What's New in PROCESSING

Instrumentation, Process Automation, Chemical, Electrical, Analytical

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What's New in Publishing
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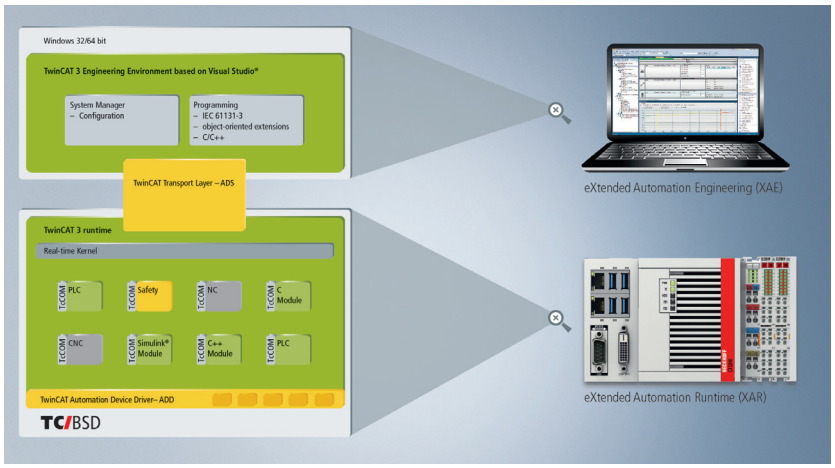
Multi-Core-Capable, Unix-Compatible Operating System for TwinCAT 3 Real-Time Applications



With TwinCAT/BSD, Beckhoff presents a new operating system that combines the advantages of Windows CE – low cost and small footprint – with the numerous features of large Windows operating systems. It therefore also is an alternative to Windows 7 or 10 in many applications.

TwinCAT/BSD provides an alternative operating system for all of the latest Beckhoff Industrial PC platforms. TwinCAT/BSD combines the TwinCAT runtime with FreeBSD, an industrial proven and reliable open source operating system.

FreeBSD is Unix-compatible and is continually being developed further, improved and optimized as an open source project by a large group of developers.

The system – and thus also TwinCAT/BSD – supports ARM CPUs up to Intel® Xeon® processors, providing a scalable platform from small embedded controllers to high-performance IPC controllers.

The current minimum size of a basic image is around 300 MB, with a very small RAM consumption of less than 100 MB. Therefore, very compact controllers can be realized with TwinCAT/BSD and all TwinCAT 3 runtime functions can be used.

The programming is still carried out on a Windows development computer and with TwinCAT 3 XAE integrated in Visual Studio®.

The new TwinCAT/BSD operating system offers multi-core support, making it possible to reserve individual cores exclusively for TwinCAT if required.

In addition to a large number of FreeBSD and Linux programs, TwinCAT functions can also be installed via the Beckhoff Package Server. Moreover, uncomplicated updates of the operating system and the TwinCAT runtime are possible in this way via the network.

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Handheld Manometers with Higher Precision and Accuracy

Manometers offer many benefits for engineers and technicians who need to measure and monitor pressure, but critical elements such as high accuracy, high precision and ease of use, play a large role in their selection of the best-for-application manometer.

Greisinger, part of the GHM Group of Companies, has launched their new handheld and fine handheld manometers, namely the G 1107 (fine) and manometer G 1113 series (manometer), both of which offer a superior and faster performance, higher accuracy with high resolution and position independency, when measuring differential and relative pressure with a high practical suitability. The two manometer models offer universal port technology, above-average battery life and robust housing with a practical and user-friendly design.

"Since even the smallest deviations can lead to malfunctions, reliably measured values are enormously important and not just for sophisticated heater systems" says Jan Grobler, MDof GHM Messtechnik, South Africa. "The G 1107 fine manometer and the G 1113 manometer can also be used to measure other leakage, gas pressure, gas flow or chimney draft measurements as the outstanding accuracy of these new devices, coupled with the high resolution and fast measuring frequency, guarantee efficient results that improve operational safety and practical handling" said Grobler.

High performance

These new handheld manometers offer a fast and reliable measurement through ease of use enabling time savings to be achieved. Their smooth display screens make measurement activities a safe and comfortable – irrespective of position – function. The extremely high resolution of 0.1 Pa (G 1107) gives efficient testing in a practical and compact housing suitable for all applications featuring a universal port connection technology.

At the heart of the manometer is the chip-based MEMS sensor, which provides reliable results for calibrated and traceable measurements. The G 1107 covers a high-resolution range of up to +/- 200 hPa/20 kPa, whilst the G 1113 provides equally precise differential pressure measurements of up to +/- 2000 hPa. There is also a switchable FINE-Function which enhances the resolution to an unrivalled 0.1 Pa (G11107) or 1 Pa (G113).

Technical features

Both of the Greisinger handheld manometers offer:

- Modern and function design – pocket size
- Excellent ROI/performance ratio
- 3-line backlit display/overhead displays at the push of a button
- Waterproof
- Robust and long battery life
- Easy to use universal pressure port with exchangeable connections
- High resolution and precision
- Speed
- Calibration options/traceable

In addition to the new specified features, the new universal pressure connection concept on G 1/8" basis offers so many connection possibilities that on-site service technicians will find the devices hugely beneficial.

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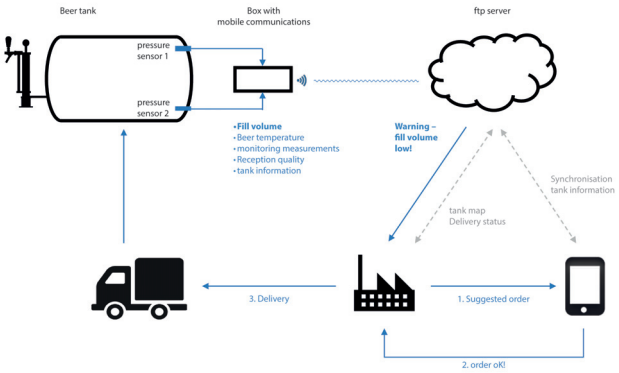
Networked Beer Tanks Delight Both Landlords and Breweries



The Internet of Things (IoT) offers "smart" solutions that help make life easier and more convenient, improve and streamline processes, and receive information in good time that was previously unavailable or difficult to acquire.

Smart solutions are highly personalised but always begin with an object and a sensor.

A level measurement with a remote transmitter is not just highly practical for detecting hazards but also for other level and fill level applications. Take pubs, for instance, where an emptying beer tank could be equally dangerous.

In this application, two pressure sensors work at the heart of the solution to measure the level of liquid in the tank and to send a warning message to the brewery by e-mail via the GSM-2* remote transmitter, the mobile phone network, and the Internet.

The brewery sends an automatic order proposal to the landlord, who simply has to confirm the order.

This automated, "smart" M2M (machine-to-machine) solution reduces stress for landlords and saves brewery drivers from profitless emergency weekend deliveries.

Inaccurate order entries are now a thing of the past, shipping can be optimised and landlords have a continuous supply of fresh beer. Crisis averted.

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Need for Speed? New High-Speed Pyrometer

With very fast processes, requirements for the pyrometers used for temperature measurement are especially onerous.

Typical examples are plastics processing machinery, such as those used for blow-molding PET bottles, which work on very short cycle times.

Another application is the monitoring of rail vehicles, where the temperature of the wheelset bearings is measured as the train wheels pass the pyrometer, in order to detect components running hot, in good time.

Instrotech, local supplier of Optris products now offers the new high-speed pyrometer CT 4M for these types of challenging tasks. With a detection time of just 90 µs, it is the fastest pyrometer within the Optris product range.

Optimum for metal surfaces and low temperatures

The CT 4M measures within the spectral range of 2.2 µm to 6.0 µm, making it ideal for low-temperature measurements on metals, metal oxides, ceramics or for materials with an unknown or changing emissivity.

Here, low temperature means the measurement range which spans 0 °C to 500°C.

The sensor head of the new pyrometer is very compact; with a diameter of 14 mm and a length of 28 mm, it can easily be installed even where space is at a premium, for example directly within a machine.

The remote electronics unit is connected to the sensor head via a cable which can be up to 15 m long. Important parameters can be entered here directly via three keys and an illuminated display.

The integrated interface allows the CT 4M to be connected directly to a PC, where all settings can be fine-tuned in the CompactPlus Connect software. Date capture and recording are also possible using the software.

Other serial interfaces or an Ethernet interface are also available as options. Instead of a PC, the pyrometer can also be connected to an Android mobile device which has the free IRmobile app installed.

This allows the settings of the pyrometer to be adjusted very conveniently during commissioning or maintenance work directly on site.

To connect the CT 4M to the process, two scalable analog outputs and three I/O pins (programmable inputs/outputs) are available.

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In-Line Illuminator

The S15WL features white light in a highly visible body for better machine visibility. It produces close to 100 lumens of in-line illumination.

Simple Installation

S15WL is a compact illuminator with double-ended connections for mounting in-line with cordsets and other products. Daisy chain multiple lights directly or spaced with double-ended cables. The unique in-line design allows for adding light to any area easily and conveniently.

Space-Saving Design

The low-cost, low-profile miniature illuminator emits 360-degree light, optimal for small enclosure and area lighting. Its sealed, compact design fits easily in small spaces. The S15WL is dimmable via two wire PWM input.

Use in Harsh Environments

Rugged, over-molded design meets IEC IP65, IEC IP67, and IEC IP68 for performance in wet environments.

Applications

- Small panels
- Tight enclosures

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Robust Safety Light Curtains

The EZ-SCREEN® LS light curtains are intuitive, easy-to-use safety devices used for machine safeguarding. They are built to withstand challenges commonly found in manufacturing and packaging environments.

Heavy-duty aluminum housing and recessed window ensure the emitter/receivers avoid damage in harsh environments.

The no blind zone design provides end-to-end sensing to eliminate gaps in detection.

Trip output for safe operation

LS-S models have trip output (auto power-up and automatic reset). In typical operation, if any part of an operator's body, or any opaque object, of more than a pre-determined cross section is detected, the solid-state output signal switching device (OSSD) safety outputs turn off.

These safety outputs are connected to the guarded machine's final switching devices (FSDs) that control the machine primary control elements (MPCEs), which immediately stop the motion of the guarded machines.

Quick and easy configuration

LS-S models require no PC software, DIP switches, or other devices for quick, easy configuration.

Highly visible alignment indicators and intuitive diagnostics simplify setup, facilitate troubleshooting, and minimize system downtime.

LS-S models are extensively FMEA (Failure Mode and Effects Analysis) tested to establish an extremely high degree of confidence that when properly installed, no system component, even if it should ever fail, can cause a failure to danger.

Because of the dual screen technology, EZ-SCREEN LS sensors are highly immune to EMI, RFI, ambient light, weld flash, and strobe light.

Applications

LS-S Models can be used for, but are not limited to, the following applications:

- Automated production equipment
- Robotic work cells
- Moulding and power presses
- Assembly and packaging machines
- Lean manufacturing systems

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The Internet of Things is Changing Logistics

Level sensors in LoRaWAN technology optimise the logistics of circulating containers that transport raw materials between manufacturers and consumers. The low-power wide-area technology used saves energy and enables users to operate a private wireless network on-site.

There is not a logistics manager who has not always dreamed of containers that independently report when they need to be refilled. Autonomous level sensors and new wireless technologies that can be operated privately on a company's premises now finally fulfill this wish.

Mobile containers report independently

In the Internet of Things, objects that did not have their own voice before get a chance to "speak." Today, battery-powered sensors can capture vital data about the location and current fill level of mobile containers, tanks, and silo containers and provide the supply logistics chain with this information.

One example of this is mobile silos that transport plastic granules from the manufacturer to the processing injection molding company. At the injection molding site, the granulate is gradually removed and the empty container is sent back to the granulate manufacturer.

In such a circulation system, hourly information about the location and fill level of the silo is especially valuable because it can prevent the supply chain from being broken in the case of doubt.

LPWAN enables energy-saving, wireless transmission of sensor signals

In the application described above, the sensor becomes the intelligent control unit of the silo tank. In this mobile system, the sensor must be able to manage without an external energy supply. This gives rise to a demand to use the available energy as efficiently as possible to achieve the longest battery life possible.

Low-power wide area network (LPWAN) technologies are a good solution for meeting these requirements. They ensure low energy consumption with a long detection range for radio signals and enable sensors to transmit data with a battery for several years and over many kilometers.

In addition to the energy and detection range parameters, a distinction can be made between SIM-based and SIM-free LPWAN technologies. In SIM-based technologies, a mobile service provider provides a public wireless network. SIM-less wireless technologies can also be set up and operated privately.

Such private wireless networks offer the company independence from the network provider and better cost control over the long term.

LoRaWAN for a Private Wireless Network

LPWAN technology particularly well-suited for establishing a private enterprise network is LoRaWAN—a Long Range Wide Area Network. These sub-gigahertz bands allow LoRaWAN technology to achieve very long detection ranges with good coverage in buildings.

As such, LoRa signals can easily be transmitted from the basement of a building. In open spaces, they bridge distances of 15 km to 40 km and are therefore equally suitable for indoor and outdoor applications.

The LoRa field device sends its signals to a LoRa gateway, which in turn forwards them to a network server. A particular advantage

of LoRaWAN technology is that the field devices do not log on to the gateway but only to the network server behind it. Therefore, gateways operate only as converters between the wireless and the wired world.

This special system architecture makes the wireless system more rugged, as the data of a field device is simultaneously received via several gateways or channels and forwarded to the network server. Only the server decides on which specific data path it will use for signal evaluation.

This procedure not only ensures valuable redundancy in signal transmission, but also facilitates network setup. This means that if the reception quality is insufficient, the network can easily be compressed via other gateways without having to create a new network plan to check the radio coverage.

Furthermore, the wireless system requires only a few gateways, as a gateway can communicate with around 2000 field devices at the same time and illuminate an area of 5 to 7 square kilometers.

Regarding data security, LoRaWAN offers end-to-end encryption of the sensor data as it travels from the field device to the internet server. The data can be transferred directly to the processing goods management system.

WILSEN speaks LoRa

The advantages offered by LoRaWAN convinced Pepperl+Fuchs to integrate this technology into the WILSEN.sonic.level battery-operated wireless fill level sensor. This sensor measures the distance to the filling material using ultrasound and calculates a fill level for the container. The payload to the network server contains not only the distance and fill level, but also the GPS coordinates, as well as the temperature and condition of the battery. In the sensor, the times for data transmission can be set within certain limits.

These limits range from once per minute to once per day. More frequent transmissions affect the battery life, but enable the exact movement profile of a mobile container to be determined. Longer transmission intervals with just a few transmissions per day extend battery life by several years.

Wireless sensor optimises the logistics process

With the current fill level and geoposition, WILSEN.sonic.level operates as an intelligent component to offer a silo tank important information for replenishment logistics. After the filling process at the site of the granulate manufacturer, the silo can confirm the exact filling quantity in the purchase order and authorise its collection at the site of the logistics company. The driver will be notified of the exact pick-up location. The movement profile along the transport route enables the injection molding company to calculate the exact time of delivery.

Once the silo has been unloaded by the logistics service provider, the silo will automatically inform the injection molding company's intralogistics system which ramp it is on. From this point on, the intralogistics system always knows the exact location of the silo on the site, even if it has been put into and removed from storage several times.

Each time product is removed from the silo, the silo provides data on the remaining quantity and can independently issue a command to be refilled when a minimum quantity is reached. Once the silo is completely empty, it informs the logistics provider of its pick-up location.

Optimising a circular economy beyond the borders of a company in such a way requires a comprehensive wireless network. For LoRaWAN, this is already the case in parts of Europe.

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Robust Needle Valve for High-Pressure Applications

The new valve is designed for four pressure ranges: up to 15,000 psi (1,034 bar), up to 20,000 psi (1,379 bar), up to 30,000 psi (2,068 bar) and up to 60,000 psi (4,136 bar). The sensitive components - spindle tip and sealing - are made of suitably resistant material.

Furthermore, the model HPNV has the same characteristics as the other WIKA needle valves: low-wear operation due to the non-rotating spindle tip, smooth handling with low torque and leak tightness tested to BS6755/ISO 5208 leakage rate A.

The high-pressure valve is available in various configurations and materials. WIKA also offers a customer-specific assembly of valve and measuring instrument. Such an instrument hook-up is delivered ready-to-install and leak tested.

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Another Interface for the uniVision 2.3 Image Processing Software

Wenglor has added another version update for the uniVision configurable standard software for 2 and 3 dimensional image processing. The latest update enables quick and easy integration of Smart Cameras and control units in EtherNet/IP controls. New overlays in the web-based visualisation of results are another attractive feature of the update.

Together with the PROFINET interface, it is the most commonly used industrial protocol in the world, making Wenglor's hardware and software technologies available to even more users.

Results of image and profile evaluations, such as measured values, detecting patterns or codes, can be transmitted from the smart camera or control unit in real time. However, it is also possible to send trigger or project load commands and, for example, transmit a match code from the control to uniVision products. This makes for seamless communication between the sensor, software and control even easier. In addition to PROFINET and EtherNet/IP real-time protocols, process data can still be output via digital IOs, TCP/IP or UDP.

Web-based visualisation allows the results to be displayed on any device in the browser. This gives users a clear overview of all relevant results without the need for complex programming knowledge. Until now, users were only able to display points and lines within the image or profile. The new update also offers the option of displaying circles, arcs and coordinated systems and overlays. This increases the scope of visualisation functions even further and makes it even easier for users to monitor all results at a glance.

The standard software of the uniVision enables the analysing of images and height profiles in the field of industrial image processing. Two and three dimentional data from smart cameras, vision systems and control units with 2D/3D profile sensors can also be evaluated. The software is intuitive and clearly structured like a toolbox. Up to 25 different software modules are available in total such as measurement, threshold value, cluster, OCR, pattern matching, tracking as well as different templates eg to read 1D codes, check presence, detect patterns or colours, depending on the hardware selected.

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New Motorized Control Valve

The semiconductor industry places stringent requirements on valves, measurement and control systems.

Pneumatically operated valves are to an increasing degree no longer able to comply with the control requirements of leading process equipment manufacturers.

For this reason, GEMÜ has developed the motorized GEMÜ C53 iComLine control valve.

The 2/2-way diaphragm globe valve GEMÜ C53 iComLine was developed for precise and demanding control applications in semiconductor production. The sealing concept of the valve is based on the tried-and-tested GEMÜ PD design, with actuator and medium separated by a regulating cone made of resistant PTFE.

As the regulating cone contour, actuator stroke and connection size can be customized to meet customers' requirements, the GEMÜ C53 iComLine satisfies virtually all control and flow requirements of the high-tech semiconductor industry.

Thanks to the combination of the precise stepper motor with ultra pure body materials, the valve is particularly suitable for lithography, CMP and etching processes, as well as applications in the analysis field of any semiconductor production process.

The GEMÜ C53 iComLine diaphragm globe valve cannot only be installed as a simple 2/2-way valve. It can also be integrated into a GEMÜ PC50 iComLine M-block in order to realize complex flow charts using minimal space. For example, when machining silicon wafers, a multi-port valve block can be used in a FOUP cleaner to control the temperature of the DI water. In addition, check valves and sensors can be integrated into the GEMÜ PCi50 iComLine M-block.

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Series of Compact Splicing Connectors for All Conductor Types

The new 221 Series Splicing Connectors are a winning product within multiple electrical interconnection sectors.

With WAGO's simple, ergonomic design and global approvals, they created a series of compact splicing connectors for all conductor types. All you have to do is pull the lever up, insert a conductor and push the lever back down.

These connectors can be used in a variety of applications; from intercom system wiring, to electrical ovens and you will be able to benefit from the following:

- Connect all conductor types without preparing them
- Combine any conductor types and sizes
- Easy-to-use operating lever for tool-free terminations
- High current carrying capacity of up to 32 A
- Perfect for distribution applications thanks to the mounting carrier

Two sizes for all conductor types

Quickly and easily connect all conductor types of different cross sections using two-, three-, and five-wire connectors. The new connectors accommodate fine-stranded conductors from 0.14 to 4 mm², as well as solid and stranded conductors from 0.2 to 4 mm². With the new 6 mm² variant, you can connect all conductor types, with cross sections from 0.5 to 6 mm².

Extremely easy to use

You can open WAGO's splicing connectors easily and quickly. Opening the levers on the 221 Series takes very little effort.

This means you can connect conductors quickly, and without any tools! While you are connecting the conductor, recessed handles on the sides ensure an easy, secure grip on the connector.

Two test slots

The new 221 Series Splicing Connectors allows you to test the voltage from two different sides, even when they are installed. The connectors have two test slots right where the WAGO imprint appears; one in the conductor entry direction and one on the opposite side.

This accessibility provides extremely convenient testing conditions, even after installation, within a wide range of applications. All connector variants also provide a secure contact for all standard test probes.

The 221 Series conquers the distribution cabinet

Mounting carriers are available for every 221 Series Splicing Connector, whether the two-, three- or five-wire model. They can be mounted vertically as well as horizontally. Secure the carrier by snapping it onto the DIN-rail, or with screws on smooth surfaces. The flexible mounting clamps simplify both connector insertion and removal.

Conductors can be conveniently connected and removed before or after inserting a connector into the carrier. One test slot is always accessible, ensuring compliance with VDE standards.

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Specialist Lubricant for High-Temperature Applications

Lubrication products used in certain applications are subjected to much harsher conditions or higher temperatures than others. By choosing products specifically designed for challenging circumstances, you can protect your equipment, improve performance, and save on maintenance and repair costs.

This is why Lubrication Engineers (LE) believes in continuously improving its products and creating solutions for particular applications.

"For example, LE developed our 1250 Almasol High Temperature Lubricant with a clay thickener system, which has one of the highest temperature capabilities of any grease thickener technology currently available in the industry," explains Callum Ford, National Marketing Manager at LE South Africa. "Bearings operating in or near heat-generating equipment are subject to temperatures that cause ordinary greases to melt and run, leaving critical bearing surfaces unprotected."

Almasol High Temperature Lubricant is designed to withstand high temperatures, staying in place to provide constant lubrication. It also resists oxidation and vaporization.

By ensuring longer lubrication intervals and fewer bearing failures, Ford says, Almasol High Temperature Lubricant helps contribute to increased production and a healthier bottom line.

It uses a base oil with a heavy viscosity and high flashpoint, as well as a high natural viscosity index. "The high temperature thickener has a high dropping point, which is why this product is ideal for applications such as asphalt plants, brick/ceramic kilns, exhaust fans, kiln car bearings, lime kilns, oven conveyors, pellet mills, plastics and soot blowers," says Ford. "Almasol is the solid wear-reducing additive in the product, which is able to withstand extremely heavy loads, chemical attack and temperatures up to 1,038°C."

The maximum useful lifetime for a grease in high temperature bearings depends on many factors, from temperature to the size and speed of bearing, the amount of oxygen available to the grease in the bearing, the load on the bearing and the degree of external contamination.

The approximate maximum useful lifetime guidelines for LE's 1250 Almasol High Temperature Lubricant are 10 000 hours at 93°C, 100 hours 149°C and between one and four hours at 204°C.

"Lubrication interval recommendations for LE's 1250 Almasol High Temperature Lubricant are much lower than the maximum useful lifetimes," Ford says. "This is because normal bearing relubrication practices replenish only a relatively small portion of the grease and the bulk of the grease in the bearing, at any given time period, has been there for a much longer time than the lubrication interval."

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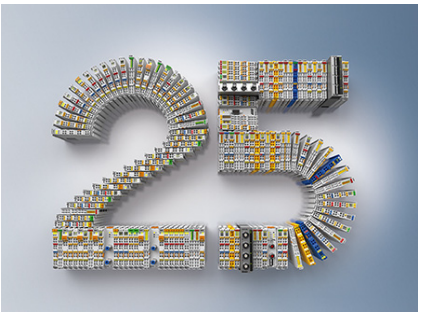
25 Years of Bus Terminal I/O: A Revolutionary Idea Celebrates its Anniversary



The electronic terminal block is a foundational component and global standard in automation technology.

25 years ago, Beckhoff had an idea that revolutionized the automation technology of the time: The Bus Terminal combined fieldbus technology with the proven terminal block principle for the first time. The final result was developed together with Wago Kontakttechnik.

The modular and open I/O system for space-saving, customizable and highly flexible configurations was then presented at the Hannover Messe trade fair in 1995.

As an industrial electronics and communication specialist, Beckhoff intentionally continued the advancement of the existing block module concept for the electronic terminal block. In itself, this significantly reduced cabling requirements for I/O installations. However, the new Bus Terminal concept went one step further: The aim was to replace the traditional modular terminal block with an electronic version.

When developing this innovation, Beckhoff drew on its many years of automation experience together with its specific expertise in fieldbus technology, communication technology, control cabinet construction and the development of industrial hardware and software.

Thus, the process not only developed the complete hardware, software and K-Bus communication for the terminal system, but also a complete product family with Bus Couplers as well as Signal and System Terminals. The result was a fieldbus-independent, highly modular I/O system.

Following the introduction of the Bus Terminal in 1995, this technology quickly went on to become a worldwide and universally accepted automation standard. This applies, in particular, to Beckhoff's system concept: 25 years of development and application experience are reflected in the broadest I/O portfolio on the market.

Bus and EtherCAT Terminal technology is used today in an extremely wide range of applications, from machine automation to Ethernet-based building automation and process technology.

Contributing to this success has been both continuous development and close cooperation with customers, which has often given rise to new product ideas and developments. This successful collaboration has resulted in today's comprehensive IP20 and IP67 I/O portfolio from Beckhoff, which is still based on the original Bus Terminal idea.

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High-Level Pressure Sensors for Complete Systems

Keller's standard product catalogue covers most applications for pressure measurement technology. However, there are often great benefits to optimising pressure sensors specifically for use and integration into higher-level complete systems.

Keller's modular product design offers great flexibility and allows customer-specific adaptations to be made without causing soaring costs – even for small production runs.

Sharing expertise to create the perfect sensor solutions

Keller has 50 years experience in countless challenging projects in the field of piezo-resistive pressure measurement technology. Applications that at first glance may seem trivial, can actually prove to be highly complex on closer analysis. By taking the actual usage conditions of the sensor into consideration right from the outset, Keller has achieved major improvements in effectiveness and durability. Keller has found that a mutual exchange of expertise with customers has been central to their success, and sharing that knowledge is what has enabled Keller to find the best sensor solutions.

The stages of creating a tailored customer-specific solution

1. Define basic sensor specifications in order to select the appropriate component
2. Assess the environmental conditions to determine the appropriate design for the intended location
3. Design the requested customer-specific solution taking all standards and laws into account
4. Assemble the electronic modules, taking into account application-specific customer requests
5. Configure electrical interfaces and connections
6. Custom product labelling with laser engraving or labels

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First-of-its-Kind Software Solution Allows for Instant Data Sharing and Recall Directly on an Oscilloscope

TekDrive™ is the first native oscilloscope-to-cloud software solution to facilitate global data collaboration directly on an oscilloscope, PC, phone or tablet.

Created to enable ultimate ease and accuracy in data accessibility and collaboration, TekDrive provides engineers the ability to instantaneously share and recall data directly on an oscilloscope, eliminating the need for cumbersome data-sharing practices.

TekDrive allows for data to automatically become accessible, usable and shareable across teams and partners, making remote work easier—all with industry-leading security practices built in.

In addition, TekDrive is the first general purpose test and measurement file system with scope-like data visualizations. The software provides ultra smooth visualization and analysis capabilities that support any modern browser, including options to view, zoom, pan, measure, decode and analyze full test and measurement data on any device without the need for any additional software.

"This technology is a game changer for teams," says Tami Newcombe, president of Tektronix. "Clients tell us about insecure data-sharing practices that are awkward and unreliable, and now with TekDrive, data sharing is secure and lightning fast. Launching TekDrive marks a major expansion of our Tektronix vision to focus on relevant and cutting-edge software solutions that directly correspond to the latest industry needs."

Seventy percent of oscilloscope users have the need to transfer data off scope. Through TekDrive, data updates are instantly saved in globally-accessible shared folders in which owners can manage secure access and permissions at a granular level.

"Engineers needed their own workspace in the cloud to securely manage complicated, real-time data from their oscilloscopes. TekDrive fulfills that need, whether they are working in the lab or at home," says David Sulpy, chief information officer at Tektronix.

TekDrive was built with the engineer in mind, and boasts a clean, easy-to-use interface for file organization, management, search, upload and download. It's also architected for ease-of-integration with secure vendor-agnostic REST APIs for scripting, automation and analysis.

Tektronix provides SDKs and examples in multiple languages, such as Python, Matlab and LabVIEW. The TekCloud Developer Program also provides a secure way for third party developers to add native TekDrive capability to their devices, instruments and software applications.

With a quick integration, any vendor of hardware or software can unleash the ecosystem of TekCloud storage, streaming, visualization and analysis into their products.

"Aggregating data from various instruments has always been a challenge. Engineers often use unsecured USB sticks, or worse, snap photos of the instrument's screen with a phone," says Siddharth Deliwala, director of laboratory programs at University of Pennsylvania. "Being able to share data directly from instruments via TekDrive is a breakthrough for engineering teams in the commercial and academic space to learn and innovate efficiently."

TekDrive is now available in many regions worldwide and will be released globally over the coming months. All TekDrive users receive a free contributor account, which grants participation rights in shared files and folders, with the Enterprise Tier boasting unlimited contributors. A 14-day trial is also available.

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A Safe and Easy Way to Keep an Eye on Water Quality

Ready-to-use water analysis panels ensure water monitoring with minimum effort and maximum reliability. The complete modular solutions are suitable for all industries.

They are customized and perform particularly well at challenging measuring tasks. Operators of municipal WWTPs, drinking water and industrial plants benefit from quick installation, state-of the-art instruments on the panels, as well as foolproof operation.

Reliable quality checks with customized analysis panels

Anyone tasked with providing clean water as cost-effectively as possible will know that this can become a mammoth job. This is due in part to the need for consistent, end-to-end verification of the required water quality. This is why several different measuring points are necessary to monitor critical measuring parameters. In addition to the high costs, a considerable amount of work and a great deal of expertise is involved in terms of the correct installation and supervision of the different measuring points.

This challenging objective can be easily achieved with a water analysis panel, which is precisely tailored to the individual measuring requirements in the plant and is equipped with all the relevant measuring parameters.

Endress+Hauser supplies these panels with short lead times. They are fitted with state-of-the-art devices and are optimally designed and foolproof to operate and maintain. Operators can thus save valuable working time. At the same time, these complete solutions take up very little space in the plant.

Endress+Hauser uses a unique, modular system for the design, which enables customers to access support very quickly: from conceptual development to implementation and commissioning. This means that plant operators are always on the safe side, particularly in terms of costs.

When plant operators receive their water analysis panel, it is completely ready-to-use and includes all components from sample preparation to the transfer of data to higher-level systems.

This allows seamless integration into existing communication networks, such as Profibus DP, Modbus TCP/IP, as well as remote monitoring via web server and a cloud connection). It's then simply a matter of connecting the panel and it's ready to go.

Master challenges easily

The compact and clear arrangement of all measuring equipment on a single panel makes it easy to operate. The user-friendly Memosens and Liquiline platform, on which all panels are based, requires significantly less specialized knowledge on the part of personnel, as do the sensor diagnostic functions, which are enabled by integrated Heartbeat Technology.

This enables status-oriented maintenance and easy inspection of the entire measuring point. With these water analysis panels, plant operators are also well equipped to cope with increasing requirements. That is because the panels can be easily extended to include, for example, the measuring parameters ammonium, phosphate, nitrate as well as total chlorine, free chlorine and bromine.

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Wide Beam Retroreflective Sensor

The Q76E has a unique design that enables consistent detection of a broad range of targets that typically challenge other sensors.

Each sensor generates a wide sensing beam capable of reliably detecting pallets, boards, totes with gaps or holes, packages, pouches, and other irregularly shaped targets, as well as objects in clear or reflective packaging.

Optimize sensor performance

The Q76E features two sensitivity levels and manual adjustment for detection of challenging targets, such as shrink-wrapped pallets, small objects, and film or perforated packaging. Use the TEACH button to adjust sensor sensitivity and select light or dark operate.

Increased sensitivity mode enables detection of objects as small as 8 mm in size. The Q76E also offers an IO-Link model for increased data availability, remote configuration and monitoring, and simple device replacement.

Easy set-up and alignment

The Q76E features a visible red beam for simple alignment and bright LEDs for visual indication. The small gap in the sensing beam allows accurate alignment of the sensor.

Additionally, it features a 250 Hz switching frequency for high speed production lines.

Applications

- Detect objects on a conveyor
- Pallet/material handling detection
- Leading edge detection of irregularly shaped objects

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Combining the Power of Pneumatics with the Accuracy of Electronics

Camozzi Automation has developed a multi-technological approach that bridges the gap between electric and pneumatic actuation using advanced proportional technology.

For applications that require accuracy, quick response times and control optimisation, Camozzi offers a series of products that use this proportional technology to control flow rate, pressure, and position. This allows us to combine the power of pneumatics with the accuracy of electronics.

We split proportional equipment into two categories, valves and regulators, with multiple options within each category. To select the best product for the application, variables such as operating pressure, flow rate, type of control, accuracy and dynamic range need to be considered.

Our latest offering, the Series PRE proportional pressure regulator with *CoilVision* technology, is a high-precision regulator with closed-loop control to accurately maintain a set pressure in the system. An external pressure sensor can be connected to the regulator to provide the pressure measurement at a precise point of the process, particularly if the pressure of aggressive gases or liquids needs to be used as the reference.

Offering flexibility in terms of control: the PRE is available with 5-bit digital control, giving a maximum of 32 different pre-set pressure points; or an analogue version with either 0-10 V or 4-20 mA signal from the PLC; or there is the IO-Link version, compatible with the latest communication trends in industry.

A feedback signal is also provided to indicate actual pressure readings from the sensor. This allows the pressure to be continually adjusted or optimised to carefully control a process, for example, precise dosing of a chemical or tensioning a roller.

It comes with or without a display and there is an option for an integrated exhaust valve, which enables the system to exhaust even in the event of a power failure. A manifold version enables the control of several outlets with only one inlet.

Furthermore, the unit is modular with our FRL range so that the quality of the air feeding the unit is easily ensured. The PRE is also available with Wi-Fi connection for easy monitoring via the cloud and comes standard with a USB port for configuration via PC, using software that is freely available on our website. Oxygen compatibility or ATEX certification can also be provided.

It is the continuous monitoring capabilities that truly set the PRE apart. *CoilVision* is the latest condition monitoring system from Camozzi, which constantly monitors the operation of the solenoids in the regulator and prevents possible malfunctions. All data coming from the regulator can be transmitted wirelessly to the cloud, where it is aggregated and used to assess the usage and operational efficiency of the regulator summarised in a visual dashboard. Importantly, the condition status can also be sent to the PLC via IO-Link for integration with the control system.

The Series PRE is available in two sizes and with different pressure and communication configurations, including IO-Link connectivity.

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Process Cranes for "Green" Power Generation

Demag, Germany, will supply Green Steam Hürth GmbH, a subsidiary of E.ON, with three process cranes equipped with grabs for a heat and power plant project. The project comprises the build of a biomass power plant with an output of 20 MW of electricity and 87 MW of heat energy at the site of the UPM paper plant in Hürth near Cologne, Germany. This project be the first to make use of Demag Remote Operating Stations (ROS), which enable the remote control of crane systems.

Managing Director of Demag, South Africa, Emil Berning said "This is a Demag milestone, where our innovative ROS, which sees the first use of Demag remote control of crane systems, is to be utilised in a brand-new European power plant project. The ROS system is a new addition to our previous offering of two variants for the control of process cranes, and its brand new technology enables the operator to control the crane from any convenient working environment".

The power plant, where E.ON is investing some EUR 110 million is due to go online in mid-2022 and will provide heat for the Hürth paper factory whilst at the same time, feed renewable energy into the grid. UPM produces more than 300,000 tonnes of high-quality newspaper made from recycled paper at the factory every year.

The paper production operation needs a lot of heat (in the form of steam) and the combined heat and power generation is particularly efficient. In this case, it is also particularly sustainable, since the power plant is fueled by wood residues, which E.ON procures in the region. According to E.ON, this will provide an efficient and reliable supply of virtually CO2-neutral energy to an industrial operation that requires a lot of energy.

Demag will deliver two process cranes for the automated continuous supply of wood to fire the boiler in the power plant. Some 45 tons of wood need to be fed around the clock every hour. The two double-girder cranes, which have a load capacity of 14 tonnes and a span of 20.6 meters, will travel on a crane runway measuring almost 100 meters in length. All of the crane travel drives feature variable speeds; energy recovery when braking and lowering loads enhances the energy efficiency of the cranes. Hydraulic multi-jaw grabs with a capacity of 12 m³ will be used as load handling attachments.

Cranes continuously feeding fuel

The crane systems will largely operate in automatic mode. The Demag Warehouse Management System (WMS) software will ensure, for example, that the bunkers are cleared, that the boiler is continuously fed with the required quantities of wood and that both cranes complete their coordinated tasks.

Not only the fuel, but also the ash as a residual material is handled by a Demag crane. The Demag engineers have specified a smaller double-girder process crane with a 5.4-tonne load capacity and a hydraulic grab for this task.

The three crane systems will operate under challenging conditions with high humidity (up to 100%) and high dust levels. They are ideally suited to meet these requirements, as Demag has already designed and delivered many cranes for refuse recycling installations and biomass power plants all over the world.

Demag ROS: crane control system with multiple views of the operating location

Since it is very difficult to view the entire very long fuel bunker from a conventional crane cab, the project engineers at E.ON decided in favour of a special Demag option. If the cranes need to be operated under classic manual control, this can be done via a ROS, which also serves as a monitoring station when the cranes are running in automatic mode.

ROS is a remote control station that includes all operating functions of a process crane with a crane operator seat – except that the operator does not view the crane and its operating environment direct, but via a widescreen monitor that shows images from several cameras in real time. The screen layout can be configured to meet process requirements, with information relevant to the process being automatically displayed.

A ROS station like this can be located very far from the crane and at the Hürth biomass power plant, it is installed in the control centre, so the operator can benefit from improved working conditions.

The many installed cameras ensure he has an even better view of the process than from a crane cab. This is because the cameras can also "look" where the normal field of vision would be restricted.

Berning commented that in simple terms, the ROS is a complete, location-independent operating station for cranes. The operator has access to all the control elements that are normally installed in a crane cab. "Just as in the cab, the control unit can be optimally adapted to meet the operator's needs. With ROS, however, the owner can decide where the "virtual" cab is located, and that makes for greater flexibility while still offering all the standard safety checks. I see many applications in energy and industrial sectors in South Africa benefiting from this new Demag technology, making specialised crane activities easier to manage".

With the ROS system, all control elements are compactly and ergonomically integrated into a console panel, the height of which can be adjusted so that no matter where the crane is located, it can be operated from either a sitting or standing position. In addition to the usual joysticks with adjustable armrests, a touch panel or – or if the user chooses – a tablet can be used as a human-machine interface, via which the operator can call up additional information. This third ROS system makes cab training easier and also significantly reduces investment and operating costs because no cabs need to be installed on the cranes themselves and access to the cab is not needed.

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Kinetrol Extends its Actuator Product Range with the Addition of the Model 60

Kinetrol Limited, the UK manufacturer of quarter-turn pneumatic actuators, has further increased its product portfolio with the introduction of the Model 60.

The new unit, which joins the wide range of actuators already manufactured by Kinetrol, increases the company's torque output coverage to over 40,000 Nm (350,000 lbf.in) to include 16" engineered ball valve and 2m butterfly valve applications.

The Model 60 is currently the largest actuator in the Kinetrol collection, adding to the sixteen units already available, starting at 0.1 Nm. The unit is a single vane actuator, giving 'direct drive' rotary control. The one moving part construction minimises side loading, eliminates axial loading and increases life expectancy.

The Model 60 also utilises Kinetrol's preloaded, double-opposed, polyurethane lip seal and air consumption reducing/energy absorbent side plate technologies. This, coupled with a new end-stop design, extends the actuator's life, reduces its energy consumption and maximises its operating speed.

As with their existing actuator range, the new Model 60 benefits from Kinetrol's popular modular concept of control accessories. This allows the customer to choose from a range of options such as the AP (pneumatic), EL (electropneumatic) and DP3 positioners, safe and hazardous area limit switch boxes and the company's distinctive clock-type spring failsafe packs.

Geoff Burton, Sales and Marketing Manager at Kinetrol, said 'This new addition to the Kinetrol range will allow us to expand into new markets, offering customers an alternative actuator solution for their larger valves with all of the proven benefits of Kinetrol's quarter turn rotary design. The new unit is subjected to our rigorous quality and test procedures and carries a guarantee for up to 1 million cycles'.

Compared to traditional actuator types of this size, Kinetrol's Model 60's output torque, in double acting applications, is uniform across its operating cycle, facilitating more optimal sizing and providing a very compact solution.

In addition, Kinetrol's spring design, for single acting applications, results in much lower torque output losses - further enhancing compactness and eliminating spring fatigue failure. A technical data sheet for the new Model 60 is available on the company website.

The unit is featured in the company's new look product catalogue which gives complete technical details on the full range of Kinetrol products.

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Monitoring Compressed Air in a Few Steps - Without Separation

The SL870020 sensor monitors compressed air consumption with high measuring accuracy. In addition, it is possible to retrofit the sensor into existing systems during operation and for device maintenance during operation.

At a suitable measuring location, with dry air and under consideration of the inlet/outlet section, only a flange with a G½" ball valve (retrofitted if necessary) is required. Then the sensor is screwed onto the ball valve, which is opened then.

The system does not lose air at this point. Afterwards, only the clamping sleeve has to be loosened and the measuring head has to be pushed in until it is placed in the middle of the pipeline with the help of a scale.

Finally, the clamping sleeve is tightened again, which completes the installation. Now only the measuring results are missing. A Modbus RTU interface, a pulse output for counting or a 4-20mA analogue output are available for this purpose.

Thus, the entire information on air consumption can be easily processed in-house, so that you never lose track of the costs.

The solution portfolio is rounded off by a local consumption measurement system that reliably performs its service even in confined spaces.

The sensors listed below have an internal flow straightener. Therefore they require no or in exceptional cases only a very short inlet and outlet distance.

- SL890021 DN 8 G 1/4
- SL900021 DN 15 G 1/2
- SL910021 DN 20 G 3/4
- SL920021 DN 25 G 1
- SL930021 DN 32 G1 1/4
- SL940021 DN 40 G1 1/2
- SL950021 DN 50 G 2

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Automated Cake Cutting System

Tectra Automation engineered a unique automated cake cutting system for Brenell Quality Desserts in Pietermaritzburg.

The company's previous solution for cake cutting was a manual process and it now sought an automated solution that would be more productive, faster, more precise, and could cut more than one cake at a time. Tectra Automation, along with Ultrasonic Systems designed and manufactured the automated turnkey solution.

The new automated system uses an ultrasonic, vibrating blade to perfectly cut one cake in under one minute. The ultrasonic cutter vibrates 40 000 times a second, resulting in not only fast cutting but also highly precise, non-damaging cutting within the very high food and beverage industry safety standards.

"The new system positions, cuts and portions two cakes in less than a minute – a massive time saving for the client," says Nico Davies, Mechatronics Engineer at Tectra Automation. Once the cake is positioned, a live curtain is activated for worker safety and the ultrasonic blade is cleaned after every cycle.

The solution used Bosch Rexroth 4-axis linear motions products, Aventics pneumatic clamping systems, a Bosch Rexroth aluminium profile, and control system to achieve a fully automated and scalable system for the client.

"Using virtual meeting platforms, we worked very closely with the customer and Ultrasonic Systems throughout the design, production and FAT processes. The lockdown didn't slow our processes at all and we met all project timelines, creating a truly customised, turnkey solution drawing on a bouquet of premium-quality international brands," Davies concludes.

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Contactless and Precise Determination of the Volumetric Flow in Systems and Piping

The new GEMÜ 3040 ultrasonic flowmeter can be used to determine conductive and non-conductive volumetric flows of liquids in a contactless process.

The 3040 ultrasonic flowmeter is distinguished by its suitability for a wide range of nominal sizes (DN 10 to 50), its lack of moving parts in the media-wetted area and its increased accuracy and reproducibility of measurement results. The device can be used to measure both conductive and non-conductive media within a pressure range of 0 to 16 bar with an accuracy of 2% of the current measured value. The flowmeter can be used in a temperature range of between -10 °C and 80 °C.

Its high-quality plastic body means that the flowmeter can be used for corrosive media, such as acids and alkalis. Its use in cooling circuits, chemical processes and water supply projects make up just a small part of the GEMÜ 3040's diverse areas of application.

The illuminated display, which is installed as standard, means that programming can be carried out directly on-site.

In addition, all of the important operating parameters can be read directly on the flowmeter and it comes with integrated empty pipe monitoring and a quantity measuring device as standard.

In order to optimize integration into different applications, all of the standard electrical and mechanical connections are also provided.

As sensor systems are also often used in control circuits as part of process automation and monitoring, the GEMÜ 3040 measurement device can be combined with a GEMÜ valve and GEMÜ positioner or process controller to form a complete pressure control system.

With the launch of this ultrasonic flowmeter, GEMÜ is further expanding its product range of measurement systems. In addition, the GEMÜ C38 SonicLine ultrasonic flowmeter remains available for ultra pure applications.

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Compact Drive Technology in a Robust Metal Housing

Beckhoff integrates servo drives with higher performance and functionality directly in the EtherCAT I/O system.

The new ELM72xx EtherCAT Terminals are fully functional servo drives in a robust metal housing that deliver an output current (I_{rms}) of up to 16 A at 48 V DC for the power supply. They expand the Beckhoff portfolio of compact drive technology in I/O terminal format and offer all of the current technology features together with increased performance and functionality compared with comparable EL series I/O designs.

The ELM72xx modules' metal housing provides optimum heat dissipation even at high output power as well as optimal shielding against electrical interference.

The new servo terminals can be directly connected to other EtherCAT Terminals and form an integrated component of the Beckhoff I/O system.

The comprehensive functionality includes the direct connection of the motor, feedback and brake via the convenient connector front end, an integrated absolute value interface and One Cable Technology (OCT). Additional I/Os enable latching of position values.

In addition, the integrated brake chopper control allows a braking resistor to be connected directly. The system also integrates programmable TwinSAFE Logic for direct implementation of the safety application in the terminal and safe drive technology either as STO/SS1 via Safety over EtherCAT (FSoE) or as a comprehensive package of Safe Motion functions for safety relevant drive technology via TwinSAFE.

Five different ELM72xx models are currently available. These are equipped with either STO/SS1 or Safe Motion:

– ELM7211: 1-channel servo terminal with 4.5 A (I_{rms})
– ELM7212: 2-channel servo terminal with 2 x 4.5 A (I_{rms})
– ELM7221: 1-channel servo terminal with 8 A (I_{rms})
– ELM7222: 2-channel servo terminal with 2 x 8 A (I_{rms})
– ELM7231: 1-channel servo terminal with 16 A (I_{rms})

In contrast to the established EL series, the ELM72xx wiring level utilizes a pluggable design. Matching motor and sensor cables further simplify installation. The drive design – ELM72xx combined with AM8100 Servomotors – is implemented using the familiar TwinCAT 3 Motion Designer software (TE5910).

The electronic nameplate and the TwinCAT 3 Drive Manager 2 software (TE5950) ensure effortless commissioning.

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Robot Streamlines Food Deliveries in a Pilot Trial

An autonomous mobile robot has been seen moving around the corridors of the REDI shopping centre in Kalasatama, a neighbourhood in Helsinki.

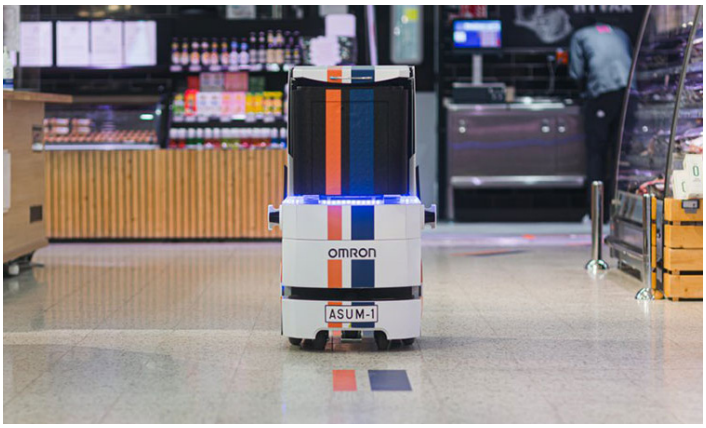
Operated by OMRON's solution partner Dimalog, the robot was taking part in a month-long 'Home-on Demand' automated courier service trial. This is testing the potential for using autonomous robots for deliveries to urban homes.

It's part of a larger experiment called the Six City Strategy 'New solutions in city logistics' project, which is looking at possible options for last mile deliveries in Finnish cities.

It's looking for solutions that will organise urban logistics as lightly, sustainably and efficiently as possible.

The trial was arranged by Forum Virium, the City of Helsinki's development company, in conjunction with construction company SRV. Other organisations involved in the project include elevator company Kone; the K-Supermarket in the REDI shopping centre, Asumi, a digital resident service platform and the design studio, Muotohiomo.

For the trial, the OMRON mobile robot was programmed to deliver items of food from the shopping centre to apartments in the nearby Majakka tower block.



Refining the robot

OMRON, Dimalog and Muotohiomo worked closely together to refine the operation and design of the robot so that they met the specific needs of the project.

To move around successfully, the robot had to navigate the supermarket and tower block corridors as well as using elevators and service tunnels. As it moved, the robot both whistled and talked in Finnish (using a speech synthesiser).

Lotta Toivonen, Development Manager for Housing Services at SRV (which built both the shopping centre and the Majakka tower block), comments: "The idea of whistling is that it's a funny thing. On the other hand, people realise that the robot is coming. It speaks a bit, and people greet it. It is treated as if it was a person."

Kaisa Spilling of Forum Virium adds: "It's been fun to see how people along the way feel like it's human. It might say in the elevator: 'I'm sorry I would like to get out here' or 'Oops, the elevator is full, I'll ask to use another elevator.'"

Running the trial

So, how did the trial work? Each delivery started with the receipt of an online order from a customer using the Asumi platform. Orders could also be placed through the supermarket by the shopping centre's smaller businesses.

The items (mainly meals) would be collected at the supermarket and loaded by staff into the robot, which would then deliver the order to the relevant business or apartment. The customer would receive an automatic notification as soon as the robot delivered the item.

Kaisi Spilling remarks: "During the coronavirus epidemic, the robot has brought lunches for homeworkers. Lunch time has been fully booked."

Throughout the trial, the robot could request an elevator itself but needed an escort to open any doors that might have to be kept closed due to fire safety regulations.

The escort was a university service design student, who reported any problems encountered by the robot and observed its interaction with people.

Self-navigating robots

The robot used on the trial was an OMRON LD model - a self-navigating autonomous mobile robot (AMR). Unlike traditional autonomously guided vehicles (AGVs), OMRON's mobile robots don't need any expensive modifications to facilities (such as floor magnets or navigational beacons).

They navigate by the natural features of the facility, having been designed to move material within challenging environments that might include confined passageways, as well as locations where there might be people moving around. OMRON's software also integrates with a company's other systems so that the robots can become operational in minimal time.

Esa Korhonen, Area Sales Manager at OMRON in Finland, explains: "Our mobile robots can dramatically boost the productivity of logistics operations. They can navigate effectively and provide invaluable support to human workers. This enables employees to focus on other tasks that require complex human skills. "

Kaisi Spilling concludes: "We are looking for new agile logistics solutions in the city. We are exploring how we could improve the smoothness of everyday life in building the future. Robotics is essentially related to a smooth everyday life."

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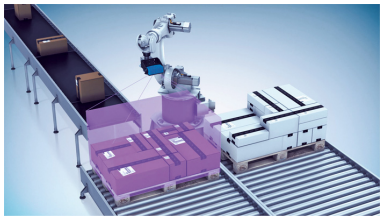
Providing 3D Machine Vision for Automated Logistics Operations



SICK Automation and Neadvance, a company specialising in computer vision technologies and artificial intelligence solutions, collaborated to engineer the ideal automation solution for a motor manufacturer in the Czech Republic.

The manufacturer needed to implement an automated step in its receiving department to facilitate robotic picking of palletised items and their subsequent transfer to conveyors.

The central element of the solution is the use of articulated robots combined with the SICK Visionary-T 3D camera. The manufacturer's depalletising robot had to be automated to the point where it could independently and consistently recognise the positon of individual parcels and packaging units on a delivered pallet and reliably grip them for transfer. The Visionary-T CX with 3D snapshot technology was selected. Its streaming camera is able to supply the robot controller with three-dimensional images in the form of 3D point clouds.

The device uses 3D time-of-flight technology to generate the 3D images. This technology, based on light being emitted from a built-in light source, measures tiny time differences in the reflection from an object's surface back to the camera. The time differences help calculate the distance to the reflective surface and, using special Neadvance-developed algorithms, convert them into a three dimensional representation. The camera's high frame rate allows this process to be done up to 50 times a second.

Another advantage of this technology is the powerful active lighting system integrated into the camera. It illuminates the surroundings enabling the camera to detect objects with very low reflection properties and operate in complete darkness.

Into action

The switch to 3D snapshot technology from SICK and the close collaboration with Neadvance has resulted in a technology breakthrough.

Within the manufacturer's goods receiving system, the Visionary-T CX is attached to the articulated joint of the robot, continuously moving with it and acting as an alert 'eye'. This enables the streaming camera to deliver information about the robot's dynamic accelerations, reversing movements, and vibrations. The 3D snapshot vision technology was explicitly important for Neadvance in this application, as every single depth and intensity pixel of an image is captured simultaneously.

In its daily operations the Visionary-T CX delivers the 3D point clouds and, using the Neadvance algorithms based on 3D shape analysis, determines the exact position of crates and cardboard boxes. The robot then moves its gripping device to the corresponding co-ordinates, picks the item and places it on a conveyor. To grasp the next crate, the process is repeated.

The solution has proved its reliability and efficiency to such an extent that the OEM is planning to implement it in its other plants. The project's general contractor and system integrator were so impressed with the Visionary-T CX 3D snapshot technology and time-of-flight principle, that they will be integrating it as standard in depalletising processes.

Visionary-T CX – a snapshot overview

- Record up to 50 3D images per second
- More than 25 000 distance and intensity values in a single shot
- Distance values: 144 x 176 pixels per recording
- Output of 3D data via a Gigabit Ethernet interface and simple digital outputs
- Provision of application-specific data
- Temperature range: 0 °C ... 50 °C or 0 °C ... 45 °C (depending on the housing), enclosure rating: IP67
- 3D information available for stationary applications
- Easy mounting and rapid sensor replacement
- Programming interface for the use of 3D data for additional evaluation on an external host.

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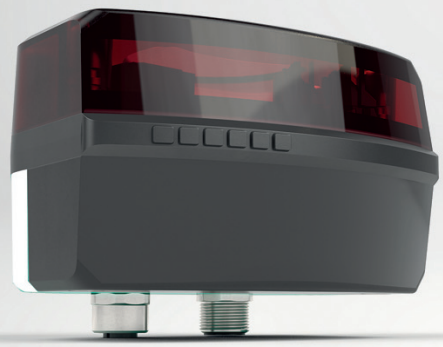
The R2300 Multi-Layer Scanner



Mobile robots—some recognisable as machines, some human-like or in a futuristic design—are becoming an increasingly popular option as service providers in public areas. Some of these, such as cleaning robots, simply need to detect environments and react correctly to obstacles to get their jobs done.

By contrast, others like information robots at airports such as Munich or Seoul, interact with people, deliberately approach them, or follow them. The R2300 multi-layer scanner from Pepperl+Fuchs enables service robots to detect their working environment in three dimensions to be able to move freely and function correctly.

The R2300 is a 3-D LiDAR (light detection and ranging) sensor for measuring the optical angle and distance. The multi-layer scanner generates four easy-to-use scanning layers, resulting in noncontact and highly accurate 3-D scanning of the environment. Compared to 2-D sensors that have only one scanning layer, the R2300 provides significantly more measurement information, resulting in more detection reliability and functionality.

This enables the sensor to meet specific challenges posed by service robotics. This includes, in particular, the detailed detection not only of a surface, but of complex environments and of changes within them, the right response to stationary, temporary, and moving obstacles, and deliberately approaching or following people.

Economic and socio-economic conditions ensure growth in the market for service robotics.

With the R2300, a sensor solution is available that can act as enabling technology for service robotics and is thus fully on trend. In its World Robotics Report 2020, the International Federation of Robotics (IFR) estimates the sales volume of service robots for the year to be around 13.9 billion USD. The focus is on logistic systems such as driverless transport systems and inspection and maintenance robots, integrated into digitalisation and personalised production scenarios.

Alongside other fields of application in outdoor or mining areas, the report also predicts the rise of medical robotics due to new technical possibilities and to demographic changes in all developed economies. These can include therapy robots in rehabilitation centers or service robots in the care industry.

In addition, more and more fields of application are emerging for service robots in public institutions. Mobile information robots are already as much of a reality at airports today as they are in museums. They are becoming increasingly prevalent in supermarkets and the hotel and restaurant industry. Room service, taking orders, clearing tables—all activities that service robots are designed for. And that are designed for such service robots.

The economic and socio-economic environment favors the development of differentiated forms of service robotics. As diverse as the fields of use in industrial or public environments are, all service robots are united by the need for the sensory detection of their working environment to be able to move within it. This is ideally captured in 3-D so that nothing is overlooked.

R2300: 3-D Vision for service robots

With its high precision, reliability, and compact size, the R2300 tackles mobile service robots applications in a technically and economically efficient manner. It is based on Pulse Ranging Technology (PRT), the innovative, direct distance measurement method developed by Pepperl+Fuchs.

A high-performance laser diode in the “eye-safe” class 1 sends short, high-energy light pulses, which are reflected by the target object and detected again by a receiver element in the sensor. The distance to the target object is calculated from the time it takes for the pulses of light to travel from the emitter to the receiver.

The special feature of this process, and thus the superiority of PRT over indirect processes with light sources that emit permanently, lies in the up to 1000 times higher energy content of a single pulse. This results in an ideal measuring range for applications including service robotics.

Starting just a few centimeters from the lens, the R2300 can detect objects on black surfaces up to 4m away and up to 10m away on white surfaces. At the same time, a measuring rate of 90 kHz and a high angular resolution of 0.1° guarantee high measurement accuracy and detection reliability, which gives service robots a high level of vision.

Combined with the precise infrared light spot typical of lasers, which, although invisible, projects sharply onto the object, the R2300 is able to reliably detect delicate object structures and contours. The resilience of the PRT against extraneous light, HF lamps, reflections from the field of application, and other noise pulses, prevents the autonomous mobile service personnel becoming disoriented and ensures high availability.

Boasting excellent integration and easy commissioning

Most service robots are space-saving and maneuverable—a design to which sensors and other vehicle components must adapt. The compact design of the R2300—with a height of just 58 mm—offers the required high level of space efficiency. The sensor measures in four levels simultaneously, providing 3-D functionality that would otherwise require multiple sensors, and therefore additional space and wiring.

The R2300 can also be electrically integrated into a service robot’s control system quickly and safely. The measured data—including angle, distance, and reflectivity—are output via the sensor’s Ethernet interface in a manner that supports automation. The provided raw data can thus be transferred directly to their automation solutions by integrators.

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A New Era of Collaborative Robot Technology

The FANUC CRX Series is a new type of collaborative robot that is designed to work directly alongside human workers. It is designed to become crucial part of the team, adding value to your business. The CRX can take over dangerous, repetitive tasks thereby maintaining the health of workers while automating assembly lines.

The CRX features contact stop technology which is designed to stop the robot immediately at any contact with a person.

The CRX is the perfect robot for the first time robot buyer. It is easy to use and has many user friendly features such as a tablet teach pendant which features drag and drop programming, which will feel familiar to anyone who uses a tablet or smart phone frequently.

It also features manual guided teaching, allowing the user to manually push the robot into its desired position.

The CRX robot is built off FANUCs world renowned reliability and boasts 8 years with zero maintenance.

This robot is designed to work without safety fences, realizing quick start up. This allows for a quicker return on investment.

The CRX Robot features a new space saving robot controller, the R-30iB Mini Plus.

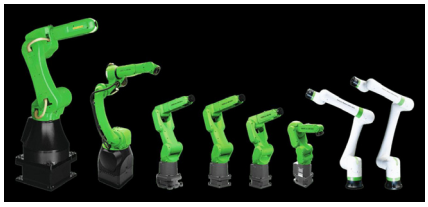
This controller runs off standard 220V single phase and can be selected with either a standard FANUC iPendant or the new Tablet type teach pendant

The CRX is currently available in 2 models.

CRX-10iA is a 6 axis collaborative robot with a payload of 10kg and a reach of 1249mm.

CRX-10iA/L also has a payload of 10kg with a reach of 1418mm and features underflip motion capability.

The CRX robot is designed to allow for plugins from 3rd party peripheral manufacturers.



This allows quick and simple installation and configuration of end of arm tooling like grippers. Various manufacturers have already released grippers and other peripherals designed for the CRX which include software plugins for easy operation

FANUC offers the widest range of collaborative robots on the market, featuring payloads from 4 to 35 kg and up to 1813mm reach.

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Robot Training Courses

Jendamark offer internationally acknowledged KUKA robot training courses in Pretoria, South Africa.

Modular in structure, the seminars enable step-by-step qualification on the basis of certified quality standards. At Jendamark, all instructors provide practical training, have many years of experience and are trained in teaching methodology.

Robot Operation Pro (4 Days)

This course is aimed at students with no knowledge of industrial robots. The goal of the seminar is to acquire basic skills required to operate a KUKA KRC4 robot.

Programming 1 KRC4 (5 Days)

Course aimed at students with no knowledge of industrial robots.

The goal of the seminar is to acquire skills required for setup and program a KUKA KRC4 robot.

Programming 2 KRC4 (5 Days)

Course aimed at Programmers and service technicians.

The aim of the seminar is to build on the skills taught previously on Programming 1 and to learn KUKA high-level programming language (KRL) and apply it in structured robot programs.

Service Electrical KRC4 (4 Days)

Course aimed at Programmers, service technicians and maintenance staff.

The participants in this seminar are trained in the fundamentals of proper fault diagnosis and troubleshooting for the electrical equipment of the KRC4 robot system including the necessary skills to re-commissioning a KR C4 system after repair work.

Safe Operation KRC4 (3 Days)

Course aimed at Programmers, service technicians.

The participants in this seminar are trained in the fundamentals of proper commissioning, fault diagnosis and troubleshooting for the option package Safe Operation.

Kuka Profinet Fieldbus Technology KRC4 (2 Days)

Course aimed at Robot service technicians and start-up engineers.

The participants in this seminar are trained in the fundamentals of configuring a Profinet network with the KRC4 robot.

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World's First Integrated Controller for Fully Automated Robotic Production Systems

Omron has announced the launch of the world's first "Robotic Integrated Controller", the new NJ501-R, based on Omron's industry leading NJ series of machine controllers for industrial automation.

With the integrated controller, it is possible to automate advanced and complex manual work and simulate the design and modification of production facilities in a virtual environment and conduct maintenance remotely.

The new machine controller offers real-time synchronization between all automation equipment, including robots, vision components, drives, and safety equipment.

Improving the speed and accuracy of production, users can simulate entire production lines without having to deploy physical equipment. This will simplify maintenance and reduce time-to-market during the design, planning, commissioning, and changeover processes.

Many industries are facing labour shortage issues, and the world is experiencing a major turning point with how society conducts business due to new global health concerns. As a result, the demand for more advanced automation with robots has increased, along with a growing demand for digitalization.

Traditionally, automation equipment for production facilities has been controlled by a number of different controllers creating a major challenge to setup and coordinate the speed and timing between various devices.

It was very difficult to verify a process design in advance with a high level of accuracy prior to construction of a machine or larger production line. After the equipment is commissioned, adjustments need to be made onsite and backtracking and specification changes are common, resulting in a huge number of man-hours.

As a manufacturer of motion sensors, robotics, and safety equipment for fully automated production lines, OMRON has now addressed these issues by seamlessly integrating the control equipment.

Integration of control and the construction process

The "Robotic Integrated Controller" automates inserting and assembling processes that require delicate and skilful processing. The robots and equipment are controlled and fully synchronized in real-time by a single controller, improving device performance, and achieving the world's highest level of throughput*[2].

Omron has also unified the programming languages for robot and machine control, making it easy to simulate a production line with single programming software. The system visualizes the process, reducing man-hours for process design and operational verification by up to 50%*[3].

Furthermore, all of this can be conducted remotely. Through Sysmac Studio's user interface, users can design, program, troubleshoot, operate and maintain future automation systems remotely from anywhere in the world.

Key features and benefits of the Integrated Controller:

- By integrating the PLC, motion, and robot control in a single controller, complex manual work that could only be conducted by humans can now be completed by robots.
- The programming language for the PLC and robot is unified in the generic IEC language, which allows engineers who typically manage PLCs the ability to also manage robots as well.
- With Omron's simulation technology, you can verify equipment performance at the early stage of equipment design, allowing mechanical designers and electrical designers to design in parallel. As a result, equipment commissioning can be completed in a shorter period, higher production capacity can be achieved, and mistakes and setbacks during equipment commissioning can be avoided.
- To run the simulation, the user can use the emulation function in Sysmac Studio. The system does not require a connection to the actual machine for operation verification. Also, the production capacity of the robot equipment can be monitored digitally.
- By re-using previous digitalized assets, it is easier to establish the next facility.

*[1] *The world's first: November 2019, according to the Omron research.*
*[2] *Highest level: November 2019, according to the Omron research.*
*[3] *50%: July 2020, according to the Omron research.*

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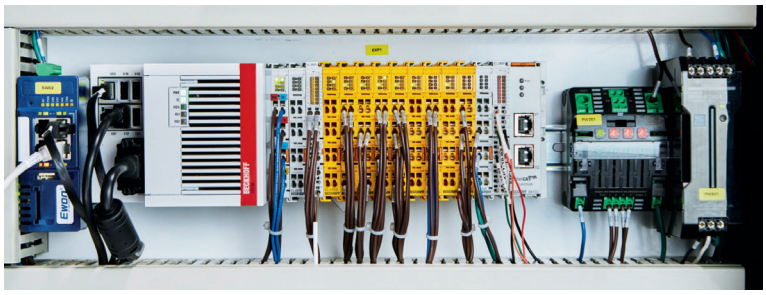
Precision Robotic Welding and 'Automated Programming' Enhance Efficiency in Structural Steel Manufacturing



In the construction industry, steel beams are manufactured in many different dimensions and changing quantities. System integrator AGT Robotics used PC-based control to develop a robotic welding system that operates fully automatically around the clock at McCombs Steel. The ability of AGT's Cortex software to interface with TwinCAT even enables automation of the weld schedule programming. Drive technology from Beckhoff contributes to the high welding quality through the precise positioning of loads weighing several tons.

Beams for buildings require reliable, high-precision welding to ensure structural integrity and public safety. McCombs Steel Company, Inc. in North Carolina, is certified by the American Institute of Steel Construction (AISC) and fabricates and erects structural steel and miscellaneous metals. As such, the company faces the challenges of maintaining high quality at the same time as lean manufacturing every day. The BeamMaster robotic welding system from AGT Robotics helped McCombs meet these challenges.

Canadian system integrator AGT Robotics specializes almost exclusively in robotic welding. The BeamMaster system was developed with the help of PC-based control and uses AGT's Cortex software with built-in artificial intelligence (AI) and a proprietary simulation engine to optimize weld schedules. The standard version comprises two or more servo-driven beam rotators, an articulated robot that moves parallel to the beam along a track and an operator station. The circular rotators can handle beams from 4 to 48 inches wide and up to 90 ft long with a maximum weight of 10,000 lbs and can turn 360°.

Flexibility for automated welding and programming

Louis Dicaire, GM at AGT, explains: "The automotive business produces a few parts maybe 100,000 times, so just a few robots repeat the same tasks for years. In structural steel, even though parts are similar, the beams have different widths, lengths, sections and accessories in an infinite number of combinations. That has slowed implementation of robotics in this industry."

In order to minimize the time and cost of reprogramming for such individual parts, AGT set themselves the goal of developing a system that would automate not only the welding, but also the programming. For that purpose, the AGT Cortex software imports 3D beam models from the Tekla CAD software that the structural steel industry relies on and uses them to create complete weld schedules for beam manufacturing.

"All joint types are covered, whether multi-pass or single-pass, a quarter-inch weld or a half-inch weld. The sequencing and flipping of the beam are automatic as well," Dicaire says. "So not only is the operation automated, but the automation programming is also automated: You could say that it's automation squared."

A universal platform for robotic welding

Transferring these software capabilities to a real-time machine control environment, however, required a similarly flexible automation platform. While searching for an EtherCAT master controller in 2015, the AGT engineering team soon identified PC-based control technologies from Beckhoff Automation as a comprehensive solution. "The openness of the Beckhoff platform, from the company that invented EtherCAT and TwinCAT automation software, was key for AGT," Ted Sarazin, Regional Sales Manager for Beckhoff, says. TwinCAT 3 provides deterministic control from a software-based master for BeamMaster. Programming of all functions, from PLC and motion control to safety and HMI, is directly integrated into Microsoft Visual Studio®.

Regarding hardware, the BeamMaster uses space-saving 8- and 16-channel EtherCAT I/O terminals, EtherNet/IP Bus Couplers to interface with the robot controllers and TwinSAFE terminals for integrated functional safety. These ensure that operators approach a beam only when the robot is not active in that specific zone. The PLC code runs on a CX5130 Embedded PC from Beckhoff that boasts a dual-core Intel Atom® processor. It delivers enough processing power for all motion and sequence planning tasks, along with other applications such as HMI, SQL databases and more. A CP2918 multi-touch Control Panel with an 18.5-inch widescreen display and integrated push-buttons serves as the operator interface. All motion control for accurate beam positioning takes place with AX5000 series Servo Drives and AM8000 servomotors from Beckhoff.

Reduced programming effort and costs

The development of Cortex software and careful system design of BeamMaster using off-the-shelf components from Beckhoff resulted in significant advantages for AGT. Programming of the first system took two months, but with easy code reuse, that is sped up to just half a day now. "Standardizing on Beckhoff also cut our component costs in half compared to previous solutions while providing more capabilities and options for customization," Louis Dicaire sums up.

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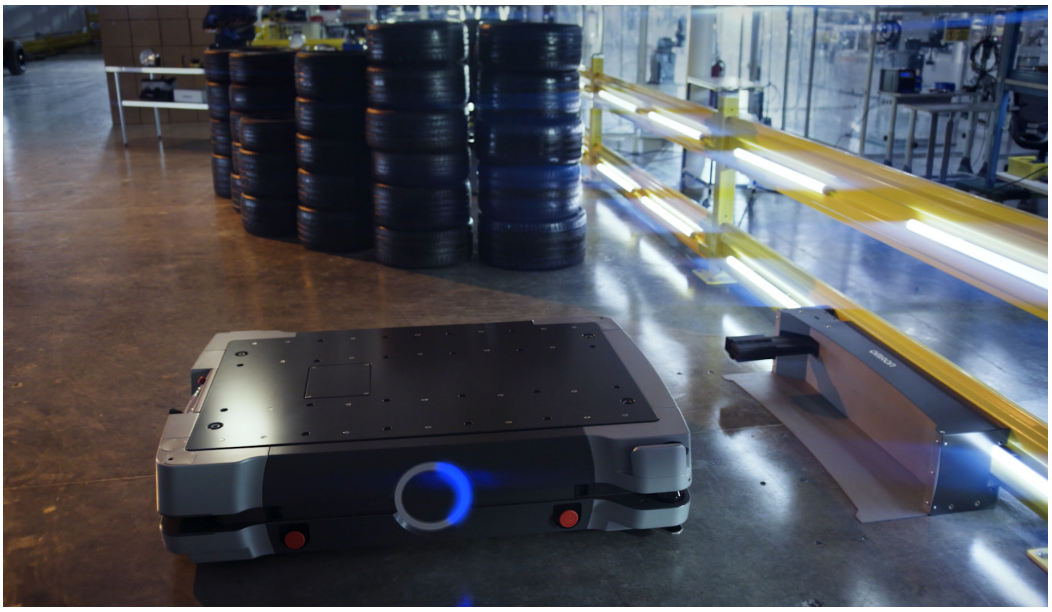
Strong But Agile: What to Consider When



Mobile robots are becoming an integral part of future-oriented factories. Autonomous mobile robots, also known as AMRs, have become progressively more versatile and can support various material handling tasks.

Mobile robots in the production environment help to reduce the workload of employees, take over routine tasks and comply with hygiene regulations, an issue that has become significantly more important because of the current corona pandemic.

In this context, experts expect the mobile robot market to grow from 18.7 billion USD in 2018 to 54.1 billion USD by 2023. Decision-makers in factories often assume that mobile robots are particularly suitable for short clearly defined distances and relatively small transport volumes. But this is far from the truth.

The following explanations and tips show what companies considering the purchase of an AMR, as well as those who must transport larger loads, should pay attention to.

Benefits of mobile robots in the factory of the future

AMRs play a major role in innovating supply chains by optimizing the traceability, speed and accuracy of routine operations. In warehousing and manufacturing they make processes more efficient, working safely side-by-side with humans and reducing the risk of employee injury in dangerous situations.

To meet the needs of flexible production, manufacturing sites must be agile enough to change or update a production line at short notice.

Since mobile robots are not fixed, they support this call for flexibility. Furthermore, innovative robots such as the Omron HD-1500 can transport loads of up to 1,500 kilograms, expanding application options to pallet-size loads and large and heavy automotive components.

Autonomous Mobile Robots vs Forklifts and AGVs

Forklifts are amongst the main sources of accidents and serious injuries in warehouses, and understandably many manufacturers are now looking into mobile robots to reduce these risks, utilizing their capability to carry heavy loads as well. When considering integrating mobile robot solutions to replace forklifts in a manufacturing facility or warehouse, it is important to rethink the entire process and understand the manufacturing flows.

Mobile robots are ideal in warehouses with automated storage and retrieval systems (ASRS) provided that the loads can be picked up by the mobile robot. When looking at WIP (work in progress) applications, mobile robots can bring great benefits in automotive manufacturing, adding flexibility to applications where the components are already moved on conveyors or shuttles.

Autonomous guided vehicles, also known as AGVs, are traditionally used in applications where material needs to be moved between facilities, covering distances greater than 300 metres.

Mobile robots can also bring value in long distance applications if multiple input and output locations are needed, especially if it is of utmost importance to make changes during transportation. An example would be to call the mobile robot to carry out an urgent task. In short, AMRs good solution for last-meters delivery where flexibility is needed.

When selecting a mobile robot for moving heavy loads, there are five key areas to consider:

1. What are the payload requirements?

When selecting the right mobile robot model for their operations, decision makers obviously need to look at the loads that need to be moved. Mobile robots with lower payload capacity are normally less expensive and more agile than models for heavier loads.

The HD-1500 can move pallet size payloads in manufacturing facilities, becoming a viable alternative to forklifts. Since it is built with sturdy metal skins, it is robust and able to withstand heavy unintended external impacts. Onboard sensors are protected as the robot completes demanding tasks.

2. How easy is the solution to deploy?

Mobile robots are easy to implement and provide flexibility because they can move more freely, without predefined routes, and can also be easily reprogrammed according to the task and calculating their own trajectory in real time, working safely side-by-side with people.

They enable easy collaboration between humans and mobile robots, but also between various types of mobile robots, and between mobile robots and other machines. A good fleet management system will help to maximize investment, as it helps to minimize the number of robots needed by coordinating them so that they share the tasks.

Selecting a Mobile Robot for Heavy Loads

Modern mobile robots can automatically calculate the best route for material transportation while navigating safely around people and obstacles without the use of magnetic floor tapes or other guides.

For example: a robot designed to deliver packages to a fixed location whilst automatically avoiding people or obstacles in its path. The robot can identify its own position by comparing the results from a laser scanner with an onboard map.

3. What is the impact on safety?

The most frequent accident risks in EMEA companies is the lifting and moving of heavy loads or persons (54% of respondents from 28 countries stated this).

Innovative mobile robots can take over these tasks while also improving safety since they come with extensive features that avoid collisions and obstacles, also when the mobile robot is rotating.

When an obstacle is detected, the mobile robot can react dynamically by slowing down, instead of abruptly stopping. The most advanced mobile robots are also capable of moving at high speed in aisles as narrow as three metres.

Other useful features are 360° safety coverage and stop position accuracy supporting a collaborative and safe working space.

Safely automating material transport operation is an area rapidly being enhanced with mobile robots in industries worldwide as a method not just to meet labour shortage challenges but to manage the risks associated with the spread of the Coronavirus.

4. Battery price vs performance?

Onsite logistics, the movement of products and material within the factory and warehouse, is becoming a bottleneck for many companies due to the frequency and tediousness of the job, compounded by rising labour costs and the need to meet social distancing protocols. Fast-paced manufacturing environments require speed and flexibility.

When selecting the right mobile robot for a specific application, other important aspects to consider in this respect are battery price versus performance.

Companies decide if they would rather invest in a low performance battery that will need to be replaced within a couple of years, or a more powerful battery with up to 11 hours uptime and 9,000 charge cycles, ensuring 10 years of operation 24 hours a day with a charge time of just 36 minutes.

5. How flexible is the solution and what kind of add-ons are available?

Manufacturers such as Omron are increasingly focusing on the ability of robots and machines to interact seamlessly. This enables production runs to be quickly and easily altered to allow for fluctuating lot sizes and reduces the need for workers to carry out repetitive tasks and heavy lifting.

Autonomous robots can be programmed with artificial intelligence (AI) to recognize and learn from their surroundings and make decisions independently. A practical example for the use of mobile robots in food and beverage manufacturing is trashcan handling related to recycling supported by system integrators with specialist add-ons mobile robots can for example, pick up and empty trash cans.

Mobile robotics - an innovative pillar in modern production

Over the years, the face of manufacturing has changed considerably – and it continues to do so. Now, a new phase is beginning, where machines are working more interactively with people. Companies such as Omron are looking towards the future of manufacturing by developing solutions that involve greater collaboration between man and machine. With the option to be equipped with a collaborative robot arm, in many applications, mobile robots are well-suited for working side-by-side with human colleagues, for example moving loads from conveyor to conveyor, thus increasing flexibility and efficiency in the production environment.

A new generation of mobile robots will help to ensure the future of manufacturing by enabling production sites to be much more agile, with flexible production lines that can adjust rapidly to meet changing consumer needs but also diverse production demands such as lifting and transporting heavy loads.

This in turn will enable manufacturers to be more responsive, more productive and ultimately to enjoy greater profitability.

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How Do You Measure Energy Consumption?

Setting up logging intervals.

With power, demand... and a power quality tool. With energy costs high, and getting higher, many facilities are trying to reduce their energy consumption.

Most have not previously analyzed their monthly energy usage, traced it to operational components, or broken out the utility fees. And until you understand how you're using energy, it's hard to make smart decisions on how to reduce consumption.

Core components of energy

If you haven't measured energy before, take a minute to understand how it differs from volts and current. When we talk about the "energy" supplied by the utility, we're talking about two primary components: power and demand.

Power, kW, is commonly measured in Watts, which indicate the rate at which energy is expended in one second. Watt-hours describe the total energy expended over other time periods, such as a month, as recorded for ac energy use by our electrical utilities. Watt-hours measure actual work, such as heating or cooling buildings, moving objects or liquids, etc.

Demand, kVA, measures the total requirement that a customer places on the utility to deliver voltage and current, without regard to the efficiency of that delivery or whether or not it does actual work.

Now let's start measuring. Use a regular digital multimeter with an accessory current probe to measure the voltage and then the current, and then multiply the two values to get demand - kiloVoltAmperes (kVA.)

This works for a simple single phase circuit where the load remains stable for the period of the two measurements. For a real-life load, we need to account for a few other elements.

Power factor, imaginary power, and harmonics

Power factor. If the circuit is operating at 100 % efficiency (which rarely happens), then demand is also a measure of power. In reality, power (kW) is usually less than demand (kVA). The difference, kW/kVA, is called power factor (PF). Utilities often collect a penalty charge if PF falls below 0.95. Some utilities are setting the bar even higher. Remember: Low power factor is bad; high power factor is good.

The typical industrial or commercial facility uses three phase energy distribution, and then uses that energy in a number of ways—to provide heating, operate three phase motors and motor drives, or handle single phase loads such as computers and lighting. Three phases make it harder to measure power or energy usage, particularly if you plan to use improved efficiency to reduce energy use.

Imaginary power: Volt-Amps Reactive (var) is a strange type of current flow that produces no work, but is present on your electrical distribution system.

It's part of the difference between power and demand and thus contributes to lowering power factor. It's usually caused by motor inductance, and is greater when those motors are not loaded to their full capacity.

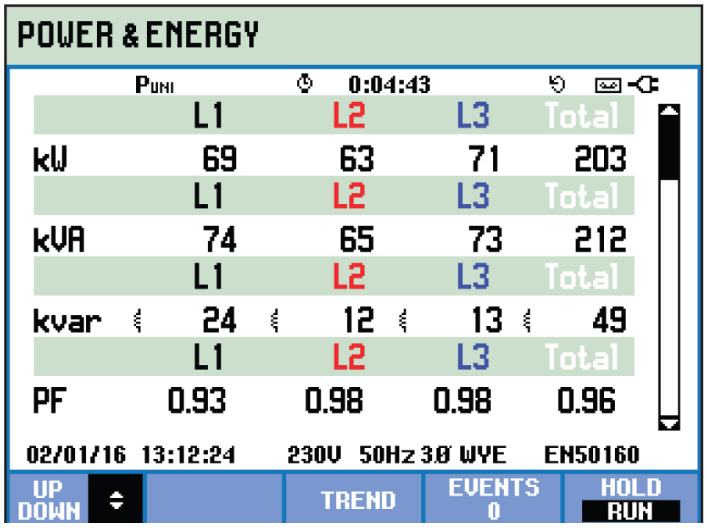

Figure 1. *Fluke 435-II power screen. This is a real time view of all the common power calculations. The kW, kVA, kvar and PF are displayed for each phase and total. The symbols to the left of the kvar readings indicates whether the load is inductive or capacitive.*

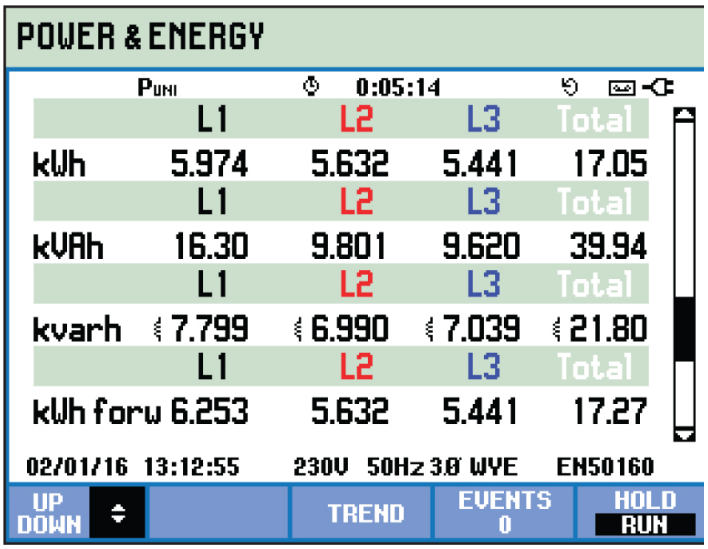

Figure 2. *Fluke 435-II energy screen when you scroll down. This allows you to track accumulated kWh, kVAh, kvarh, kWh forward and kWh reverse for each phase and total.*

A constant speed motor driving a large air movement fan is an example where mechanical dampers have been used to regulate air flow, making a fan less efficient. This also reduces the load on the drive motor and increases imaginary power in the electrical supply system.

Many facilities opt to change their motor supply from direct line drive to an adjustable speed motor drive, so that they can optimize the motor's opera-tion and speed to its load. That optimization uses energy more efficiently in the fan and motor and increases power factor.

Harmonic currents, reflected back into the supply system, are produced by the input rectifier loads of adjustable speed motor drives, computers, and similar electronic devices. Harmonics also reduce power factor.

How to measure power

To measure real power, we need a meter that can simultaneously measure voltage, current, and all the stuff mentioned above that lies in-between, over a one second period. A digital multi-meter can't do that. The solution lies in a power quality tool.

Depending on the make and model you select, you can test single phase, split-phase, three phase (3 wire or 4 wire) measurement configurations, and measure or record, V, A, W, VA, var, PF and Harmonics. Some of the recording models also provide the means to record measurements over time to report the energy readings used by the utility—kWh, kVAh and kvarh (see Figures 1 and 2). The good news here is that these tools will account for all of the issues mentioned above and accurately report energy use when it happens, as a function of instantaneous voltage and current measurements over time.

Timing

Here's the last complication. You can only measure energy as the work that your electrical system delivers to your loads, and that takes time. You can estimate what energy usage will be by observing power use for a short period of time. Using that information you can project longer term energy usage with some simple math.

Example: A 100 watt light bulb burning for one hour consumes 100 watt-hours of energy. That same bulb would use 100 x 24 x 365 = 864,000 watt-hours, or 864 kWh, over a year.

It gets a little more complicated with motors, variable speed motor drives, and computers, but if you measure the power usage for one hour and then apply some assumptions to the results, you can estimate the energy usage for a month or a year, pro-vided the rate of energy usage stays the same.

The other option is to do a 30-day load study with a power logger. That will get you the results shown in Figures 3 and 4, and an absolute understanding of your power consumption over time.

Getting started

Ready to measure power? Using your power quality tool, connect your voltage and current probes to your phase(s), and start monitoring. Check your Power (kW), Demand (kVA), and the resulting Power Factor. High PF is a good thing. Then check your detractors, vars and Harmonics. If they are both low, then your power supply is pretty pure and you should be running relatively efficiently. In terms of energy consumption, kW and KVA are the values to compare over time, as you make changes within your facility to reduce consumption.

If you really want to save money...

So yes—you could use your multimeter to measure voltage and current, make your calculations, and go from there. But the whole point of energy reduction is that for the first time, electrical measurement accuracy makes a monetary difference. If your "energy" calculations are inaccurate, because they don't account for power interferences in your system, then you really don't know how much you're consuming, or what impact your reduction efforts have. It's worth it to use at least an entry-level power quality tool to get real energy values, and to then track those over time.

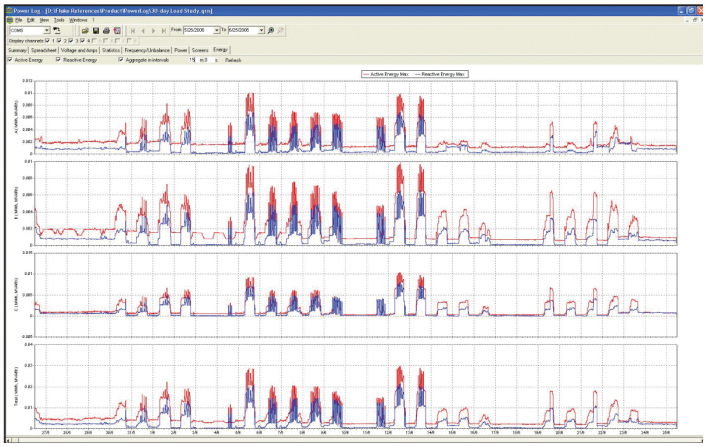

***Figure 3**. PowerLog "Energy." This 30-day load study graph allows us to view the kWh and kVARh for each phase and total. An averaging period can also be selected to help match the billing period used by the local utility (typically 15 minutes).*

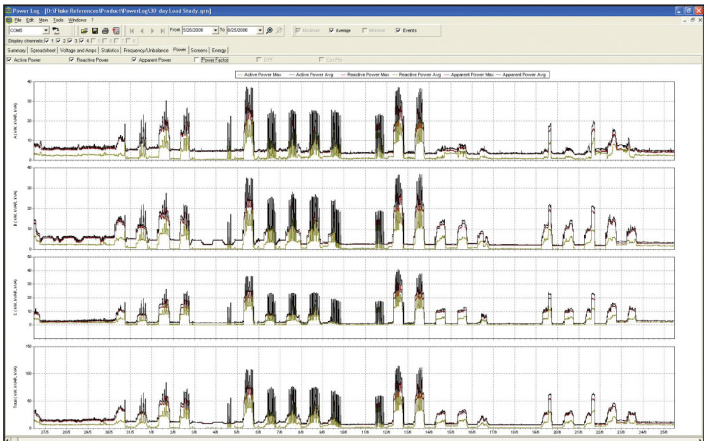

***Figure 4.** PowerLog "Power" view. In this view of the 30-day load graph we can view the kW and kVAR for each phase and total. From here we can identify our maximum values along with time and duration.*

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Larger Air Conveyor Converts Standard Pipe to Convey in Corrosive Environments

The new Type 303 Stainless Steel 3 NPT Threaded Line Vac Air Operated Conveyors convert ordinary pipe into a powerful conveying system for parts, scrap, trim and other bulk materials. This chemical and corrosion resistant Line Vac operates seamlessly at higher temperatures providing a long-lasting and low maintenance solution ideal for food, chemical, pharmaceutical and medical processes.

The durable construction of the Threaded Line Vac employs a larger inside diameter, aiding in conveying bigger parts and larger volumes of material over long distances with ease. In addition, it's designed for simple attachment to standard plumbing pipe couplers in order to take advantage of common pipes and fittings that are readily available.

Threaded Line Vac Conveyors utilize minimal amounts of compressed air to generate an instant and powerful vacuum on one end, with high output flows on the other. Regulation of the compressed air pressure also provides a fine-tuned control of the conveyance rate making it suitable for a wide range of applications including scrap trim removal, material conveying, part transfer, fiber tensioning and filling operations.

3 NPT 303SS Threaded Line Vacs are CE compliant and meet all OSHA pressure requirements. Ranging from 3/8 NPT through 3 NPT, all Threaded Line Vac models are also available in type 316 stainless steel to serve in exceptionally demanding corrosive, high temperature or hygienic environments.

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UPS Series with One Cable Technology Minimizes Installation Work

The new CU81xx UPS series are designed for universal use. Due above all to the flexible connection options extending up to One Cable Technology for uninterruptible power supply (UPS-OCT), it is suitable for an extremely broad range of applications. This includes the entire range of Beckhoff components – in particular the Industrial, Panel and Embedded PCs – as well as third-party products.

In combination with the Beckhoff Industrial PCs, particularly efficient cabling is possible with just one cable for 24 V DC supply and communication through UPS-OCT. The uninterruptible power supply units from the CU81xx series have been designed for rear panel and DIN rail mounting.

At present, one capacitive and two battery-assisted versions are available:

– CU8110-0120: capacitive UPS (0.9 Wh) with a maximum power output of 120 W

– CU8130-0120: battery-backed UPS (15 Wh) with a maximum power output of 120 W

– CU8130-0240: battery-backed UPS (30 Wh) with a maximum power output of 240 W

In the battery-assisted versions, the NiMH battery cells are easily accessible from the front should they need to be replaced.

The UPS neither needs to be dismantled nor dismounted from the DIN rail for this purpose. It is only necessary to release two screws in the cover to replace the battery module.

One-cable solution offers special benefits

A special feature of the UPS series is its flexible communication capability, which allows the retrieval of status values for diagnostic purposes or the configuration of the UPS. All Industrial PCs with an appropriate interface and Windows 7 or 10 operating system can thus be connected in the conventional way via USB 2.0.

In the simplest case, e.g. when using a classic PLC, digital I/Os are also available so that, for example, the controller can read a power fail signal and respond accordingly. The UPS connection can be implemented much more conveniently with the UPS-OCT one-cable solution, which is currently supported by the C6030 Ultra Compact IPC, the CX52xx Embedded PC series and the CX2100-0024 Embedded PC power supply unit.

This solution combines the IPC power supply with the UPS communication in a single 24 V DC cable. This makes the installation much simpler, because the IPC can be supplied both with power and all necessary information directly from the UPS with just one cable. UPS-OCT will be supported by all Beckhoff Industrial and Embedded PCs in future.

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High and Fanless Computing Power with Scalable Interface Expansions and 1-second UPS

The C6027 ultra-compact Industrial PC from Beckhoff is a fanless device that offers high computing power in a compact form factor trough Intel®-Core™ i U series processors.

Compared to the C6025 IPC already on the market, it has a second circuit board level with optional interfaces or an integrated 1-second UPS. Further variants are in preparation.

The C6027 ultra-compact Industrial PC opens up numerous new application areas for a modular device with an additional circuit board level – optionally selectable as an interface or function extension. Available to start are:

– 6 x Ethernet ports (RJ45)
– an integrated 1-second UPS to secure persistent data

In the initial variant, i.e. with a total of nine Ethernet ports, the C6027 is ideally suited as an IoT or security gateway for connecting different machine and system modules. In addition to this edge computing functionality, the C6027 also provides machine builders with a powerful and, at 82 x 127 x 69 mm, extremely compact machine controller.

Supported by diverse, flexible mounting options, the device fits in almost every control cabinet and machine concept. The IPC's energy-efficient Intel® Core™ i U processor – with significantly lower energy consumption than the other processors in the series – and the advanced passive cooling design enable full heat dissipation via a heat sink on one side.

Housed in an aluminum and zinc die-cast enclosure, the C6027 offers a feature set that includes the following:

– up to four CPU cores
– 4 GByte DDR4 RAM (expandable to 8 GByte)
– 40 GByte M.2 SSD with 3D flash memory
– 1 x DisplayPort video connector
– 4 x USB 3.0 ports
– on-board Ethernet controller with 3 x 100/1000Base-T ports
– operating temperature range of 0 to 50 °C

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Industrial Edge Controllers Solve Key Challenges in Pipeline Operations

Denka Wangdi, of Emerson's machine automation solutions business, explains how the gathering, storage and analysis of detailed operational and diagnostic data by modern edge controllers provides significant benefits for pipeline operators.

Industrial Internet of Things (IIoT) technologies are initiating an exciting era of digital transformation and creating widespread opportunities for performance optimisation.

These technologies include smart digital devices such as industrial edge controllers, which provide reliable industrial control and enable IIoT-capable data communications.

Edge controllers can collect, store and analyse huge amounts of process data and provide actionable insights leading to improved decision-making. A good example of how this technology can be used to achieve significant performance improvements is in pipeline operations.

Data collection challenges

Many pipelines in operation today were installed as far back as the 1950s and 1960s. Typically, pipeline automation such as programmable logic controllers (PLC), remote terminal units (RTU) and supervisory control and data acquisition (SCADA) technologies were installed.

As these technologies have become obsolete, the pipelines have been updated incrementally. However, there is still a great deal of legacy hardware installed and significant amounts of valuable data is often trapped in remote locations. Even if the data could be obtained, its accuracy can be questionable, since older pipelines were not equipped with condition monitoring equipment to identify leaks.

When end users are updating or redesigning their pipeline automation, they would ideally like to preserve the robustness of their existing systems, while also taking full advantage of the latest opportunities for digital transformation.

In addition, they would like to future-proof their systems as much as possible. Edge controllers are a solution that enables these challenges to be met, while also providing significant additional benets.

Modern edge controllers

Today's robustly-packaged edge controllers are physically similar to traditional PLCs and RTUs. The difference is that, while edge controllers incorporate a real-time operating system (RTOS) for deterministic direct control, much like PLCs or RTUs, they also add a general-purpose operating system (OS), such as Linux, to perform advanced computing and communication tasks.

The RTOS and general-purpose OS are fully independent of each other in terms of the hardware and software, but with the use of industry-standard OPC UA communications, they can be congured to interact with each other efficiently and securely.

The RTOS element of an edge controller can easily perform the traditional control logic functions. An edge controller can therefore simply be used as a replacement for a PLC, reserving its more advanced capabilities for future implementation.

However, the real benets of digital transformation start to be realised when the integrated general-purpose OS is employed.

Huge amounts of process data can be collected, stored and analysed by the edge controller's general-purpose OS. Advanced algorithms and logic can be executed, with the results transmitted securely to the RTOS element of the controller as required, to implement responsive low-latency control.

Alternatively, the general-purpose OS can securely communicate data to supervisory systems for further evaluation. The general-purpose OS includes features that many conventional components lack, such as a rewall for security. It is also equipped with 'IT-aware' communication protocols such as MQTT, which are an ideal solution for the low-bandwidth telemetry connections typically available to pipeline operations.

Increased access to digital intelligence – whether peer-to-peer in the eld or up to an on-premises or internet-based cloud – helps operators make better decisions and work collaboratively, and represents a cultural benet achieved through digital transformation.

Challenges for pipeline operations

Edge controllers are an ideal solution to many challenges that are specic to pipeline operations. The all-in-one nature of edge controllers enables end users to enhance basic control schemes with closely integrated on-board visualisation options. The detailed operational and diagnostic information that is made available this way can be of significant benefit to operators and maintenance personnel.

Among the key operational challenges faced are leak detection and corrosion monitoring. Operators need to be informed as quickly as possible when issues arise, but also need to avoid the expense of deploying personnel unnecessarily if there isn't a major problem.

Edge controllers can address these and other issues by providing the information necessary to enable good alarm management.

Some of the latest leak detection and corrosion monitoring systems can provide extensive data. However, this can only be acted upon responsively if the data is communicated to the operations and maintenance teams.

Edge controllers can act as the gateway for this information, connecting to these sensing systems via traditional I/O wiring, or with more advanced serial or network communications.

In addition, they perform data logging to identify slow-moving changes trending towards an eventual problem, and carry out other pre-processing, such as ltering, to minimise false alarms.

Surge control can also be a major challenge for many pipeline operations. Edge controllers provide a solution by enabling each local controller to better interact with upstream and downstream stations, and to responsively coordinate operations with a central control room.

Having more data and computational power available enables users to implement advanced surge control automation schemes.

Having the exibility to apply edge controllers to new or existing pipeline automation systems is an important benefit in many applications. Edge controllers can enhance PLC and RTU solutions by adding integrated monitoring, data processing and visualisation features to the basic control functionality. In addition, edge controllers can be seamlessly added to existing automation systems to add IIoT capabilities without having to disrupt operations.

Although pipeline operators are becoming increasingly aware of the significant benets offered by digital transformation, they may still be cautious about how to proceed. Edge controllers are an ideal solution for bringing IIoT advantages into an operation, while preserving existing investments. By using edge control devices and IIoT concepts, end users have the opportunity to solve many of their key challenges and improve their pipeline operations.

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Remote Monitoring Cathodic Protection Systems

The coronavirus pandemic has forced businesses to change how they operate at a fundamental level, with staff forced to work from home because it isn't safe to go on site as normal. Unfortunately, problems like corrosion are not waiting for people to get back to sites to control it. Here Gary Bradshaw, director at remote monitoring specialist Omniflex, explains why the benefits of remote monitoring cathodic protection (CP) systems are more compelling than ever.

Corrosion is a natural, electrochemical process where metals are gradually degraded and destroyed as part of two simultaneous chemical reactions, an anodic oxidation that corrodes the metal structure and a cathodic reduction. CP systems are used to control this by ensuring that the structure you want to protect remains the cathode in any electrochemical reaction.

The classics

Traditionally, protecting critical infrastructure using CP systems has been done following one of two approaches. The first is called impressed current cathodic protection (ICCP). In this method, current is applied from an external source to ensure that the metal structure remains cathodic with respect to its environment. It does this by connecting anodes to a direct current (DC) power source, which can then be connected to a transformer-rectifier alternating current (AC) power supply.

The second is called galvanic CP, where a steel structure is connected to a metal alloy with a more negative electrode potential than it, like zinc. This guarantees that the metal structure is always the cathode of the electrochemical cell, and the metal alloy becomes a sacrificial anode that is consumed by corrosion, rather than damaging the structure.

Galvanic CP installations are not regularly monitored, if at all, on the assumption that the simplicity of the systems will ensure their ongoing performance and asset protection. But in a world of increasing requirements for compliance, performance guarantees and reporting, strategic assets do require more regular monitoring. This normally involves regular physical visits to sites by experts. So, what do you do when site visits cannot proceed as normal because of the ongoing global pandemic?

Benefits of remote monitoring

The remote monitoring of CP systems offers several key benefits for enterprises and asset owners. Firstly, cloud-based remote monitoring platforms provide managers with a single, easy-to-access repository for all live and historical CP data. Secondly, by automatically monitoring and recording data relating to asset performance and system status, all abnormal events, like power outages or system failures, can be reported directly to all relevant personnel immediately. This significantly reduces the chance of a negative outcome, like high maintenance costs or unplanned downtime.

Omniflex recognised the need for remote monitoring galvanic CP installations and developed the world's first battery powered instrument for remotely monitoring and testing galvanic CP installations wirelessly via the web, iGAL. The new technology is designed to help asset managers monitor the corrosion of embedded metal structures while cutting down the need to physically visit the site to undertake time-consuming, costly and often hazardous surveys.

More compelling than ever

With the world still in the midst of the coronavirus pandemic, and a long road to recovery ahead, site visits and manual system inspections cannot proceed as normal. In many cases, businesses that rely on these to check on the system status have been unable to gain any system data over the last year and are left hoping that nothing has gone wrong.

Remote monitoring is no longer just the most cost-effective way of gathering system data, it is now the only way to do so in many cases. If you're a consultant working from home and you're responsible for monitoring systems fitted with an iGAL, you can continue to gather and monitor system performance 24/7, despite the disruption caused by the pandemic.

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How to Troubleshoot Conveyor Belt Challenges

Some of the toughest maintenance challenges at manufacturing facilities are presented by large belt-driven conveyor systems.

These critical assets require gear oil for their gearboxes, electric motor grease for the motors, and grease for multiple lubrication points – particularly bearings.

Improper lubrication and contamination can cause premature wear, or even worse, create unplanned downtime.

Recurring challenges include dirt, water, heavy loads, vibration and extreme temperatures – and these are even more severe when the system is located outside.

Some of the common lubrication challenges that maintenance teams face in trying to keep conveyors properly lubricated are multiple lubrication points, long walking distances, and difficulties accessing some key machinery points.

All of which means that compliance with manufacturer-recommended relubrication intervals can be difficult to achieve.

To combat these challenges, Lubrication Engineers (LE) South Africa has developed a comprehensive lubrication strategy to help its customers manage the risks of conveyor belt wear through correct gear oil selection, grease selection, grease application, contamination exclusion, and visual monitoring and contamination removal.

LETS strategy

The strategy is called LETS (for load, environment, temperature and speed) and includes a set of questions to help maintenance teams identify what lubrication solutions from within the original equipment manufacturer's recommended range will best suit their particular operating conditions.

LE National Marketing Manager Callum Ford says, "We work through these questions with our clients, and help them identify the right lubricant and reliability solutions to properly care for their equipment."

While implementing the LETS approach with its clients, LE has seen a number of common problems emerging across conveyor belt applications, including incorrect gear oil and greases selection, and problems with grease application.

Gear oil

Inferior or incorrect gear oil can lead to equipment problems and unplanned downtime. For example, some gear oils become foamy and lose performance in the presence of moisture.

Another problem occurs when extreme pressure gear oil is used in gearboxes with internal backstops. Extreme pressure prevents the clutch or sprag mechanisms from properly engage, resulting in the mechanism slipping.

A helpful solution can be to use the answers from the LETS process to select the gear oil best suited to an application – ideally one designed to combat the effects of high temperatures, water, contaminants and heavy loads.

A long-lasting, nonfoaming, turbine-quality oil with anti-wear additives will ensure that the conveyor belt equipment works without interruption.

Grease

If the wrong grease is used, the reliability and lifespan of equipment may suffer. In most cases, to solve this requires an extreme pressure grease that can withstand heavy loads, maintain performance in a broad range of operating temperatures, seal out water, protect from corrosion and wear, and will not emulsify when water is present.

Incorrect grease application can be a problem, even if the correct grease for the application has been selected.

Over greasing, under greasing or not greasing can all cause problems. Many operators have to manually grease lubrication points in hard-to-reach or unsafe areas and end up neglecting to grease those spots.

An experienced lubrication consultant can help determine correct lubrication amounts and intervals, and then help with choosing which single- or multi-point lubrication system will work best in a particular application.

Automatic systems are precision lubrication tools that can also be used to improve the accuracy of greasing application, as well as reducing labour time, enhancing safety, reducing equipment failures, and keeping out contaminants.

The essential nature of conveyor belt operations means that their effective functioning needs to be a key focus for plant management, and using the correct lubrication solutions with the right application can have far-reaching benefits for maintenance and productivity.

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New Co-Axial Valve Offers 10 X Life Expectancy Compared to Ball Valve Actuator Combo

The recently launched co-axial VIP EVO Valve from Italy-based OMAL provides the lowest cost of ownership with a life expectancy 10 times that of a ball valve/actuator combination and reduced maintenance costs.

It integrates the valve and actuator into a single compact device, minimises pressure losses and has multi-functional security holes that prevent air supply system damage.

The VIP EVO Valve saves at least 70% of compressed air when compared to an equivalent ball valve with SR pneumatic actuator. Compatible with LPG and LNG gas, oxygen, nitrogen, petroleum, air and water, among others, its easily accessible limit switches are adjustable on both sides.

The EVO Valve allows for different materials for different applications and has a switching time of less than 0.2 seconds for valves up to one inch.

Available in double acting and spring return VIP valves in sizes from 3/8 to 2 inches, it is ideal for use with fire-fighting applications, aviation refuelling systems, gas filling units and PSA generators among other applications.

Fewer mechanical parts translate to reduced friction and therefore less wear, and this is what facilitates the valve's considerable longevity. Reduced downtime and lower production losses combined with energy savings and minimised inventory, means the VIP EVO Valve provides ROI in as little as three months.

Warrantied for up to 300 000 cycles (model dependent), VIP EVO can be used in horizontal, vertical or angled mounting. It is available with EPDM, NBR and FKM seals, is ATEX and PED certified and certified up to SIL 3.

It features an integrated slot for the valve position sensor, facilitating easily sensor mounting in both sides of the valve, minimising space. Risk of injury to personnel is reduced by the omission of any external moving parts on the valve.

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Exact Determination of Fuel Consumption

Kobold DOE is an oval gear flowmeter, categorised as positive displacement flow technology. When liquid flows through this positive displacement flowmeter, two oval geared rotors measure a constant volume per rotation, within a precisely machined measuring chamber. With each rotation, a constant volume of liquid is measured. The rotation of the oval gears is sensed via magnets embedded within the rotors.

The meter can be used with a wide range of media and chemicals. The aluminium version in particular is suitable for applications with motor and heating fuels or lubricating liquids.

These magnets transmit a high-resolution pulse output. The output signal can be process externally via a remote display controller or PLC, or via a variety of output/display options available as accessories attached to the flowmeters.

The positive displacement flow technology allows for precise flow measurement of most clean liquids regardless of the media conductivity. Other liquid properties also have a minimal effect on the performance of this type of meter. Flow profile conditioning is not required as with alternative flow technology options making oval gear installations simple to install in tight spaces and at an economical price.

A common application is the measurement of diesel engines' fuel consumption in transport or conventional power plants. On each fuel pipe (supply and return) one DOE is installed. The differential flow computer ZFC determines the actual fuel consumption.

Also, temperature sensors (for example our MWD) are used to increase the accuracy of the measurement. The flow computer can compensate for the effect of fuel expansion due to increasing temperatures.

Technical specifications

- Pressure Max. 64 bar; Temperature Max +80 °C
- Viscosity range: up to 1000cP
- Accuracy: ± 1% of reading
- Material: stainless steel
- Pulse output

Product highlights:

- Compact measuring device
- Exact, even with significant temperature differences between supply and return
- Applicable in rough conditions (rain, snow, salty atmosphere)
- Durable at reasonable costs

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Laser Distance Sensors – Game Changer for Transit Time Technology

German manufacturer, Wenglor Sensoric has released its latest generation of long-range laser distance sensors with Wintec to redefine the performance limits of photoelectronic sensors.

These transit time sensors available in plastic or stainless steel 316L housing have not only been given a big increase in performance with the integrated "Dynamic Sensitivity" (DS) technology, but also combine all the features of the popular Wintec series which have been revolutionising the automotive industry since 2009.

A working range of up to 10,000 mm, maximum reproducibility of 3 mm, insensitive to ambient light up to 100,000 lux, are just some of the highlights of the new Wintec. In addition, with the latest IO-Link 1.1 standard with COM3, process data can be written, numerous status messages such as temperature or ambient light warnings can be called up. Even impact and shock loads can be recorded.

Dynamic Sensitivity

The result of intensive R&D in transit time sensors, the sensor emits very short light pulses in the nanosecond range, with signals that are statistically evaluated and then produce the distance to the object. Even with very weak signals the sensor generates precise measurements. This is the only way to achieve a working range of up to 10,000 mm while improving reproducibility to just three mms over the entire working range of the sensor.

The sensor is also immune from interference from natural or artificial ambient light up to 100,000 lux. Added to this is that other sensors in the immediate vicinity of contamination in the working range do not influence the performance of the sensors due to the DS technology. Any object – black or shiny – can be taught in at any angle within 10 m at the touch of a button.

Transit Time Technology with High-performance Technology

Long-range laser distance sensors with Wintec detect objects based on the principle of transit time measurement, regardless of colour, gloss surface structure or inclination angle. The sensors can be installed next to each other, even opposite each without influencing each other. This capability has made Wintec one of the most popular photoelectronic sensors and is now an essential part of every automation process.

Other features include the teach-in key is illuminated, enabling optimal visibility, even in dark environments. The sensors also work reliably from temperatures of -40 °C, have a very short warm-up time and LEDs on the front for integrated installations in shuttle systems, for example.

Simple operation and low power consumption compared to conventional transit time sensors enables significant time and cost savings for user.

Plastic or Stainless Steel Housing: Suitable for Any Industry

A version in corrosion-resistant stainless steel 316L housing with Ecolab approval is suitable for use in food industries. High-pressure cleaning up to 100 bar and water temperatures up to 80 °C in the wash down range are possible due to the laser-welded IP69K housing and chemical resistant plastic parts.

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Double-Eccentric Butterfly Valve Meets Stricter Temperature and Pressure Requirements

The GEMÜ Tugela butterfly valve is particularly distinguished by its double-eccentric construction, which is why it is also designated as a high-performance butterfly valve and suitable for pressures up to 40 bar or temperatures up to 230 °C.

The butterfly disc separates directly from the sealing seat when it opens, which reduces wear and thus increases service life. Thanks to the locking screw on the actuator flange, the gland packing can be retightened directly at the shaft, which sits in a carbon braid bearing, so that the butterfly valve can be serviced when installed. This, in turn, significantly reduces the maintenance requirements.

Double-eccentric design for easy opening and increased service life

When constructing butterfly valves, a distinction is made between three main designs.

In a concentric design, such as the GEMÜ Victoria series, the pivot point is in the centre of the seat valve, i.e. the main seal is interrupted by the shaft.

In a simple eccentric construction, the main seal is offset to the shaft axis. There is no interruption over the entire 360° sealing circumference with this design.

In a double-eccentric design, the shaft axis is additionally, as the second eccentricity, moved out of the piping axis so that the shaft centre is slightly offset from the piping centre.

Further features of the GEMÜ R470 Tugela butterfly valve are the shaft blow-out protection as an additional safety measure in case the shaft breaks and the improved sealing due to an optimized disc design in spherical form. It also has an antistatic spring for use in ATEX areas and a TFM seat ring which is particularly low-brittle and ensures reliable use in a wide temperature range.

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Why PROFINET is a Great Choice for I/O Networks

Darrell Halterman, senior product manager of PACSystems controllers at Emerson's machine automation solutions business, explains the advantages of using PROFINET protocol for PLC, PAC and industrial edge controller applications.

The PROFINET industrial Ethernet communications protocol was purpose-built to deliver interoperability, high-performance communications, high-availability architectures, and advanced diagnostics to help with troubleshooting.

These features help to minimise operational downtime and enable designers to create robust and reliable industrial automation input/output (I/O) networks that are maintainable long-term.

These I/O networks are relied upon to enable programmable logic controllers (PLCs), programmable automation controllers (PACs) and industrial edge controllers to perform deterministic control.

Early industrial automation protocols relied upon proprietary media and components, partly to guarantee performance. As industrial networking made the transition towards commercial Ethernet technology, it remained necessary to address the always-on need for automation systems while guaranteeing performance. Here are some of the reasons why PROFINET is an ideal fit for industrial I/O networks.

Connectivity

Automation systems for industrial machines and equipment rely on the connection of controllers to hardwired field devices such as sensors and actuators via I/O modules. Controllers also connect with more intelligent and capable I/O devices, such as variable frequency drives (VFDs) and smart pneumatic solenoid manifolds. These devices often have Ethernet connectivity and can be located in a protected control panel or installed directly on equipment.

Using an industrial protocol such as PROFINET, designers have the flexibility to choose any combination of best-of-class I/O systems.

They can select panel or field-mountable versions of each device as required to fit the application, and can even source them from different suppliers, with high confidence in their reliability and interoperability.

Uninterrupted communications

In much the same way as consumer-grade home networks, industrial-grade I/O systems can be connected with switches and cables in a star topology.

However, the 'always-on' performance demand of automation often requires solutions more robust than those available using basic IT technology.

PROFINET addresses these concerns by providing various levels of redundancy, with the specific aim of providing uninterrupted communications.

Using a ring network configuration, Media Redundancy Protocol (MRP) provides communications recovery within a few milliseconds of networking loss due to a cable, device or switch failure. These networks can be designed with external switches to form a ring.

Designs can be simplified for industrial controller and I/O systems by incorporating on-board embedded multi-port switches within controllers and I/O devices, enabling a ring network to be created without the need for external switches.

Controller redundancy is often needed in the most critical applications, which requires PLCs, PACs, or industrial edge controllers that can be installed in pairs on an MRP ring. One controller is the primary and the second is the hot back-up, configured to take over seamlessly if the primary fails.

Diagnostics

Should there be a problem with an industrial automation I/O system, operators and maintenance personnel need to know about it as soon as possible.

This still applies to systems that have been configured with MRP and redundant controllers, because even though operation will continue unabated after a single failure, the system may then be just one additional failure away from an outage.

PROFINET provides diagnostics to help users debug industrial I/O systems. Controllers can be configured to recognize I/O failures, notify users, and even initiate an orderly shutdown. Users can also access diagnostic tools to monitor I/O network performance and system health, providing them with an early indication of any impending issues.

Industrial I/O roadmap

In addition to providing I/O interoperability, redundant architectures and helpful diagnostics, PROFINET has further features that make it an ideal solution for PLCs, PACs and industrial edge controllers.

A specified profile enables data to be easily shared between PROFINET and OPC UA networks. Another standard profile makes it possible to connect IO-Link sensors and devices to PROFINET.

Time-sensitive networking (TSN) represents a set of networking standards for improving performance by minimizing latency to provide high availability data transmission over deterministic Ethernet networks.

Conclusion

PROFINET enables users to create the highest performance I/O networks that can support the most demanding applications such as motion control, while further improving their overall network capabilities, robustness and security.

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