales manager at Smart Automation. "This helped us to discuss the optimal solution together with the customer and facilitated the subsequent phases of project preparation."

Future-proof thanks to standardized device integration

A key requirement for the production line was the use of different Ethernet protocols. With their Ethernet multiprotocol functionality, Turck's BL67 and TBEN series I/O modules were therefore the ideal solution for this project. They combine the three Ethernet protocols Modbus TCP, Ethernet/IP and Profinet in a single device and can be run automatically in any of the three networks. This enabled the number of device variants required to be effectively reduced. The identical planning of machine and plant sections with different Ethernet protocols also allows standardization in the integration of devices with different communication standards. A future reconfiguration of the plant can therefore be implemented without any major effort.

The Turck I/O modules used in the line also support the decentralized control approach with their ARGEE onboard logic. This field logic controller functionality can handle small to medium control tasks without placing any burden on the central controller. This means that when I/O modules are changed or replaced, the program in the central controller does not need to be adapted and the individual modules can be tested independently beforehand. They therefore provide considerable support for the modular machine design principle, as Zakrzewski confirms: "By working with Turck, we were able to achieve a high level of modularity for the entire production line. As a result, we are able to easily redesign the process as needed."

Flexible process monitoring with RFID

To fully monitor the manufacturing process, Smart Automation has implemented an RFID-based tracking system in which Turck's TBEN-S module and HF read/write devices play a central role. All parameters and measured values of the manufacturing process are recorded for each individual part and stored in a database on a server and in the cloud. This solution makes it possible to flexibly design the manufacturing process, for example by skipping individual steps or reworking certain elements at any time.

Factor 1 sensors with maximum switching distance for all metals

The company chose Turck's uprox series for the inductive sensors required. As factor 1 sensors, the uprox devices detect all metals reliably and with the same switching distance, thus standardizing sensor selection – another benefit in machine design. The uniform use of these sensors enables an easier integration into the plant, since differences in distance and target material do not have to be taken into account. Installation and maintenance are also less complex. This makes the production of the plant more efficient.

Production in view with LED technology

In such a large project, it is very important to display the current status at the various production stages. The company chose the WLS27 programmable LED strip

WLS27 LED line lights display the respective status of a module by color

With their compact design, the TBEN RFID interfaces can be easily mounted almost anywhere

lights from Turck's optical sensor partner Banner Engineering to indicate the status of the machine in each module using different colors. K50 illuminated touch buttons were used for intuitive communication with the user.

Fast and error-proof: pre-assembled cables

Another challenge with the complexity of this line was the connection technology. But Smart Automation has also found a solution for this in Turck's extensive connectivity portfolio. Pre-assembled cables of various lengths were selected during the planning phase and passive hubs were used where necessary. This not only enabled connection errors to be ruled out from the start but made it possible to significantly accelerate assembly and commissioning of the individual modules.

Conclusion

The combination of modular machine building and decentralized control offers multiple benefits with regard to the increasing production requirements in the automotive industry. Thanks to the solutions used, it was possible to reduce the number of operators and the amount of cabling, as well as the time required for the installation work. This would not have been possible with classic centralized control technology. The modular concept also increases system availability, as only one module needs to be replaced if it fails. Ultimately, the modular design offers easy expansion options for the plant to also meet future requirements. This increases flexibility and ensures long-term cost efficiency. "It was very important to us that manual operations could be easily automated if the customer requested it at a later date," Zakrzewski said. "Turck's extensive portfolio enables easy handling of a wide variety of signals, from standard digital and analog signals to RFID, which have been used for both operator logging and process tracking. By working with Turck, we were able to achieve a high level of modularity along the entire line."

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Parking Lot Organizer

Frozen food specialist Ardo optimizes loading traffic and safety on the company premises with Turck's multiprotocol I/O module and programmable LED lights

Ardo Foods NV, headquartered in Ardooie, Belgium, produces frozen vegetables, herbs and fruit. With 17 sites in eight countries, the family-run company supplies its customers in the retail, food service and industrial sectors with high-quality frozen food via a global distribution network. At the site in Koolskamp, Belgium, peas, beans, root vegetables, spinach and other vegetables are washed, blanched, frozen, packaged and stored. A newly designed truck and employee parking lot between the access road to the company premises and the loading ramps presented the company with major challenges, as transport vehicles were continually driving in and out. This situation in a limited maneuvering area presents several risks such as collisions, obstructed access and delays, which could endanger not only smooth operations but also the safety of people.

There was therefore a need for arriving truck drivers to know in good time whether the site is already full and how long they will have to wait before they can

The limited maneuvering space in the Ardo truck parking area requires smart access control

The WLS27 LED strip is waterproof and clearly visible even in daylight, making it perfect for outdoor use

enter. With drivers coming from different countries and often unable to communicate with each other or with the staff on site, the system had to be language-neutral. "We realized that there might be problems with the traffic between the loading ramp and the truck parking area," says Bart Nollet from Ardo's engineering department, describing the initial situation. "That's why it was important to ensure that long-distance drivers are warned of any bottlenecks and know that they have to wait at the barrier, regardless of their spoken language." A system to regulate the number of trucks in the loading area, including a waiting time display, was required to solve these problems.

Control, visualization and programming from a single source

"The Turck Multiprox team suggested using an LED strip light that counts down the time while the driver waits," says Nollet. "Besides the hardware, the team also took care of the programming, which helped us a lot." At the heart of the traffic control system is the compact TBEN-S2-4IOL multiprotocol I/O module for Ethernet with four IO-Link master channels. One of its key strengths is its flexibility with regard to the wide range of communication protocols such as Profinet, EtherNet/IP and Modbus-TCP, which enables easy

QUICK READ

As one of the leading frozen food manufacturers, Ardo operates 17 production sites in eight countries across Europe and supplies its markets with frozen vegetables, herbs and fruit. The company designed a new loading area in Koolskamp, Belgium, in order to prevent dangerous situations despite the constant arrival and departure of transport vehicles. Turck Multiprox developed a system for efficient truck navigation and access control in the limited maneuvering area.

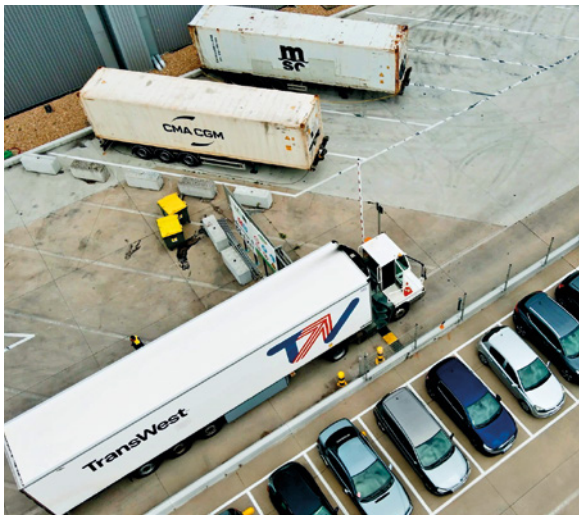
»We are very pleased with the solution. Barely two months after we had discussed the problem, the solution was ready for use thanks to the system engineers from Turck Multiprox. The fact that not a single dangerous situation has arisen proves that the system works perfectly.«

Bart Nollet | Ardo

integration into the existing infrastructure and ensures communication with IO-Link system components. The module enables fast processing of data streams and thus precise and in-time control of the traffic flow. The control functions of the TBEN-S2-4IOL are programmed via the browser-based ARGEE logic software, which enables easy adaptation and expansion of the system and rapid implementation of the Turck solution.

Improved driver guidance thanks to programmable WLS27 LED lights

The programmable WLS27 LED light from Turck's optical sensor partner Banner Engineering displays the estimated waiting time. The LED strip shines very brightly and is clearly visible even in daylight. The numerous colors and light modes can be parameterized via IO-Link. This allows the WLS27 to display a wide range of information clearly and intuitively.



Since the system was installed, there have been no more problems with international drivers or dangerous situations

The light points on the WLS27 LED strip visualize a timer that counts down the driver's waiting time

The TBEN-S2-4IOL multiprotocol I/O module is the heart of the traffic control system

Thanks to its unbreakable, waterproof and UV-resistant copolyester casing with IP69K protection, it is perfect for outdoor use. At the barrier, it uses different colors and flashing patterns to show truck drivers when they can enter, regardless of their spoken language. The clear visual signal prevents collisions and ensures a smooth flow of traffic while improving safety for people, vehicles and infrastructure.

Flexibility and control intelligence through ARGEE programming environment

The web-based ARGEE programming environment is important for straightforward programming of the TBEN-S2-4IOL module. It adds logic functions to the multiprotocol I/O module to create a field logic controller that can be configured without complicated software installations and programming languages. This makes it possible to adapt the LED display to the requirements of the traffic control system. One example of this is the programming of a dynamic timer that adjusts itself to the remaining waiting time. The timer regulates the speed at which the red LEDs are dimmed depending on the remaining waiting time.

Connection with the local parking guidance system

By communicating with the local Ardo parking guidance system, the TBEN-S2-4IOL receives real-time information about the occupancy of the loading ramps and the status of the barrier. This data on parking space occupancy enables the traffic control system to precisely control the WLS27 LED lights. Today, Turck's TBEN I/O module continuously records data on parking space availability and barrier status in order to indicate to the drivers of arriving trucks via light signals when they may enter or how long they have to wait. The opening of the barrier is also coordinated according to the availability of parking spaces. The simple integration of the local parking guidance system was a decisive factor in the overall efficiency of the new solution, which now makes delivery traffic at Ardo in Koolskamp much safer and more efficient.

"We are very satisfied with the Turck Multiprox solution," Bart Nollet sums up. "Barely two months after we discussed the problem, the solution was ready for use thanks to the system engineers from Turck Multiprox. The fact that we have not heard a single comment from a foreign driver since then and not a single dangerous situation has arisen proves that the system works perfectly."

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Get Rolling

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

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

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

Digitalization of conveyor technology

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

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

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

Christian Steiner | SSI SCHÄFER

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

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

No perfect I/O solution on the market

SSI SCHAEFER searched the market for systems that could offer a data connection to the motor rollers with a CAN interface, the required 48 volt power supply and Profinet communication for controlling the systems. The devices were required to have a robust design with protection to IP67 for direct installation on the conveyor belts. The perfect solution for this was not available on the market: "Although it was possible to also buy CAN bus controllers on the market, we wanted an SSI SCHAEFER solution that was really tailored to our needs," says Christian Steiner. After initial contact with Turck at the SPS automation trade fair in Nuremberg, the automation specialist checked whether it was possible to modify its own I/O solutions to meet SSI SCHAEFER's requirements. Long story short – it was.

CCU module saves on separate I/O modules

The TBEN-LL-4RM-4DI-4DXP I/O module for controlling CAN roller motors, which was then further developed by Turck, is known at SSI SCHAEFER as the Conveyor Control Unit or CCU for short. Digital inputs and outputs for external trigger signals or actuators were also required in addition to the 48-volt power supply for the roller motors, 24 volts for conventional actuators, CAN communication to the motor and Profinet communication to the PLC. Besides four conventional I/Os, four DXP ports are provided on the module, which can be used either as inputs or outputs. "The module now enables us to collect more sensor data, or to be more precise, double the number of I/Os compared to the previous module. We previously had to use additional I/O modules from other manufacturers to collect the signals from the sensors," Hansjörg Lerchster explains the benefit of the new CCU. "We can now combine all this together. Bus communication also makes the solution plug-and-play compatible."

Automatic address assignment simplifies commissioning

There are also benefits gained from the easier installation and commissioning of the CCU modules. "Addresses are now assigned automatically. We have received very good feedback from the plants under construction. The CCU module is easy to install and the error handling is also very good. It directly displays which motor roller is not working. That wasn't possible with the old technology," says Steiner, describing the feedback from his colleagues.

The new motor rollers have been gradually introduced since 2021. SSI SCHAEFER produces over 100 kilometers of conveyor technology every year. The motor rollers are integrated into various product groups, from straight conveyor belts to curves and

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

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Hansjörg Lerchster | SSI SCHÄFER

inclined rollers right through to complex alignment conveyors. Due to the extensive conversions and adjustments required in the design drawings, this type of transition does not happen overnight.

Future security and modular

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

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

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

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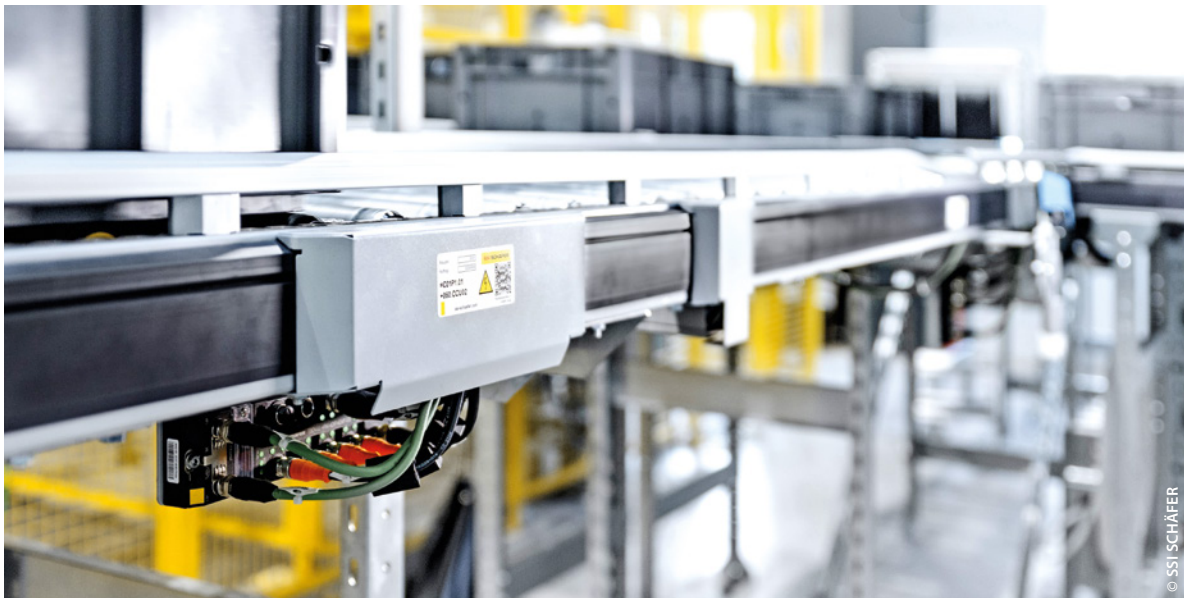

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With the decentralized CCU module, SSI SCHAEFER conveyor lines can be set up, tested and operated much more efficiently and are easier to install – including the option of predictive maintenance

To the Point.

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

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

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

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

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

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

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

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

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

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

Decentralized control modules significantly reduce data traffic and also enable directly on the conveyor system or the TBEN-L-PLC IP67 PLC for autonomous control directly on the module are increasingly being used in intralogistics systems. A further IP67 module, which was developed specifically for controlling roller motors, is another important component for making conveyor systems more flexible and modular.

»The ISC CAM solves many of the problems that classical automation structure raised.«

Lazlo Kleczewski | Intralox

Creative Conveying

EV battery manufacturers require easily scalable conveyor solutions – for smart control of the variable systems, Intralox developed the decentralized logic module ISC CAM with robust Turck block I/Os

E-mobility is currently shaking the global automotive market. Car manufacturers aren't alone in feeling impact of the increasing demand for alternative drive concepts, of which battery-powered electric vehicles are currently the most important. The whole supplier structure is challenged to meet changing demands. First and foremost the production of lithium ion batteries needs to keep up with the pace set by demand for electric vehicles. "We have customers that need to scale their operations very aggressively in order to meet the demands that the electric vehicle makers are going to need," says Martina Costa, Business Development Analyst for the Automotive Team at Intralox in Amsterdam, a company specialized in conveyance and material handling technology for numerous industries. "Battery manufacturers won't be able to do that just by building new greenfield plants. They will need to increase the throughput of their existing facilities."

The EV battery conveying solution: scalable, flexible, and pallet-free

Besides the increasing demand for scalability Intralox identified two other criteria that would separate the wheat from the chaff when battery producers look for the conveying solution to be installed in their next battery production plant: First and foremost is flexibility since the number of different types of batteries will increase dramatically over the next five years. Plants need to be able to handle a large number of different types on the same intralogistics system. The equipment transporting the batteries through the production line needs to be able to handle a variety of weights, dimensions, and other differing properties. The third demand that Costa identifies is that manufacturers will need a solution without pallets and workpiece carriers, which increase complexity and the cost of the production line as the pallets need to be collected, returned, and checked continuously. Manipulating batteries directly on the conveyance surface reduces investment cost and time to market.

Intralox: conveying innovations

Intralox happens to be an inventor's company in the most literal sense, holding more than 1400 patents in force around the world. With an inventor as its founder, the focus has always been on developing new solutions where the patents add value. This is one reason for Intralox's concentration on technologies like their modular plastic belting for special purposes such as hygienic belts for carrying unpacked food. Their solutions are part of the logistics infrastructure of market leaders in almost any industry.

An example of this inventive spirit is the Intralox Activated Roller Belt (ARB) technology that the company pioneered 15 years ago. With conventional roller

With its demo loop in Shanghai, Intralox demonstrates that decentralized automation solves many problems of equipment manufacturers when integrating automation of their products into bigger systems

conveyors, so-called pop-up belts are used to separate goods or to move them perpendicular to the conveying direction. Those belts pop up between the rollers and are separately motorized to allow for lateral movement of the goods. One downside of this technology is belts in between the rollers do not offer support throughout the whole surface of the product and therefore limit the size of the items being conveyed.

Intralox's ARB technology solves this problem by using a belt in which small rollers are embedded at a certain angle to the direction of belt travel. Especially when high throughput and very sensitive handling and separation is needed, ARB equipment and especially DARB equipment can be a problem solver. DARB stands for a special version of ARB – the Dual-Stacked Angled Roller Belt – which is able to move items up to 90 degrees perpendicular to the line travel.

The DARB technology perfectly complies with the three critical demands for EV battery production logistics stated above: scalability, flexibly and ability to handle batteries directly without pallets. It improves scalability as it is able to increase the throughput of battery lines significantly compared to conventional pop-up belt conveyors by eliminating stop and start times before perpendicular movements. It is also more flexible as full width support removes most restrictions on item dimensions. The only limit set is the dimension of the belt itself. Smaller parts cannot fall in between rollers like with standard roller conveyors. Finally, DARB equipment eliminate the need for pallets since they support the EV battery over the whole baseplate.

Problem: Central PLC solutions poorly scalable

Some lithium-ion battery manufacturers are already benefiting from the capabilities of DARB equipment in their production, as Martina Costa explains. But the company identified more room for improvement when looking for the optimal conveyor for the growing

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Machine builders that need to integrate their machines into higher-level systems often have the choice between two suboptimal alternatives: either integrating their controls in the main line PLC or building up a separate control cabinet with PLCs on each single machine. Both variants are not only complex and expensive, but also not scalable enough to meet the growing demands on modern intralogistics systems. Thus the belting and conveying specialist Intralox developed the Intralox Smart Carryway Automation Module (ISC CAM), an autonomous IP67 unit to control conveyors like the DARB Series 4500. Turck provided its TBEN block modules for the ISC CAM, IP67 PSU67 power supplies and color-coded cables for easy commissioning and cabinet-free installation.

Turck's large portfolio of IP67 I/O modules ensures a seamless, decentralized approach for modular machines and plants

ISC CAM: The decentralized Intralox logic on Turck's robust TBEN-S block modules enables a variable conveyor layout without complex control cabinet installation

Fast cabling, easy installation: The robust PSU67 power supply provides all required voltages directly on site

battery industry. Intralox is the OEM (Original Equipment Manufacturer) but the automation of DARB equipment is traditionally done by the integrator of the intralogistics systems using Intralox guidelines. "We realized that this process is not always efficient as much know-how is lost in communication. We sell DARB constantly, but the integrator only does it now and then. That could become challenging for all parties", explains Martin Benavidez, Intralox Product Manager for ISC. The acronym stands for "Intralox Smart Carryway", an innovative program that aims to develop an automation solution for controlling Intralox machinery, including the DARB product line. Benavidez is driving the project together with Lazlo Kleczewski as Product Design Manager for ISC.

Integrators choose to leverage another PLC available in the line to control the DARB equipment. The main drawback of having one PLC controlling several machineries is that debugging during commissioning and changes in the operation are time-consuming and risky. To solve this problem for the benefit of customers, Intralox expanded its offer to include automation of the DARB system. "We started using a separate PLC to automate the DARB, but is not cost efficient, especially in the small ones. We had to offer different PLCs and build big electric cabinets following many customer requirements and regional regulations. Product development and maintenance is complex because of this", explains Benavidez. He adds that using traditional PLC technology is difficult to scale because of the effort required to engineer and assemble the control cabinet and maintain different PLC platforms that have been established for years in factories. "Scalability is very important for us. Therefore we looked for a solution where we can channel our experience and knowledge gained over many years into a small device that is easy to use and carefree", Lazlo Kleczewski adds.

Solution: Decentralized IP67 controls bring flexibility

The solution ist the ISC CAM (Intralox Smart Carryway controlled by a Carryway Automation Module), a small IP67 block module that contains Intralox' software logic to maximize the performance of the equipment without needing an electric cabinet. Turcks TBEN-S provides the hardware platform for the ISC CAM. Thanks to its multiprotocol capabilities, it can service a wide range of customers with minimal product variations. Turck's multiprotocol devices support the Profinet, Modbus TCP and Ethernet/IP protocols and adjust themselves to the Ethernet protocol spoken on the network without user intervention. This allows for an improvement for all parties involved. The integrator only needs to program his PLC to communicate a few basic instructions, thus reducing the effort and risk of integrating and commissioning DARB equipment. The end user will be ensured to always have the latest automation knowledge used in the equipment and can rely on the full Intralox support for DARB equipment. "The ISC CAM solves many of the problems that classical automation structure raised", says Lazlo Kleczewski.

DARB demo loop with decentralized automation

To showcase DARB technology as a key conveying solution for EV battery industry Intralox built a demo loop in Shanghai, where potential customers get an impression of the capabilities of the technology. In addition to that, the loop demonstrates the benefits of decentralized automation. Each piece of DARB equipment has its own ISC CAM for the carryway automation, and other key automation functions in the loop, like motor control and safety are distributed into other simple modules. The result is a high level of modularity of both the hardware and software improving set-up, troubleshooting, and modifications like adding or removing a conveyor.

»We started using a separate PLC to automate the DARB, but it is not cost efficient, as we had to offer different PLCs and build big electric cabinets following many customer requirements and regional regulations.«

Martin Benavidez | Intralox

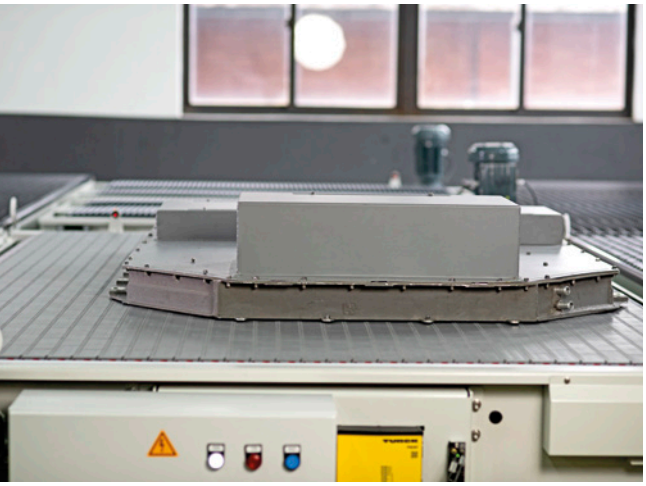
With this demo loop, Intralox demonstrates that decentralized automation solves many problems of equipment manufacturers when integrating automation of their products into bigger systems. Traditional solutions would require a cabinet for housing the HMI, motor controller and variable frequency drive, power supply, and other components that are not available in high electrical protection degrees. However, the ISC and the wide Turck portfolio of field modular components in IP67 offer solutions to these problems. Allowing the creation of more clean, flexible yet nimble solutions.

Full range IP67 portfolio for decentralized automation by Turck

The loops HMI does not have the typical screen on the cabinet. "There is no need for a physical HMI because the loop can be controlled, adjusted and changed thru a 'virtual HMI' that is hosted in the web-server of the ISC. This is easily accessible with a laptop or any device with a web-browser", says Lazlo Kleczewski. The automation of the motors and safety systems in the loop is done decentralized by a combination of field controllers from the Turck TBEN product line. Thanks to the large portfolio of IP67 I/O components for serial and Ethernet communication the demo loop's cabinet is not bigger than a shoebox. It only incorporates some safety components. The ability of Turck Ethernet solutions to communicate with either Profinet, Ethernet/IP or Modbus TCP dispenses the development of individual solutions for customers in different regions. Turck's robust power supply unit PSU67 simplifies the supply of the 24 VDC for running the automation components.

Fast and trouble-free cabling is promised by the M12 connectors with color-coded rings for poka-yoke connections

There are other benefits of this 'integrated and holistic design' that Intralox proposes. For instance, not having a cabinet reduces parts, but also allows to eliminate cables with loose-ends making the concept virtually plug and play. By using color coding on the connectors, a high level of poke yoke is created thus minimizing the chances of mistakes. Therefore the cabling and wiring of the equipment becomes simpler and intuitive and almost impossible to connect it wrong. "We are trying to demonstrate that it is possible to take these complex systems and make them simple and intuitive. The only thing it requires, is to think slightly different", the ISC team resumes.



Supporting EV battery modules throughout the whole surface is one key advantage of DARB technology as the demo loop in Shanghai shows

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Each shelf location is equipped with an RFID read/write device that reads the RFID tag underneath the box as soon as it is stored

Seed Center

KWS optimizes and secures its seed production with Turck's RFID solution for the wireless identification and temperature monitoring of silo boxes – Profinet S2 redundancy included

As one of the world's leading seed specialists for corn, sugar beet and cereals, KWS Saat SE & Co. KGaA uses state-of-the-art plant breeding methods to increase farmers' yields and further improve the resistance of plants to diseases, pests and abiotic stress. This requires the seed to be propagated and processed under controlled climatic conditions and to high standards of quality. In the sugar beet seed production facility at its Einbeck site, KWS prepares the sugar beet seed in a highly automated, multi-stage process. The

»This is the perfect solution for us. The measured values are transferred wirelessly and the storage boxes are identified without contact.«

Dr. Joris van Dort | KWS

seed is transported fully automatically into boxes between the individual process steps and stored in a dynamic high-bay racking system. The temperature inside the storage boxes has to be determined and monitored at all times and as accurately as possible in order to ensure seed quality.

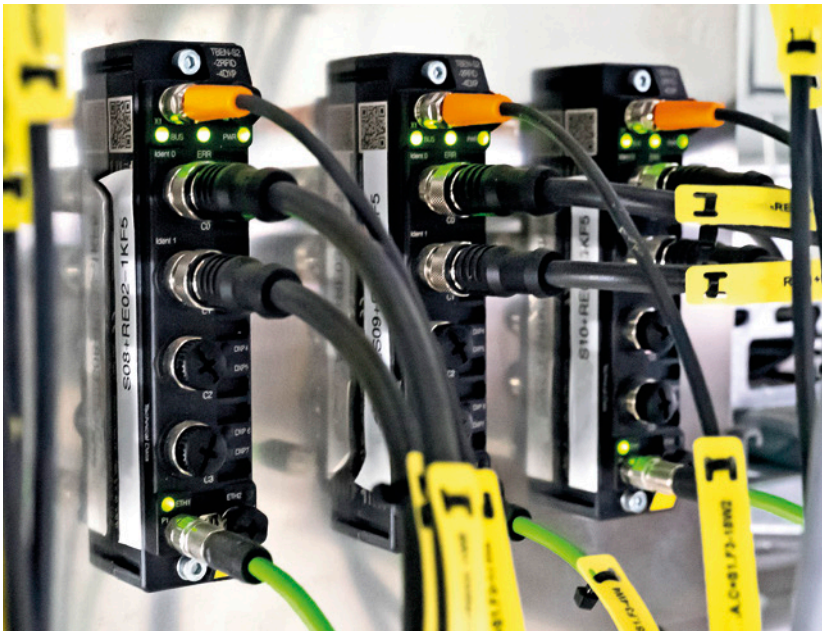
High availability thanks to Profinet S2 redundancy

The seed must meet certain requirements, for example, in terms of tolerance to various diseases or drought. The relevant data is exchanged and processed in the system between a server and the controller. "If silo data were lost as a result of a control system failure, it would no longer be possible to track which seed is stored in which box," says Christian Fricke, technical innovations team leader at KWS. "In this case, there would be nothing left to do but dispose of the seed that could not be identified. For a high-priced product that can't be reproduced at short notice, this is obviously not desirable."

The required warehousing system must therefore guarantee maximum availability and data security. Profinet-based systems can be designed for these tasks with a redundant controller, referred to as S2 redundancy in the Profinet specification, and Turck's compact TBEN RFID interfaces with Profinet S2 system redundancy for highly available systems meet this requirement. In the event of a controller failure, a parallel PLC takes over the process control automatically and without any loss of data. Another benefit: The robust RFID interfaces with IP67 protection can be mounted directly in the warehouse without a protective housing.

Wireless power and measured value transmission

A robot takes over in the treatment process the dynamic removal and placement of the boxes on the appropriate shelf location. As a result of the production team's previous experience, the new solution focused on contactless power and signal transmission:



Turck's TBEN RFID interfaces with IP67 protection are screwed onto a metal panel in a cabinet-free installation in the warehouse

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KWS Saat SE & Co. KGaA is the world market leader for sugar beet seed and supplies its customers with seed varieties for conventional and organic farming that are specially tailored to their requirements. To do this, the seed must be propagated and processed under suitable climatic conditions. In this highly automated treatment process for sugar beet seeds, Turck›s BL ident RFID solution ensures the contactless transmission of power, address data and measured values from temperature sensors inside silo boxes and ensures high plant availability – also thanks to Profinet S2 redundancy made possible by the RFID interfaces. The possibility of automatic address assignment and Turck's unique HF bus mode for connecting up to 32 HF read/write devices per port guarantee fast installation, efficient storage and easy device replacement for service tasks.

»The fact that the Turck solution uses HF bus mode suited our requirements perfectly. This enabled us to install the RFID read/write devices for a rack without any major effort and we just had to connect the pre-assembled cables with T pieces.«

Christian Fricke | KWS

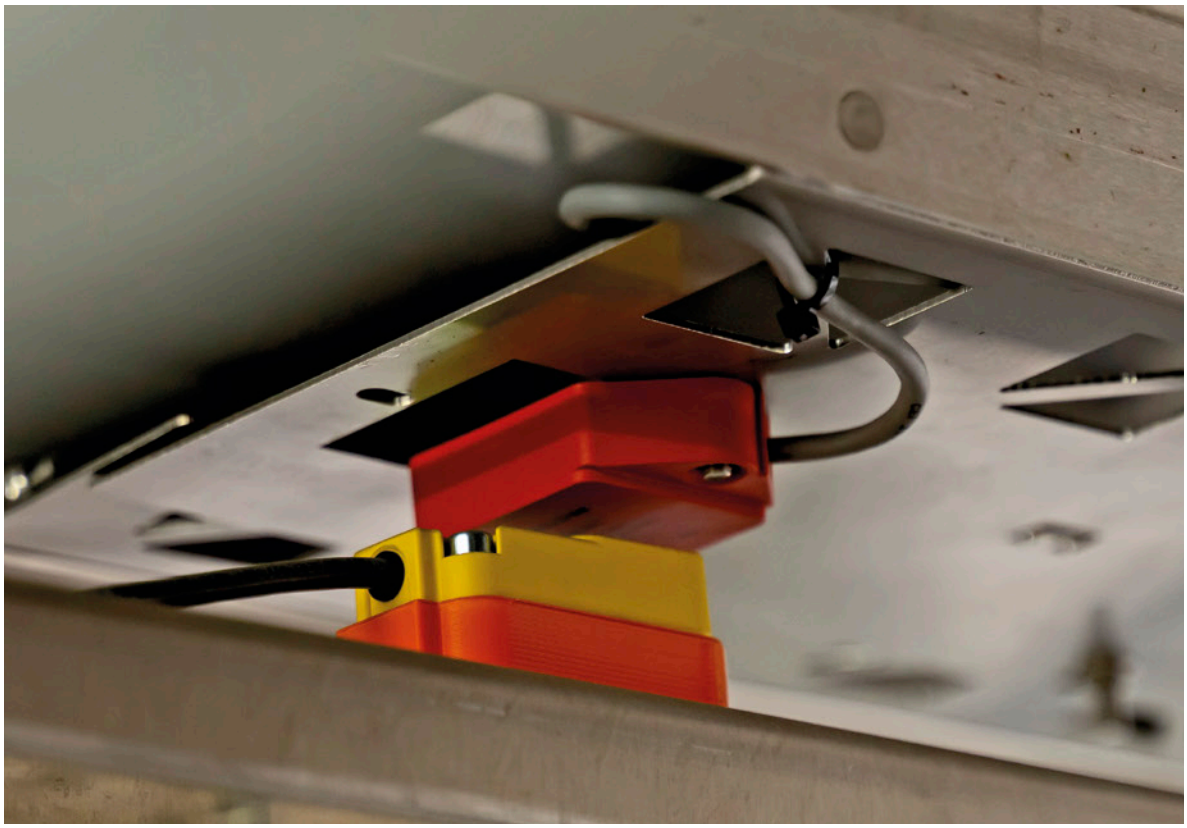
"In the previous system, signal transmission was via contact pins underneath the box," Christian Fricke explains the initial situation. "However, any contamination on the contact pins or inaccurate placement of the boxes on the pins kept causing downtimes in production, and so we looked for a better solution."

Turck's RFID solution provides RFID tags at the bottom of each box with an attached sensor element that measures the temperature inside the storage container. Each shelf location is equipped with an RFID read/write device that reads the tag on the box as soon as it is stored. The read/write device supplies the temperature sensor with power via the voltage induced in the tag. This completely eliminates the maintenance effort required with a battery-powered solution.

Automatic identification of the seed storage boxes with RFID

The boxes are managed by the control system of the high-bay supplier. At the same time, a process control system receives the booking telegrams from the controller. For example, if a box is moved to a new position, the process control system updates the entries in the database. "The storage system remembers where a box was stored," Christian Fricke explains.

RFID technology enables unambiguous and complete monitoring of all boxes during transport and storage. The ID stored on the RFID tag on the bottom of the box can be used to check whether the box is at the correct shelf location. If there are any discrepancies, a stock reconciliation is carried out. The RFID system thus provides the basis for verifying the



The RFID tag has a sensor connected to it which measures the temperature inside the storage container

Thanks to Turck's HF bus mode, the HF read/write device can be connected very easily to each shelf rack using T pieces, thus considerably reducing wiring effort and costs

database information. "This is the perfect solution for us," says Dr. Joris van Dort, technical innovations manager at KWS. "The measured values are transmitted wirelessly and the storage boxes are identified without contact."

Fast commissioning thanks to HF bus mode

A key requirement for the new system was the avoidance of the complex geometry of the old solution and its large cabling and wiring overhead. Turck's RFID interfaces stand out here with a feature that is unique in the market: HF bus mode. This function allows the connection of up to 32 HF write readers per port. In applications with many write and/or read positions, this considerably reduces the wiring effort as well as costs. Temperature values and IDs are read cyclically. This makes it possible to implement continuous temperature monitoring. The read values can also be assigned to the containers at any time. "The fact that the Turck solution uses HF bus mode suited our requirements perfectly," said Christian Fricke. "This enabled us to install the RFID read/write devices for a rack without any major effort and we just had to connect the pre-assembled cables with T pieces."

Benefits of automatic addressing

The automatic addressing of the RFID read/write devices proved to be a major benefit of the Turck solution both for commissioning and for service operations. After connecting with the T pieces, the devices are automatically assigned addresses which were activated in the web server. If a device is faulty and has to be replaced, the TBEN registers which read/write device is missing when it is removed. If a new module is connected, it is automatically assigned the address of its predecessor. It is no longer necessary to store preconfigured replacement devices or carry out any time consuming addressing of replacements for service tasks.

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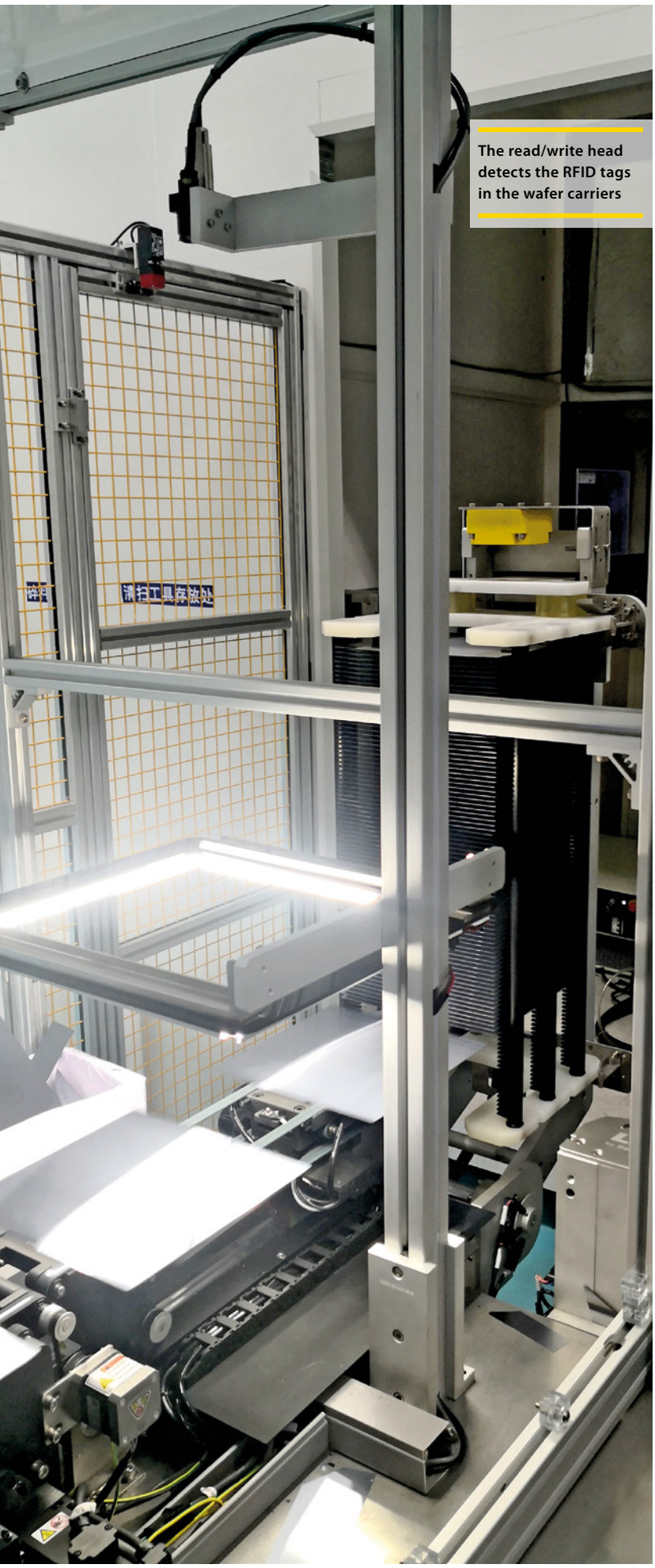


The read/write head detects the RFID tags in the wafer carriers

Clear as Daylight

Chinese solar cell manufacturer uses Turck's RFID system to increase the quality and efficiency of its production

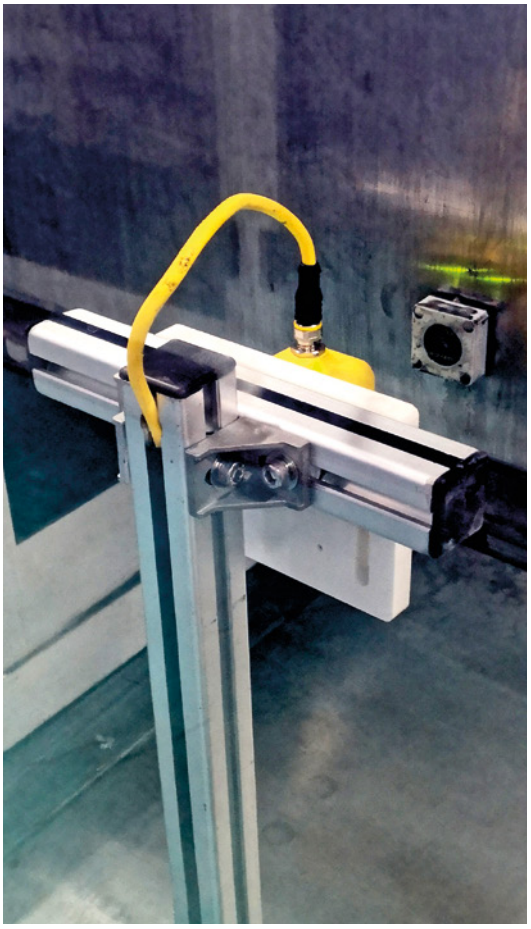
The photovoltaic industry is playing a key role worldwide as part of the energy transition. Solar cell manufacturers are faced with the challenge of consistently producing good quality and increasing their production output – while maintaining or reducing costs. But where do the errors mostly occur in the production process? At which points is an adaption worthwhile? In order to find well-founded answers to these questions, manufacturers need a full and seamless collection of production data.

A Chinese system integrator was therefore commissioned by a manufacturer to collect this data for its solar cell production in order to provide a basis to make well-founded production decisions. An automated solution was required to guarantee smooth production and quality control. The customer decided as a result to use RFID to implement data acquisition and processing as efficiently as possible throughout the entire production process. The contactless RFID technology allows products to be tracked and anomalies to be identified in real time, so that sound data-driven decisions could be made in good time.

Production tracking by wafer carrier detection

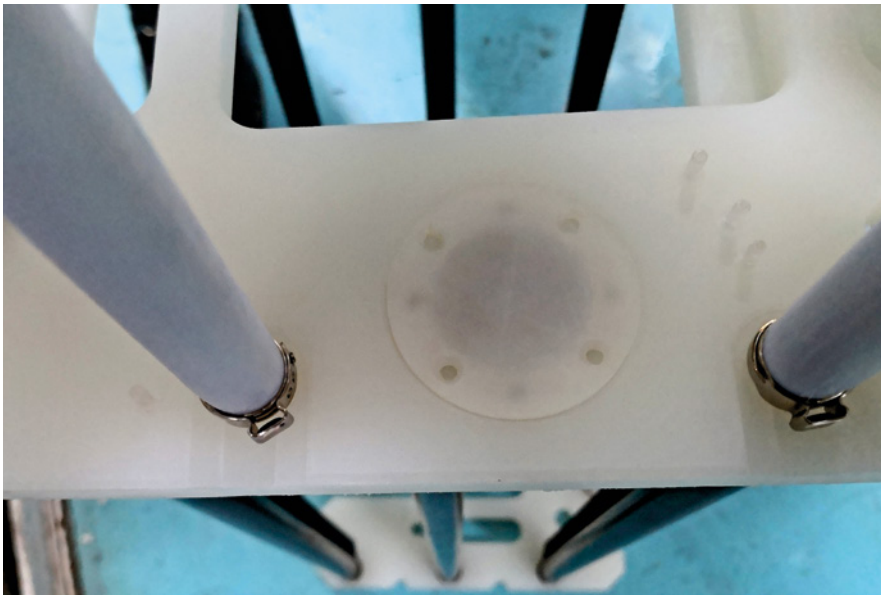
Quality assurance and control play an essential role in the production of solar cells. The complex manufacturing requires the precise allocation of production batches right down to the individual silicon wafer. The solar cell wafers are transported between the production steps and stored in special wafer cassettes. These wafer carriers are designed so that the solar wafer is protected from external factors such as dust, humidity and mechanical stresses. The installation of RFID tags provides each wafer carrier with a unique identification code to which a production order is assigned.

Read/write heads are installed at the stations of each process step in order to capture the information of the tags as soon as they enter their read range. An RFID data acquisition system was set up based on the collected data, which feeds the information automatically to the system and interacts with it in real time. In this way, real time information about the wafers can be called up and analyzed on each production line, thus enabling accurate production monitoring in the field and decision making in real time.



HF read/write heads at each process station ensure reliable data acquisition

With its 16 kilobyte data buffer, Turck's TBEN S RFID module offers impressive performance



The integrated RFID tag allows each wafer carrier to be identified uniquely and assigned to a production order

RFID solution impresses integrator

Its modular and versatile structure enables Turck's BL ident RFID solution to be adapted easily to any application and integrated in existing plants. Standard software modules are available for easy system integration and commissioning. The system could thus be easily integrated in the complex solar cell manufacturing process.

Turck's TBEN RFID modules offer three Ethernet protocols with Profinet, Ethernet/IP and Modbus TCP, which are compatible with the controllers of many manufacturers. In this way, the user is able to reduce the number of different variants in the warehouse and thus also reduce the product inventories to be kept on hand for each project, thus saving considerable costs. When it comes to maintenance and servicing, the system integrator appreciates the possibility of being able to replace the components of the RFID system during operation, thus minimizing downtime for his customers.

The tags were robust enough for solar cell production and impressed in the specific project. The tags with protection to IP68 can be stored for up to 100 hours at temperatures up to 140 degrees. Thanks to the 16 kilobyte data buffer of the TBEN RFID interface, the wafer carriers no longer have to wait in front of the read/write devices until all read/write operations have been completed. This means that the manufacturer can achieve a higher production speed – without any loss in quality. The TBEN module also offers an integrated switch that enables a line or ring topology to be set up and thus simplifies network cabling.

All these features impressed the customer and gave him a significant improvement in the efficiency of his production. "By using Turck's RFID solution, the company is now able to track all production processes fully and ensure a high level of process quality. The RFID system not only improves the flow of information but also provides a reliable basis for making well-founded decisions for future optimizations," the system integrator concludes

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QUICK READ

A Chinese system integrator is automating the quality assurance and traceability of solar cell production for its customers with RFID technology. The company chose Turck's BL ident RFID system, which can be integrated smoothly into existing plants. This solution enables real time control and monitoring of the individual production steps, supplies reliable data for the production management and allows comprehensive, timely and precise monitoring on site.

RFID tags on the workpiece carriers store production data and enable unique identification of the material on the carrier plate

Production Line in View

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

With the rapid rise of electric vehicles in recent years, the automotive industry has changed considerably. Electric vehicles are increasingly replacing vehicles with pure combustion engines and promise a more environmentally friendly, low-noise and low-maintenance driving experience.

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

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

QUICK READ

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

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

Digital workpiece carriers as the ideal solution

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

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

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

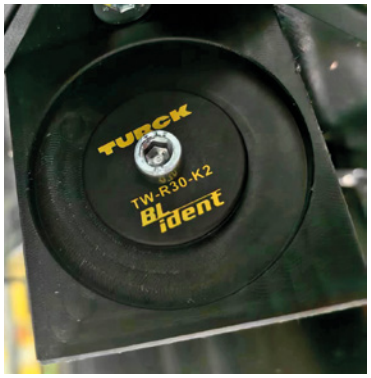
Improved traceability and productivity

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

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

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

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



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

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

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

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

Guiding Light

Turck's pick-to-light system ensures error-free and significantly faster picking processes at Skylux in Belgium – even with temporary staff

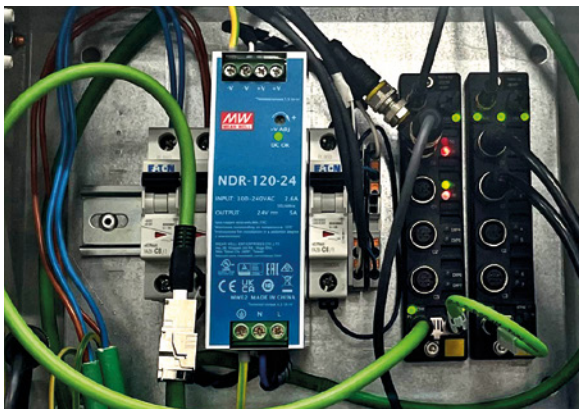
A total of 750 PTL110 indicators guide operators through the picking process at Skylux – and halve the picking time; the TL50 Tower Lights with beeper module (top right) warn operators if they make a mistake

"As a family business, Skylux has been bringing natural daylight into people's lives for three generations," says Veronique Mattheeuws, chief commercial officer at Skylux. The company from Stasegem in Belgium is known for its skylight domes and flat roof windows but is now also focusing on a second mainstay: "Outdoor Living." "Our aluminum conservatory systems also bring the magic of nature indoors," Mattheeuws explains and adds: "We believe that we can constantly improve, in all areas. That is why we are continuously striving for better solutions, services and products – for our customers, but also for our employees."

Pick-to-light solution

Skylux recently made this ambition reality in a project in the order picking department for the Outdoor Living division. Skylux is a B2B supplier that delivers its products to installers, who are responsible for ensuring perfect installation and processing at the end customer's premises. Each order contains numerous small parts: Nuts and bolts, manuals, end caps, rubber seals, cables and more. These are picked by employees and then undergo a comprehensive quality check before the order leaves the warehouse. "As inspections have shown, order picking was very time-consuming and prone to errors. That's why Skylux wanted to invest in a pick-to-light solution," Tsjelle Stevens, founder and managing director of integration partner Code Care explains.

Searching for indicators, finding a complete solution Code Care supports manufacturing companies with their digital transformation projects. The integration partner considers Skylux one of its most important customers and was also responsible for the implementation of this pick-to-light project. Tsjelle had already had a positive experience with the robust and versatile indicators from Banner Engineering and therefore also planned to use them for this solution. The system engineers at Turck Multiprox put together a complete solution for Code Care and Skylux. Besides the TL50 tower lights, this consists of the cascadable PTL110 pick-to-light indicators with display, touch button and



The ARGEE control logic on the TBEN block modules translates ERP data into light signals for the PTL110 - without external PLC

»The TBEN-S block modules translate the data from the ERP system into commands for the indicators and the corresponding display without the need for a PLC. The free ARGEE software on the modules takes care of this.«

Tsjelle Stevens | Code Care

optical sensor as well as the Turck TBEN-S2-2COM-4DXP intelligent I/O modules with the ARGEE logic control software integrated as standard. Code Care was able to connect the solution to Skylux's ERP system without any problems.

An end to lengthy article searches

"It all starts with the operator scanning a QR code on one of these blue containers with their tablet," Tsjelle explains. "The corresponding picking order appears on his tablet. He then walks along the shelves with the trolley that holds the container. There are a total of 750 picking locations in the warehouse. The operator works each aisle in turn. On his tablet, he sees a picture of the article he needs to take. The PTL110 indicator on the container with the article to be taken lights up green. The picker is thus visually guided without having to conduct a lengthy search." The new system now makes order picking error-proof. If an operator takes an item from the wrong bin, one of the fifteen TL50 tower lights outputs a warning signal and lights up red. "A visual signal provides additional safety," Tsjelle explains.

Order picking in half the time – even for beginners

After taking an article, the operator presses the button on the PTL110 to switch off the green light and move on to the next article. The PTL's capacitive pushbutton is very robust but does not require a great deal of pressure. The operator is thus able to work through the entire order article by article. "In the past, it could easily take an hour and a half, but now it only takes half as long," he says. In the peak season, when many temporary workers are also taken on, the time savings become even more noticeable for Skylux. "While we previously had to train each temporary employee for four hours to familiarize them with the entire warehouse and all the items, new colleagues now can now start picking after just half an hour." The numerical display on the PTL110 indicators also shows the exact number of parts that need to be taken.

Dynamic and flexible adaption

The signals from the indicators are controlled by Turck's TBEN-S2-2COM-4DXP I/O modules. "They are IP67 rated, so trouble-free operation is ensured in any environment. Even more important is their integrated intelligence. The TBEN-S block modules translate the data from the ERP system into commands for the indicators and the associated display without the need for a PLC. The free ARGEE software on the modules takes care of this," Tsjelle explains. The indicators are connected in a cascade. This means that only one port on the TBEN-S-2COM is required to connect 64 or more PTLs in series. The I/O module and PTL indicators communicate via Modbus RTU. "The combination makes it a particularly dynamic and flexibly adaptable system. If picking stations are added or the error analysis shows that it is better to place certain items further apart, this can be implemented very easily and flexibly."

Easy work

Tsjelle, who is now a familiar face in the Skylux workshop, notes that the employees are already very satisfied. "It really made their work a lot easier. They used to have to go through the labels to find the right article code, now they can see immediately where they need to go." His own task of installing the pick-to-light hardware and customizing the ARGEE software, as well as writing the interface between the pick-to-light solution and Skylux's ERP system, also went smoothly. "This was child's play as ARGEE works with standard protocols," Tsjelle sums up.

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QUICK READ

Skylux, the Belgian specialist for skylights, flat roof windows and conservatories, has digitalized its order picking with a pick-to-light system from Turck and Banner Engineering, in collaboration with integration partner Code Care. The complete system, consisting of cascadable PTL110 indicators, TL50 tower lights and decentralized TBEN-S-2COM I/O modules with an integrated controller logic, significantly reduces errors and picking times – and makes the work of both established employees and temporary staff easier.

Turck's TBEN-S multiprotocol I/O modules ensure reliable communication between the PTL110 and the WMS

Catch the Light

Sioen Industries optimizes intralogistics processes with a pick-to-light system based on the Banner PTL110 series and Turck›s robust TBEN logic I/O modules

The employees place the carton on the displayed pallet and acknowledge the action via the touch button of the PTL110

Anyone who works in challenging and potentially dangerous environments needs quality protective clothing that protects against injury or accidents, whether they are firefighters, welders or arborists. The Belgian company Sioen specializes in technical textiles and protective workwear and produces more than three million pieces of protective clothing at 22 sites in 20 countries worldwide. Sioen employs around 5,000 people worldwide and generates sales of around 700 million euros. At the Mouscron site, the family-owned company operates a large shipping and distribution center in addition to four production plants. Garments produced worldwide are processed, stored and picked there so that they can be shipped to customers quickly and efficiently.

Previously, the inbound and outbound processes were largely carried out manually. After delivery, the pallets were transported to a coworker who scanned the individual cartons and placed them on defined pallet positions. These positions were reserved for specific goods – whether they were present or not. This took four to five coworkers around five hours to process a truck.

A coworker in the outbound area would receive a pick list for each customer and go through the stores in order to collect the goods. "This was obviously not an efficient way of working," recalls Filiep Vanwymelbeke, head of logistics at Sioen Apparel. "We therefore looked for a system that could handle the challenges of both the inbound as well as the outbound logistics." We finally implemented a powerful warehouse management system (WMS) to solve this problem, in combination with an error-free pick-to-light solution based on the PTL110 series of Turck's optical sensor partner Banner Engineering.

Inbound: pick-to-light as a playmaker

In the incoming goods area (inbound), employees lift the cartons from the pallets onto a conveyor belt. A scanner automatically captures the labels on the cartons as they pass by. Depending on the label, they are then directed to one of six conveyor belts. If the label cannot be read, the carton is conveyed to a designated belt for manual processing. Once a coworker at the end of the conveyor belt has scanned the delivered carton, the WMS immediately indicates via the pick-to-light system which pallet it must be placed on. The coworker places the carton on the appropriate pallet and acknowledges the action via the touch button of the PTL110 device located above the pallet. The PTL110's three-digit display immediately shows the number of cartons on the pallet.

The pick-to-light system provides several signal states. A green signal indicates that the system is ready

The versatile PTL110 with touch button, optical sensor and three-digit display is especially suitable for reliable operator guidance

»Where it used to take five coworkers up to five hours to handle a truck, it is now handled by three coworkers in two to three hours. This corresponds to a time saving of up to 15 hours per truck per day.«

Filiep Vanwymelbeke | Sioen Apparel

for use, while red indicates an operating error. In addition, a purple signal indicates that a mixed pallet must undergo quality control. When the pallet is complete and can be removed, the LED of the PTL110 finally lights up blue.

Outbound: reliable order consolidation

Two streams of goods converge on the outbound conveyor: Cartons with standard contents and cartons with a mixture of different goods that vary in height depending on the contents. At this point, the pick-to-light system becomes active again. The coworker scans the carton, whereupon the WMS determines the pallet on which it is to be placed, according to the customer or carrier. The PTL110s indicate the correct location of the pallet by means of simple color signals. "We are very satisfied with this way of working," says Vanwymelbeke. "We're thinking about doubling the number of PTL110 devices in the outbound area to serve even more customers and carriers at the same time."

Multiprotocol I/O module ensures reliable operation

The communication of the PTL110 devices with the WMS is crucial for the optimal operation of the solution. All PTL110 devices are connected for this purpose via Turck's TBEN-S multiprotocol I/O modules. The robust IP67 modules can be mounted directly on the conveyor line without a control cabinet and feature as standard the web-based ARGEE field logic controller software. ARGEE allows the module to be used as a small control unit by using standard communication protocols (ModBus registers).

Communication with the WMS can be easily configured by using PickIQ. In this way, the ARGEE software sets up a connection between the PTL110 and the WMS without the need for extensive programming. The customer's IT personnel do not need any special knowledge of automation software for this. PickIQ uses a serial bus protocol that uses a common ID to avoid latency or delays when polling multiple devices. This allows the system to operate without delays even during peak hours.

Error rate reduced to zero

The versatility of the PTL110 devices is demonstrated by their application in both inbound and outbound systems. The multifunctional displays with touch button options, optical sensors and three-digit display with clear signal indication enable simple and reliable monitoring of the number of cartons on a pallet. The PTL110 devices stand out on account of their fast response time and flexible installation options, which allows for easy customization and expansion of the system. The M12 connectors enable fast and safe installation of multiple devices. The display also has the ability to show up to 14 colors, combined with several animation functions to distinguish different states.

"The inbound error rate has dropped to virtually zero," Vanwymelbeke notes. "Where it used to take five coworkers up to five hours to handle a truck, it is now handled by three coworkers in two to three hours. This corresponds to a time saving of up to 15 hours per truck per day. In this way we are able to use our employees for other tasks."

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QUICK READ

Sioen Apparel is a specialist in technical textiles and protective clothing, and develops, produces and sells yarns, fabrics, nonwovens, textiles and garments for various applications worldwide. To optimize inbound and outbound processes at its distribution center in Mouscron, Belgium, Sioen has implemented a high-performance warehouse management system in combination with a pick-to-light solution based on the PTL110 series from Turck's optical sensor partner Banner Engineering and Turck's TBEN IP67 I/O modules. By using the cascadable display modules with optional touch button and optical sensor, error rates have been drastically reduced and sorting and picking processes significantly accelerated.

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Publisher
Hans Turck GmbH & Co. KG
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