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April 2022 vol.35 no.8

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APRIL 2022

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ON THE COVER

Beamex has expanded its successful PG pump family with the Beamex ePG, a revolutionary new electrical pressure pump for industrial pressure calibration applications. The Beamex ePG continues the company's mission to provide better ways to calibrate, based on over 40 years' experience providing solutions for pressure calibration.

The Beamex ePG is a robust, portable battery-operated pressure pump that enables easy and quick pressure generation from near vacuum up to 20 bar (300 psi). With a field-replaceable, long-lasting battery pack, users can perform a large number of pressure calibrations on a single charge.

The Beamex ePG can be used together with any existing pressure calibrator, meaning users do not need to buy a new calibrator but can simply replace their manual hand pump with the ePG. It is very intuitive to use, with coarse and fine adjustment buttons to easily generate the required pressure. The Beamex ePG can also be serviced by the user to simplify maintenance.

When the Beamex ePG is used together with the Beamex MC6 family of calibrators, it enables fully automatic pressure calibration where the MC6 calibrator automatically controls the ePG. This optional feature will be available in the near future with a firmware update to the Beamex ePG.

AMS

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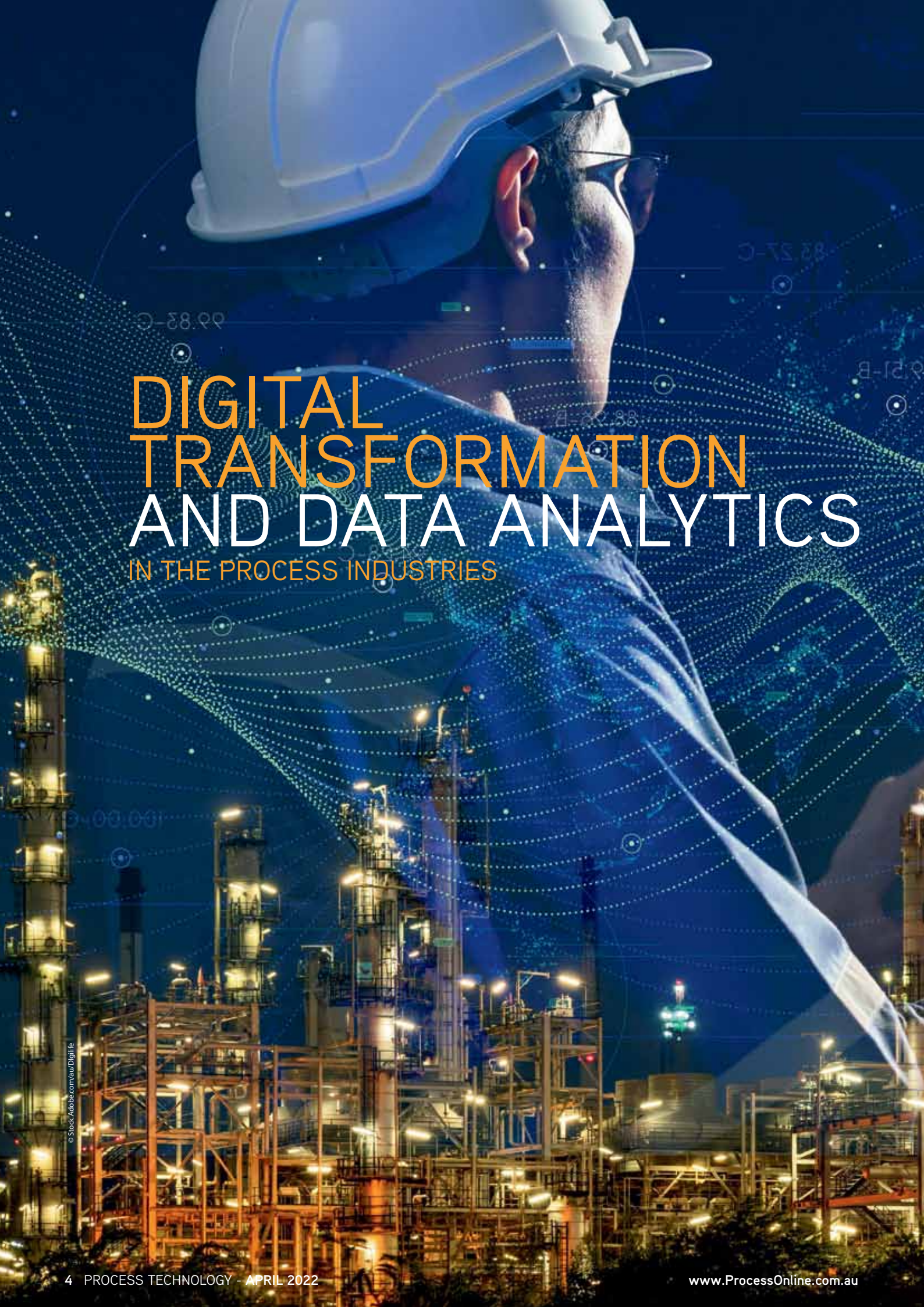

DIGITAL TRANSFORMATION AND DATA ANALYTICS

IN THE PROCESS INDUSTRIES

The industrial world is changing, and it is driven by the application of digital technologies.

Fundamentally, digital transformation is about deriving value from digital data from various sources and assets along with algorithms to make insightful and well-informed decisions. But in the complex world of manufacturing, data doesn't gets translated into value easily. In fact, most organisations struggle with it. Even more data is collected than can be analysed, leaving much of it untouched.

Until the process industries start thinking about better data integration and architecture, and using advanced big data analytics tools to process (unused) data, it will be difficult to extract maximum value from it.

The value of data and data analytics in smart manufacturing

Data is a key pillar of digital transformation, as every interaction in the digital world generates data. So, along with exponential increases in devices, connectivity and IT/OT convergence, there has been a corresponding increase in data volume along with new tools and mechanisms that have been created to analyse, visualise, and interpret this enormous volume of what some refer to as 'big data'.

How can (big) data and data analytics help manufacturers?

Big data has been a common theme in the data and analytics arena for a while. Generally, it is a term that describes the large volume of data — both structured and unstructured — that inundates a business on a day-to-day basis. According to Gartner, big data is a greater variety of data that arrives in increasing volumes and with ever-higher velocity.

Data has the potential to make manufacturing smarter, through being data-driven rather than event-driven. In the operations and production functions of an industrial organisation, using data and digital technology for strategic problem-solving and business innovation is what is called 'smart manufacturing'.

In contrast to traditional manufacturing, smart manufacturing uses internet-connected technology, such as wireless sensors and smart devices, to provide real-time data processing and analytics. This, in turn, allows for the near-immediate output of information, such as information on material availability and inventory, or predictive maintenance. The organisation can then use this data to improve its plant's performance.

Unfortunately, manufacturers aren't perfect: generally they use less than 5% of their plants' operational data due to poor data management, legacy applications and static strategies. One way for them to derive meaningful insights from the other 95% of their data is to make better use of advanced big data analytics. Thanks to new predictive, preventive, or even prescriptive data modelling techniques from data science, new insights can be derived by combining data from IT and OT streams. It's one of the reasons why even the most conservative manufacturers increasingly rely on data and analytics to provide actionable insights into how to improve their businesses' operational effectiveness and new product development.

What insights do big data and advanced analytics provide?

There is a close relationship between the use of advanced analytics — meaning the computational use of statistics to understand a business's data to make better (smarter) decisions — and a successful digital transformation.

The use of data to enhance production and operations isn't new; many manufacturers already use data or data analytics for industrial applications. However, they are often only providing old answers to old questions, such as how to reduce downtime by 4% in order to decrease costs by 2%.

True smart manufacturing with big data analytics will create new answers to new questions. Advanced analytics can even uncover new insights into the operation of their plants. They can gain insight into everything from major inventory management problems to a specific machine's effectiveness. Incredibly, enterprises can use big data to uncover and solve hidden operational problems as well.

Figure 1: The value of data analyics in smart manufacturing.

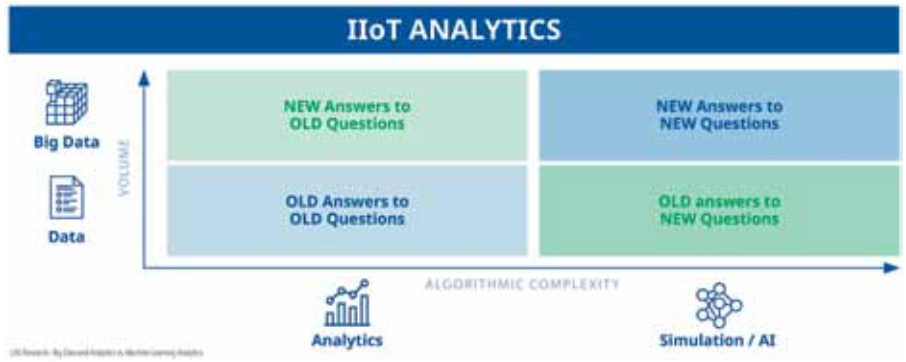

Figure 2: Current data analytics often only provides old answers to old questions.

There are different data science strategies for utilising big data. Maybe the simplest form is called descriptive data analytics, used to understand changes in a business through the analysis of historical data. As a next step, diagnostic data analytics examines data to determine why specific events occur though root-cause analysis.

For maximum corporate benefit, process manufacturers can turn to business analytics insights from practices such as predictive data analytics — which determines data patterns to predict future outcomes — and prescriptive data analytics, which provides recommendations for the best next steps to drive desired results.

Key enabling technologies

Numerous technologies, such as Industrial Internet of Things (IIoT) devices, AI, machine learning, digital twins, 5G, robotics and cloud services can help process manufacturers sense and provide data to analyse in order to digitally transform their businesses. As process manufacturers move to combine information technology (IT) with operational technology (OT) to improve tools and techniques, the IIoT works to collect massive amounts of data from a plant's industrial data sources and assets.

Businesses now need complex algorithms to help them interpret the big data they collect in their plants and use it to optimise value chains and improve product quality.

Examples of successful data analytics in manufacturing

Several studies have shown that organisations make the best decisions when armed with data and tools to gather insight:

- A 15–20% increase in ROI can be achieved by introducing big data to enterprises' business analytics.
- According to research by Deloitte, high-performing organisations are 4–5 times more likely to have fully deployed advanced analytics and visualisation, 10 times more likely to have fully deployed RPA solutions, 12% more likely to have fully deployed predictive analytics capabilities, and are 18 times more likely to have fully deployed AI/cognitive capabilities.
- A research project conducted by Towards Data Science used data analytics to tweak the efficiency of air conditioning units in factories. In some cases, air conditioning accounts for some 50% of a building's energy consumption and 10% of all global electricity usage. By measuring and analysing data from aircon units, a reinforcement learning algorithm was able to optimise their air conditioning for 25% energy savings across the board. Manufacturing data can be similarly analysed to uncover anomalies or inconsistencies that drive process refinement.

The role of data management and data architecture in digital transformation

Increasing data-driven operations in manufacturing also brings new challenges and requirements to data management and integration, and data architecture. The goal of data management is to collect, store and analyse information to ease the digital transition by organising both structured data and unstructured data to facilitate interpretation and assist in daily decision-making. But proper data management requires a sufficient data architecture in a manufacturing organisation, especially if that organisation pursues digital transformation. The right approach to data therefore captures the entire value-creation process, from data capture to value delivery, by way of various software applications and their augmented offerings.

The role of data management

Data management and orchestration services span the entire set of tools and frameworks that enable cataloguing, organising, managing and processing data for delivery to specific analytics applications. These services help analytical applications automate the different steps of data pipeline development from source to consumption. These include extract-transform-load operations, data transformations and data modelling to provide a fully abstracted but unified environment for delivering large volumes of data for individual analytics applications in the form they expect.

The roles of the data historians and data lakes

Through a plant's operations, process and asset data are aggregated, cleaned and enriched. Most operations have accumulated years of time-series data in various states of completeness; however only a small portion is being used as a basis for operational decisions, one of the pillars of smart manufacturing. By processing, interpreting and applying business logic to

Figure 3: Key enabling technologies for smart manufacturing.

the process and asset data, digital application and services are established.

Today's historians and data lakes are being used to store ever-increasing amounts of data originating from a much wider variety of sources, including control and monitoring, laboratory information management, and asset management systems. They have the potential to translate this into actionable insights to implement and improve equipment diagnostics, maintenance, safety, alarms, production, performance and other process plant activities. However, if not managed well, most data lakes lack the essential features that prevent a data lake from turning into a 'data swamp'. Historians are the critical point of integration between IT and OT, acting as an edge data collector to distribute consolidated OT information throughout the enterprise in various formats via company intranets, the Internet and the cloud.

The role of data architecture

The design of a data- and platform-centric architecture is important. It manages data along its entire lifecycle from ingress to egress, and is architected around an established sequence of activities and processes around data, namely: data enablement (getting data into the system); data curation (transforming, storing and organising data so acquired); and data utilisation (consuming the raw, acquired or process data, in order to perform analytics and ML to derive insights), culminating in innovation.

Data architecture captures the tech stack and its interplay with existing systems and business processes. At the heart of this architecture there needs to be a digital platform that provides various reusable services and joins together the various components of digital solutions and applications. This platform is regarded as the operating system for the cloud or as middleware for digital applications. This platform provides application enablement and facilitates quick and effective delivery of software-as-a-service to end users.

The role of the cloud in data analytics and digital transformation

Cloud technology has practically eliminated the need for on-premise IT data centres, server co-location, and traditional in-house IT resources. Process manufacturers can program IIoT sensors and smart devices to send the data they collect to the cloud or a digital platform.

The cloud is already the infrastructure of choice for most business applications, especially outside the energy and chemical sector. However, it remains unexploited for most operational applications. The reason for this is that most valuable operational applications rely on a continuous feed of plant data, which means they can never be isolated from the plant in a way that, say, an HR performance management system or capital budgeting system can. This is partially addressed with 'edge devices' living in the 'fog' between the real world of the plant and the virtual world of the cloud to bridge the gap — but there is still a potential pathway for a 'bad actor' to reach the plant even through an edge device.

However, as manufacturers take digital transformation steps to make their business more efficient and even autonomous, many are looking for new technologies to consolidate IT and OT data. Typically, a cloud-based digital platform helps businesses more easily collect and analyse useful data.

Data, data applications and autonomous operations

In process industries, digital transformation and smart manufacturing are often seen as a journey towards autonomous operations. This manufacturing state can be defined as assets and operations that have human-like learning and adaptive capabilities that allow them to respond without operator interaction to situations within a secure bounded domain: situations that were not pre-programmed or anticipated in the design.

An autonomous plant or manufacturing enterprise will require sensing and digital infrastructure that spans the entire operation and integrates data, smart devices at the edge, bulletproof hardware and software to deliver the required level of flexibility, adaptability and resilience. New technologies such as autonomous robots, additive manufacturing, artificial intelligence (AI), machine learning, augmented reality and 5G will allow for the required increased levels of automation, remote and unmanned operations. Putting humans out of harm's way, a facility might entirely automate operations, maintenance and incident management.

The role of industrial applications in realising industrial autonomy

Obviously, smart applications or solutions play an important role in the journey towards industrial autonomy. Simply put, applications are software programs built to solve specific business problems, such as asset management, production optimisation, or health and safety. They are enabled by big data analytics and built on digital cloud platforms, using services such as data, enterprise data management and orchestration, and logic builders and visualisation available from the platform. Platform plumbing encourages applications to connect with each other and securely exchange or reuse data as needed. Once available on the platform, data can be reused by other applications, thereby eliminating data duplication throughout the lifecycle.

So, what is possible with today's process and asset data? With the availability of application packages and open interfaces, virtually any kind of analysis of plant data is now possible. An OT data foundation is fundamental to your digitalisation ambitions. Data reconciliation, field mapping and normalisation are prerequisites for the effective use of analytics software and applications, such as advanced process control, real-time optimisation, simulation and AI.

This article is based on an original Yokogawa white paper published online at https://bit.ly/35U8TH0.

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The EPC-R7200 industrial-grade PC is designed for AI developers that use NVIDIA Jetson family modules.

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The Wenglor I03 and I04 series inductive sensors are tiny, with a diameter of just 3 mm and 4 mm respectively.

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RUGGED ANDROID TABLET

Getac has announced the launch of its ZX10 fully rugged tablet, a 10″ device built around the Android 11 operating system.

The ZX10's combination of Android 11 OS, Qualcomm Snapdragon 660 Mobile Platform and Adreno 512 GPU is claimed to deliver a seamless user experience, enabling efficient workflow in a wide range of field scenarios. Dual hot-swappable batteries ensure full-shift operation, while the LumiBond sunlight-readable display (800 nits brightness) with rain and glove touch capability helps maintain productivity in a range of weather conditions. The ZX10 also has options of up to 6 GB LPDDR4 RAM and 128 GB storage.

An 8 MP front camera and 16 MP rear camera are said to deliver high-quality photo and video capture, while dual integrated microphones filter out loud background noise for enhanced audio quality. Wi-Fi 802.11 ac, Bluetooth (v5.0), dedicated GPS and an optional 4G LTE module offers rapid data transfer and location positioning capabilities in remote field locations. Dual LTE SIM card slots allow field workers to quickly switch between two 4G network carriers.

MIL-STD-810H and IP66 certification means the ZX10 can withstand drops of up to 2 m, shocks, rain, vibration, dust and liquid spillages. It also has an operating temperature range of -29 to 63°C, is only 17.9 mm thick and weighs just over 1 kg.

The ZX10 is designed to meet the needs of public safety, utilities, energy, transport and logistics, manufacturing, automotive and defence professionals who utilise Android-based devices.

Getac Technology Corp
www.getac.com/apac/

INDUSTRIAL-GRADE SMART GLASSES

The Visor-Ex 01 smart glasses and smartphone solution was designed with a new generation of remote workers in mind. Instead of integrating all components in the headset itself, they are distributed into separate units that can be conveniently attached to the body.

The Visor-Ex 01 head unit can be clamped to any helmet. It works with any headset for audiovisual communication, and serves as the visual interface between the worker and their digital environment. It also offers an optical zoom lens for laser scanning in product identification.

The pocket unit and the Smart-Ex 02 acting as communication and CPU unit can be attached to any belt and provide interference-free communication via cables.

Instead of using proprietary technologies, Visor-Ex is an open system that is said will seamlessly work out of the box with a variety of software applications due to its smartphone CPU, which provides a touch display for a facilitated user experience. It enables standard Wi-Fi as well as 3G/4G wireless communication.

The system conforms to the demanding requirements of the process industry and offers intrinsic safety for explosion hazardous areas.

Pepperl+Fuchs (Aust) Pty Ltd
www.pepperl-fuchs.com

STRAIN SENSOR

The DA54 strain sensor from meSysteme is a high-resolution measuring system used for the detection of forces and deformations in structures such as silos and tanks. This strain sensor offers comparable performance to the direct application of strain gauges even though the sensor is housed in a robust, anodised aluminium housing with IP65 enclosure. It consists of pre-wired, high-resolution strain gauges with negligible drift and is suitable for both static and dynamic measurement applications.

These precision strain sensors are generally applied for precise measurement of force and deformations on press, lifting tools or pedestals on production machines. The robust construction housing makes them durable and resistant to oil and moisture for integration in the industrial environment.

The DA54 sensor measures the forces transmitted through the housing at a position lateral to the loading direction. However, it can also measure strains up to 1000 μm/m longitudinal stress without impairing its accuracy. It can be easily applied without requiring drilling of threads, and the mounting strength can also be enhanced by integrating high-performance cable ties and magnetic clamps. However, the application surfaces must be thoroughly cleaned and grounded before applying the sensor in place.

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ETHERNET SWITCHES

Moxa has announced its next-generation industrial Ethernet switches, the EDS-4000/G4000 Series. The series includes 68 models that are IEC 62443-4-2 certified for cybersecurity due to the built-in hardened security that was developed by following the stringent software development lifecycle described in the standard.

For increased performance, the EDS-4000/G4000 Series provides multiple interface combinations with up to 14 ports and a range of options including fast Ethernet, Gigabit, 2.5 GbE uplinks, SFP and IEEE 802.3bt PoE connectivity.

The EDS-4000/G4000 Series is also certified for NEMA TS2, EN 50121-4, IEC 61850-3/IEEE 1613, DNV, ATEX Zone 2, Class I Division 2 to fulfil the needs of a wide variety of industrial applications. The series also features Turbo Ring and Turbo Chain fast network recovery to ensure smooth operations.

An improved web GUI provides a more intuitive way for users to perform configurations and network management. The rotatable power module offers flexibility to field engineers when they are installing devices and maintaining the network. In addition, the LED indicators on two sides of the device help engineers easily identify the status of networking devices.

Colterlec Pty Ltd

www.colterlec.com.au

IO-LINK-CAPABLE RADAR SENSORS

Turck's LRS Series IO-Link-capable radar sensors offer level measurement in the 0.35–10 m range. The devices with protection to IP67/69K are designed for level applications in factory automation, for which optical or ultrasonic sensors are unsuitable due to factors such as dust, wind or light. The freely radiating LRS radar sensors also offer detailed analysis functions. The absence of a metal guide probe enables the sensor to be used easily in hygiene applications and simplifies commissioning.

The touchpad of the LRS series with capacitive buttons and a translucent front cap is based on the same concept as Turck's Fluid 2.0 sensor platform, and enables the output of distance, level and volume values. The LRS sensors are available either with two switching outputs or with one switching and one analog output. Due to their additional IO-Link interface and intelligent decentralised signal preprocessing, all variants provide a large quantity of additional information for processing in condition monitoring applications in IIoT: besides signal strength, this includes temperature values, operating hours or switching cycles.

Users of Turck's IO-Link master can call up the Radar Monitor via the IODD configurator without any additional software. The browser-based configuration tool graphically displays the measurement curve of the sensor and offers plain text access to all relevant parameters. This makes it possible for example to mask out the interference signal of an agitator or grid, or to perfectly align with the real-time feedback of the sensor in order to maximise the reliability of level measurement in challenging applications.

Turck Australia Pty Ltd

www.turck.com.au

LEVEL SWITCH WITH INTEGRATED DISPLAY

The Hydac HNS 3000 is an electronic level switch with an integrated display. The float-based sensor for high-precision analog monitoring of fluid level has one, two or four PNP switching outputs, with an analog output signal available as an option.

Switch outputs are user-selectable based on measured value, with independent adjustment of the switch and switchback points.

In addition to a conventional minimum and maximum switch signal, it is possible to set additional warning signals to prevent tank overflow or pump aeration with the 4-output version.

The sensor is available in probe lengths from 250 to 2500 mm. The instrument is also available with or without temperature sensor.

Depending on the application, several different floats are available such as stainless steel for aggressive media or plastic.

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Wastewater treatment plant modernises rain overflow basins

Warendorf is a town in western Germany and the capital of the Warendorf District. The town is best known today for its well-preserved medieval town centre, horseriding and the opportunities provided for cycling. The Warendorf wastewater treatment system includes two wastewater treatment plants, several pumping stations and special facilities, such as rain overflow basins and rainwater spillways.

To increase system efficiency, the Warendorf wastewater treatment plant operator regularly modernises and equips the system with the latest technologies. As a part of the latest retrofit measures, the decentralised rain overflow basins in the Hoetmar district of Warendorf were coupled directly to the network, the local emergency power generators were replaced and the automation level was updated. The utility has two augers with a maximum conveying capacity of 6500 cubic metres and a basin volume of around 1000 cubic metres. The rain overflow basin is located upstream of a small, decentralised wastewater treatment plant.

As a part of the modernisation program, a PLC based on PLCnext Technology from Phoenix Contact was installed in the automation level. The protocols supported by the AXC F 2152 device, such as OPC UA, and the integrated security functions, were significant reasons for selecting this controller. As the core element of the local automation of the rain overflow basins, it needs to support a variety of protocols. For example, classic fieldbus systems such as Modbus/RTU and Modbus/TCP can read and process the data from the frequency converter, the various measuring devices and the new generator. Additional interfaces, such as Profinet and OPC UA, make it easier to integrate sensors and actuators in the future.

The OPC UA server installed in the AXC F 2152 controller provides the local user interface with information, so wastewater treatment plant employees have all the relevant data available at a glance, displaying the plant's current status and allowing the employees to control the plants manually.

In the past, key system data was transmitted to the control system via the classic IEC 60870-5-104 remote control protocol. Now it is transmitted to the control system via the OPC UA protocol, offering simple implementation and flexibility, and opening up significant advantages for the operator.

The application is programmed based on the IEC 61131 standard. Using Phoenix Contact's PLCnext Engineer software functions and program parts already in use could be adopted from the existing system and quickly adapted to the rain overflow basin's special requirements. The operator can also configure, diagnose and visualise the entire system with this software. As a result, the wastewater treatment plant employees only have to be familiar with one tool to perform all tasks.

The scalability of PLCnext Technology means that the open control platform can be used on multiple PLC performance classes while still behaving and operating in the same way. This allows the operator to use a lower-performance controller for small, decentralised facilities, and equip complex processes with a powerful controller.

From a cybersecurity standpoint, the Warendorf wastewater treatment operation has developed and put into practice a system-wide IT security concept. For example, the individual system parts are already segmented and protected upstream by an FL mGuard security router and firewall. The AXC F 2152 PLC device fits into this IT security concept because it is already equipped with such key functions as an integrated firewall and user administration function.

The firewall installed in the controller limits and monitors the controller connections based on specific rules, while the user administration function allows all user rights to be set up and changed individually. In addition a VPN function means the PLC device can be connected directly and securely to the central infrastructure via the VPN tunnel.

"Modernising the rain overflow basin and the associated new automation technology has created the perfect foundation for solving future challenges," said Frank Linning, manager of the wastewater treatment plants and special facilities at the Warendorf wastewater operation. "In particular, the IT security functions available in PLCnext Technology and its support for OPC UA communications make it a perfect fit for our automation philosophy."

The demands and framework conditions in water management systems are changing faster than ever. To optimise their processes, wastewater systems need to record and process more data and information than ever before. The foundation for this is a flexible and open automation technology that also supports future standards, is easy for employees to use and truly supports them in their everyday work.

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OPEN PATH GAS DETECTORS

Emerson has released two open path gas detectors to increase safety over wide areas in extreme environments. Extreme environments include both heavy vibration conditions and operating temperatures ranging from -55°C up to 65°C commonly found in the oil and gas, refining, chemical, mining and large-scale refrigeration system operations.

The Rosemount 935 Open Path Combustible Gas Detector uses infrared technology to detect a wide range of combustible hydrocarbon gases, including methane, propane and ethylene. In the oil and gas industry alone, 22% of all fatalities come from explosions or fire and exposure to hazardous gases.

The Rosemount 936 Open Path Toxic Gas Detector uses ultraviolet technology to detect hydrogen sulfide and ammonia, two of the most common toxic gases in industrial facilities. Leveraging xenon flash technology, the Rosemount 936 enables greater installation flexibility versus the tunable diode laser (TDL) technology, which needs perfect alignment between beam and receiver for high reliability.

Open path detection technology uses a source and a detector. The source sends a modulated light beam across the monitored space and the detector senses the amount of light absorbed by the presence of gas. This approach provides a high degree of coverage across wide areas up to 200 m in length with accurate measurement, even if the toxic or combustible gas cloud is drifting at any point between the devices or when 95% of the light beam is obscured by fog, rain or smog. The system also will alert if the path is blocked completely by a physical obstruction.

Emerson Automation Solutions

www.emerson.com/au/automation

AIR HUMIDITY AND TEMPERATURE SENSOR WITH IO-LINK

Turck is offering its first combined air humidity and temperature sensor that can be easily integrated via its IO-Link interface. The combination of the two measured variables, air humidity and temperature, in a single device makes the CMTH-M12 suitable for use in the condition monitoring of machines and plants or for monitoring climatic conditions in production halls and warehouses.

The sensor monitors two limit value ranges, each with a minimum and maximum value, and provides a warning signal in the event of an out-of-range value. The bidirectional IO-Link interface can also be used for the transfer of cyclical data as well as warning and status messages, such as operating hours. Conventional switching outputs are also available.

When used in combination with Turck's multiprotocol I/O devices, user data and analysis data can be transferred over a variety of Ethernet protocols. While I/O modules transfer the user data to a higher-level controller via EtherNet/IP or Profinet, Modbus/TCP can be used as a parallel channel for analysis data. This information can also be provided for internet access via Turck's edge gateways and cloud systems

Turck Australia Pty Ltd

www.turck.com.au

IMAGE-BASED PARTICLE MEASUREMENT

German company SOPAT (Smart Online Particle Analysis Technology) develops and sells photo-optical and image-based analysis and measurement technology that quantitatively characterises multi-phase particulate systems. In combination with the hardware, SOPAT software provides real-time analysis of particle size distribution and characteristics.

The goal is to produce tailor-made particle measurement systems that allow for the early detection of trends and efficient process optimisation. This advantage leads to cost reductions in both time and personnel, increasing product quality and reducing waste.

Measurements occur inline during the production process, so neither sampling nor dilution is necessary. This means that the sample is neither changed on the way to the laboratory, nor must production be stopped. SOPAT says that image analysis also provides a clear differentiation between different kinds of particles species. For example, bubble size can be measured separately from the ore, clay or other substance.

A wide range of probes is available to cover the range of 0.5 to 50,000 μm; however, for mining the ideal probe has a measuring range of 1–350 μm.

The probe can be directly mounted in the in-flow or the out-flow port of a flotation vessel for continuous measurement and feedback to the onsite SCADA system. Other mining applications are also possible.

To protect the probe in abrasive applications, rubber fittings or pneumatically retractable ceramic fittings are available.

ALVI Technologies Pty Ltd

www.alvi.com.au

THERMAL IMAGING CAMERAS

The i-series is SATIR's latest range of handheld thermal imaging cameras. A fixed 3.5″ LCD capacitive touch screen has replaced the company's normal flip screen design of cameras offering the end user a wider range of models. Currently two models are available: the i-160 (160x120 resolution) and the i-384 (384x288 resolution).

There are four imaging modes on both models and seven colour palettes allowing the end user to select the models most suitable to their surveys. The spectral range is 8–14 μm and the temperature measurement range is -20 to +550°C with accuracy of ±2°C or ±2% of reading. Each comes with a rechargeable battery with 4 h working time that can be charged using a USB-C charger for fast charging.

The i-series models also have a laser pointer, Wi-Fi connectivity, and text and voice annotation, with 16 and 64 GB of data storage. Accessories include a charger, data cable, a high-strength shock-resistant case and an optional spare battery, as well as an Android app.

The i-series range of handheld thermal cameras can be used in a wide range of applications from mechanical to electrical and power surveying.

Slentech Pty Ltd

www.slentech.com.au

INDUSTRIAL-STRENGTH MQTT NETWORKS — PART 1

ADVANTAGES OF THE MQTT PROTOCOL FOR INDUSTRIAL NETWORKS

The first of a two-part article explaining the fundamentals of the MQTT protocol, and how it can be adapted to industrial applications.

Since 2015, MQTT has consistently ranked as the most popular Internet of Things (IoT)-specific messaging protocol in the Eclipse Foundation's annual IoT Developer Survey. An open-source OASIS/ISO standard, MQTT is used in many consumer applications, like mobile chat, home automation and car-sharing. It is supported by major cloud computing and IoT platforms for enterprise applications in smart energy, health and banking services as well. And more recently, MQTT has gained traction within the manufacturing and processing industries.

However, there are several obstacles to bringing the power of MQTT to bear in an industrial environment. MQTT's innate flexibility is also a potential drawback, requiring stronger guarantees of interoperability and state management to meet the needs of a diverse industrial network. Likewise, the integration of disparate device protocols cannot be addressed purely through MQTT, given its current level of support in field devices and the long lifespan of legacy systems. And while MQTT goes a long way to addressing fundamental cybersecurity issues, MQTT by itself isn't sufficient to create a secure industrial IoT (IIoT) infrastructure.

For system integrators, developers, engineers and managers wondering what MQTT can do for them, this two-part article explains the fundamentals of the protocol, demonstrates how the Sparkplug B specification adapts MQTT to industrial applications and shows how to establish and scale MQTT networks using industrial edge computing.

Fundamentals of MQTT v3.1.1

MQTT (formerly MQ Telemetry Transport) was designed for industrial networks. In the 1990s, ConocoPhillips (now Phillips 66) needed a way to improve telemetry reporting over its costly, low-bandwidth dial-up and satellite SCADA infrastructure. IBM partnered with system integrator Arcom Control Systems (now Cirrus Link Solutions) to develop a minimalist communication protocol that gracefully handled intermittent network outages and high latency among distributed devices over TCP/IP.

With efficiency and stability as principal goals, IBM and Arcom made a few critical decisions in designing the MQTT protocol, including the use of a publish-subscribe architecture, a message payload with very low overhead and mechanisms for dealing with client disconnections.

Publish-subscribe communication

Traditional communication models use a poll-response mechanism to interrogate field devices and maintain state awareness. Data is refreshed when a master device or application issues a request for new data, causing field devices to respond with the requested data. Queries are often triggered cyclically based on timing parameters.

IBM abandoned this model in favour of a brokered publish-subscribe model that is central to the strength of MQTT. In that scheme, a central server acts as a broker, managing data delivery for the entire network.

Rather than being prompted by command, MQTT-enabled field devices and gateways publish data to the broker only when they detect a change in a monitored value, a behaviour known as report-by-exception. Other clients, including software and other field devices, can register with the broker as subscribers to any data published on the network.

Since some devices may not need to publish very often, state awareness is maintained by periodically sending a small keep-alive

packet to the broker, in addition to other mechanisms that we'll discuss later.

Flexible topic paths

Although each client identifies itself to the broker with a unique client ID, with the broker as the one and only endpoint, there is no device addressing scheme. Instead, clients identify published data using individual, hierarchical topic paths represented as plain text strings.

For example, CellA/Oven/Temperature could represent the internal temperature of an oven in a particular work cell. A client could subscribe to that topic by using the exact path as a topic filter or could enter a more general filter to capture related data as well.

For instance, there might be other devices in that same cell that also publish temperature data as CellA/Pump/Temperature and CellA/Fluid/Temperature. A subscriber could use the single-level wildcard (+) character to register a filter with the broker that would match all three: CellA/+/Temperature.

Or maybe that oven in CellA also publishes pressure and humidity data. The subscriber could register those topic filters independently as CellA/Oven/Pressure and CellA/Oven/Humidity or could capture all subtopics using the multi-level wildcard (#) character: CellA/Oven/#.

The broker stores these topic filters as part of each client's network session and routes matching updates from publishers to any and all matching subscribers: one-to-one or one-to-many. This creates a system that is something like Twitter for machines: a free flow of anonymous, interest-based, event-driven, bidirectional communication.

Message payload

MQTT is an application layer protocol like HTTP, meaning that it defines the interface methods that applications and devices use to talk to each other over a network, and both are commonly used as messaging transports. In fact, MQTT has become a contender with HTTP for the most widely used protocol in IoT applications. But unlike HTTP, MQTT was designed for machine-to-machine communication.

While HTTP is famously heavyweight, with a long list of message headers used to describe and respond to resources, MQTT is data-agnostic, with a streamlined on-the-wire footprint that can be processed efficiently by devices with limited power and processing capabilities. It uses a simple byte array payload with a fixed 2-byte header and variable-length header fields (up to a few additional bytes) to indicate packet length or control codes. A packet can be up to 256 MB in size and can transport anything from process variables to a picture of your favourite pet.

Fault tolerance mechanisms

Reliable messaging is critical for industrial communications because of the need for accurate system state awareness and timely control response. Understanding this, MQTT's designers included features to gracefully handle unintended client disconnections and ensure data delivery to subscribers.

Messages can be transmitted or received with one of three quality of service levels (QoS 0,1, or 2). Higher QoS levels carry more overhead but provide a stronger guarantee of delivery.

- QoS 0 publishes a message once with no required acknowledgment.
- QoS 1 publishes a message repeatedly until it is acknowledged.
- QoS 2 publishes a message repeatedly but guarantees that it is received only once.

Published topics can be flagged as retained messages. This flag instructs the MQTT broker to store the most recent update to that topic. When a new client subscribes to that topic, it will receive this message immediately, rather than waiting for the next publication.

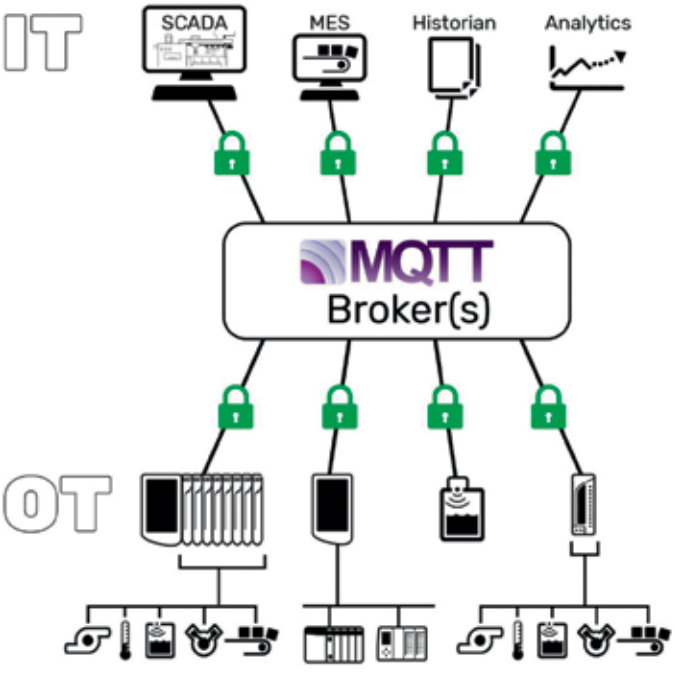


Figure 1: In the MQTT architecture, publishers and subscribers from across the organisation connect to a common data broker.

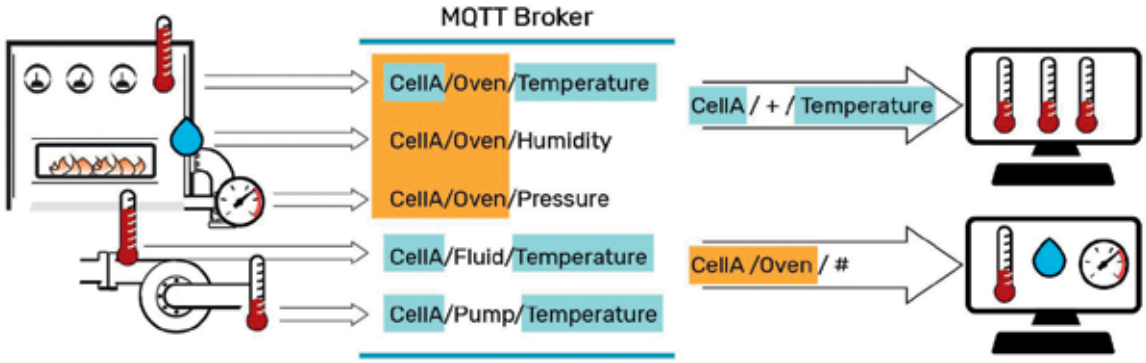


Figure 2: MQTT's flexible topic filters provide a simple subscription mechanism.

A client can also opt to connect to an MQTT broker with a persistent session. When the client disconnects, intentionally or otherwise, the broker keeps these network sessions open and stores the client's subscription filters along with any matching QoS 1 or 2 messages that arrive while it is disconnected. When the client reconnects, messages are issued in the order they were received.

Finally, each client can also designate a special message as a last will and testament (LWT), with its own topic path, QoS and retention settings. This message is registered with the broker upon connecting and is distributed to subscribers should the client connection be interrupted unexpectedly. Each client's keep-alive timer value determines when the broker considers this connection lost.

Reduced bandwidth

Combined with its streamlined payload, the communications model used by MQTT results in an 80–90% reduction in overall bandwidth consumption compared to poll-response protocols, according to Cirrus Link. This efficiency creates significant room for existing networks to grow — up to millions of connections — with MQTT.

Decoupled data

It is the decoupled nature of MQTT data exchange that unlocks the scalability of industrial networks. Without the need for point-to-point connections or direct addressing, MQTT networks can grow and share data flexibly.

Any client that wants access to published data — a maintenance database, ERP or SCADA system, for instance — can simply point to the common MQTT broker and subscribe to any desired topics, without needing the details of the publishing source. Network traffic between publishers and the broker is unaffected by the number of subscribers receiving updates, and subscribers do not require reconfiguration if a field device type or IP address changes.

Data integrity and security

The architecture also has important implications for data integrity and security. Since the MQTT broker doesn't house or modify data, but only distributes it, each publisher is the single source of truth for its respective topics, reducing the potential for discrepancies and data siloing.

MQTT's fault-tolerance features complement the flexible nature of the publish-subscribe model by building in guarantees that ensure that clients are advised of changes in data quality and equipment state without constant polling.

The broker alone manages user authentication, data access rights and message delivery, simplifying network management and allowing each client to remain anonymous to other network members. And since MQTT connections are device-originating (outgoing), only the broker is required to have an open firewall port. Field devices can be completely locked down while still permitting bidirectional communication.

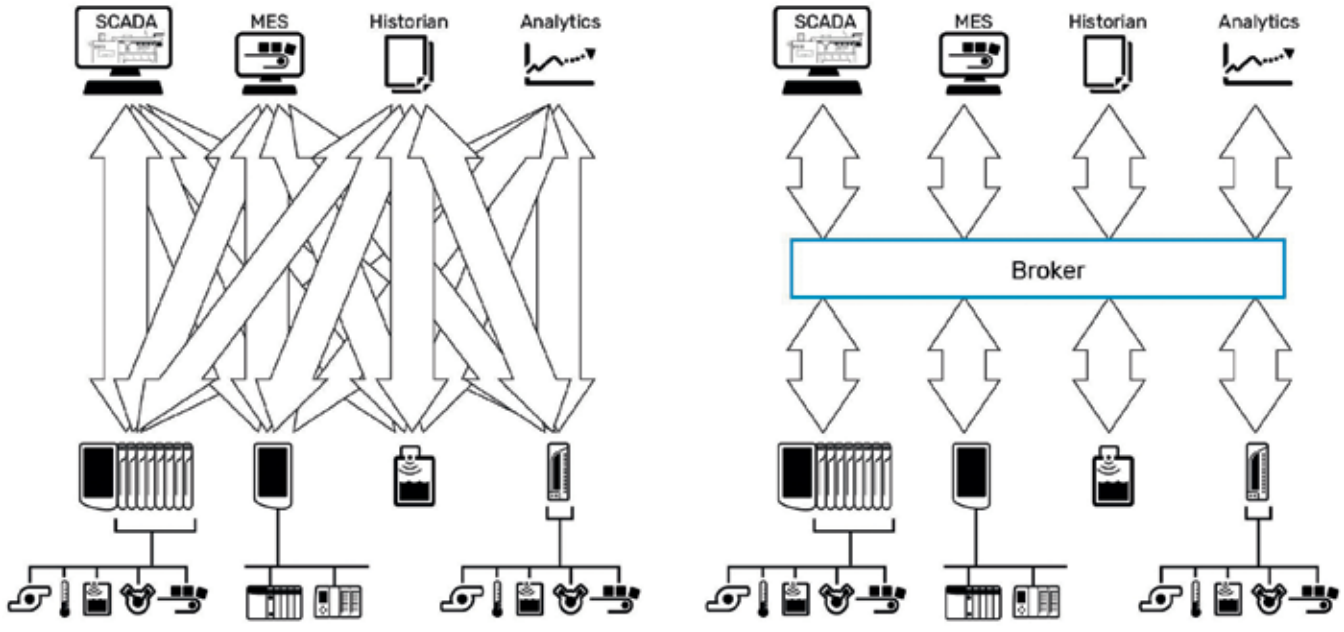


Figure 3: Brokered traffic dramatically reduces the number of network connections.

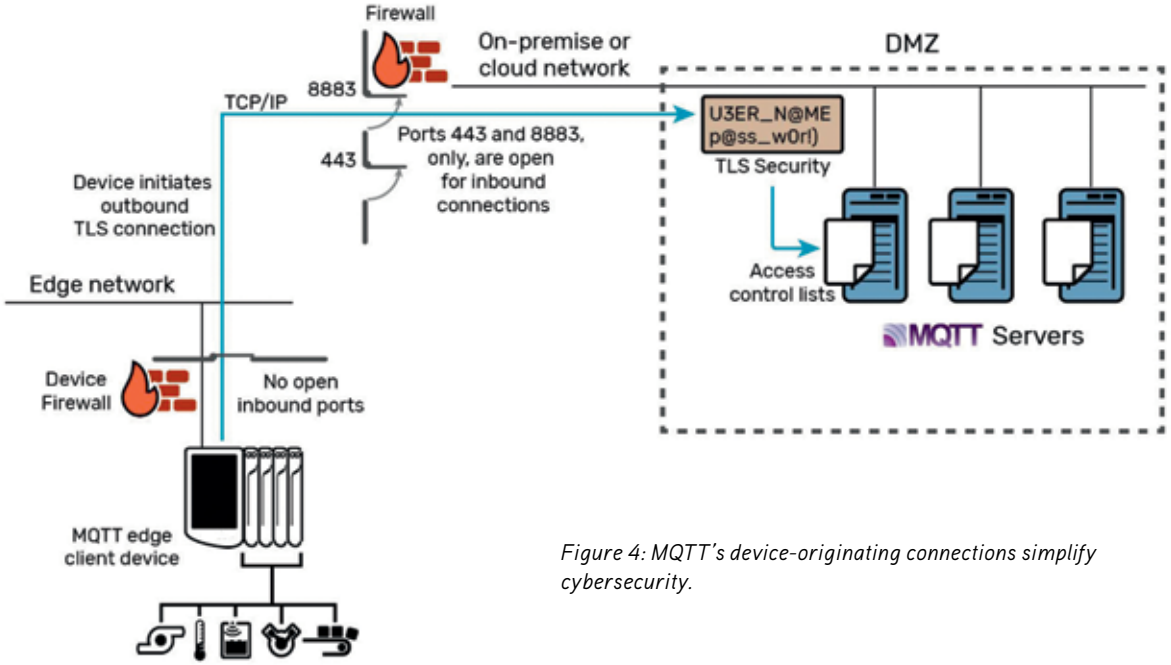


Figure 4: MQTT's device-originating connections simplify cybersecurity.

MQTT also supports optional username and password fields, but in an effort to keep the specification as simple as possible, it primarily relies on security mechanisms in other layers. The most common method is to make use of the transport layer security (TLS) mechanisms already built into the TCP/IP stack (port 8883 is registered for MQTT TLS). In combination with certificates of trust to authenticate the identity of connected endpoints, secure site-to-site MQTT communication is feasible even over public networks.

Faster, better with Sparkplug B

Because of its flexibility, MQTT has been adopted for many IoT solutions. It imposes few naming conventions and accommodates any payload of an appropriate size with equal efficiency. Developers can customise MQTT's basic structure (topic paths) and behaviours (retained messages, persistent sessions and so on) for their MQTT client as best suits the application, with no extraneous design elements to account for. However, this same flexibility can also be a limitation, particularly for the kind of large, diverse networks characteristic of industrial installations.

With no uniform naming standard, no common data format and no contextual information on published topics, the details of each publisher's data — which topic paths to subscribe to, how to decode or interpret the payload, the appropriate QoS level and how to recognise a publisher's LWT — must be known ahead of time in order to be discovered and used by subscribers. Since each device is free to use different conventions, configuring a large network can require significant effort akin to mapping conventional tag data between applications. These factors slow the pace of development and may even inhibit interoperability, adding to the cost of integration and undermining the goals of IIoT.

Likewise, while MQTT includes features to monitor client connection status and data quality, there's no guarantee that a vendor will utilise them in a field device or software client.

These weaknesses — and other observations about MQTT's adoption in the marketplace — inspired the development of the open-source Sparkplug MQTT Topic Namespace and Payload Definition, under the leadership of MQTT co-inventor Arlen Nipper and Cirrus Link Solutions. The current version, Sparkplug B (SpB), expands on the basic MQTT architecture to address common industrial use cases and adds a handful of important implementation details to MQTT clients that conform to the specification.

Components of an MQTT/Sparkplug B network

Sparkplug adds to and clarifies the roles of basic MQTT clients, enabling new features and more explicit messaging that are the basis for other enhancements in the specification.

The specification distinguishes between two types of MQTT clients:

- MQTT/Sparkplug B Edge of Network (EoN) Nodes: These clients provide physical and/or logical gateway functions to enable MQTT/Sparkplug B communications for legacy devices and sensors. EoN nodes also include smart devices and sensors capable of publishing their own Sparkplug B data, process variables or metrics directly to an MQTT broker.
- MQTT/Sparkplug B Application Nodes: These are software clients, optionally including one primary application responsible for sending commands and receiving historical data. An MQTT/SpB application node may also be a gateway to legacy software systems.

Sparkplug nodes use predefined message types to distinguish between internal data and data originating from connected devices. Nodes are also responsible for reporting on the state of their connected devices, if present.

Any MQTT 3.1.1-compliant broker will support Sparkplug B payloads, and one or more can be used as needed for redundancy, high availability or scalability.

In Part 2

In Part 2 of this article we will further describe the features of the Sparkplug B specification and how it makes MQTT more suitable for industrial use. We will also look at how MQTT with Sparkplug B can be practically implemented with the application of edge computing.

Systems 22 Pty Ltd
www.systems22.com.au

HYGIENIC SERVO ACTUATORS

Developed for use in the sterile and wet areas of production and packaging machines, Wittenstein alpha's axenia value series motor/gearbox systems can be incorporated into open units without any additional protective measures. This not only saves time and cost in integration, but also avoids the multiple performance, process and product risks associated with enclosed or encapsulated servo actuator solutions.

axenia value servo actuators in single-cable technology complement the Wittenstein range of hygienic design and EHEDG-compliant planetary gearboxes (HDV and HDP). They are also offered in the cyber dynamic line for output ratings up to 335 W as mechatronic drive solutions for sterile applications where germs, bacteria, microorganisms and dirt pockets must be ruled out and machine components have to be cleaned fast, reliably and without residue.

Using the system toolkit provided, the hygienic servo actuators in the axenia value series can be configured in three motor sizes with a maximum acceleration torque of 32, 80 or 200 Nm and gear ratios from i=10 to i=25, depending on the desired task and the performance requirements. A holding brake, temperature sensors and analog and digital encoder systems for position and speed can be built in as options.

The exterior housing surfaces and the cable glands are made from extra-hard-wearing 1.4404/AISI 316L stainless steel. The rolled steel surfaces are very smooth with roughness of less than Ra 0.8 μm. The housing has IP69K protection to prevent the ingress of moisture during CIP or SIP cleaning or high-pressure washdown.

Treotham Automation Pty Ltd

www.treotham.com.au

PANEL PCs

Aplex Technology has released the ARCHMI-9xxB series of rugged industrial all-in-one HMI computers housed in a fanless silver aluminium case that provides IP 66 front panel protection.

The ARCHMI-9xxB Series LCD panels are available with resistive or projected capacitive touch screens and feature 8th Generation energy-efficient Intel Core i3-8145UE or i5-8365UE processors with up to 32 GB of DDR4 2400 MHz memory. An internal M.2 M Key slot is provided for operating system and data storage. Rear I/O connections include one COM port, four USB 2.0 ports, two Gigabit Ethernet ports, a DP port and audio line out. An internal Mini-PCIe Slot allows full size Mini-PCIe cards to be installed. An internal nano SIM card holder is also included. An internal expansion slot allows I/O expansion cards to be installed.

The ARCHMI-9xxB Series Panel PCs can be panel or VESA mounted, allowing the system to be ergonomically positioned for operator convenience. The ARCHMI-9xxB requires a 9–36 VDC power source and can operate in temperatures ranging from 0-50°C.

A wide range of screen sizes is available including: 12.1″, 15″, 17″ and 19″ 3:4 ratio as well as 15.6″, 18.5″, 21.5″ and 32″ 16:9 ratio full HD. Both offer 300 cd/m^3 brightness and optional 1000 cd/m^3 high brightness panels are also available.

Interworld Electronics and Computer Industries

www.ieci.com.au

ALARM HORN SOUNDERS, BEACONS AND COMBINED SIGNALS

The E2S AlertAlarm, AlertAlight and Sonora ranges of alarm horn sounders, beacons and combined signals are designed to provide reliable and effective alarm notification in harsh environments.

Mechtric and E2S have announced significant upgrades to the AlertAlarm and AlertAlight series that will progressively come into effect over the next 2–3 months. These include wider voltage range; increased sound output; 64 tones with 4 stages with dual DIP switches for independent second stage; dual cable entries; and extended temperature range of -40 to +66°C.

There will be enhanced enclosure configuration including back box options that provide dual 20 mm cable entries, and stopping plugs supplied as standard.

New electronics for the A100 include up to 110 dB(A) @ 1 m; DC voltage range: 10–60 VDC; and AC voltage range: 24–260 VAC 50/60 Hz.

For the A105N it includes up to 113 dB(A) @ 1 m; DC voltage range: 10–60 VDC; and AC voltage range: 24–260 VAC 50/60 Hz.

For the A112N it includes up to 120 dB(A) @ 1 m; DC voltage range: 10–60 VDC; and AC voltage range: 100–260 VAC 50/60 Hz.

For the A121 it includes up to 124 dB(A) @ 1 m; DC voltage range: 10–60 VDC; and AC voltage range: 100–260 VAC 50/60 Hz.

Global accreditations as standard are UL/cUL/ULC approved for fire and general signalling; UL EU approved to EN54 standards — CPR compliant (A105 and A112N); DNV type approved (A105 and A112N); and MED compliant — DC and AC voltages (A105 and A112N).

E2S products are distributed in Australia by Mechtric and are available from electrical wholesalers.

Mechtric Pty Ltd
www.mechtric.com.au

CITECT SCADA LIVES ON AS AVEVA PLANT SCADA

Citect SCADA has been a trusted SCADA platform for over 35 years and continues to evolve.

For over thirty-five years, Citect delivered innovative, reliable, and flexible SCADA software that enabled companies across the globe to optimise industrial processes, improve situational awareness, and make real-time decisions based on accurate information. Citect is synonymous with excellence in SCADA solutions in the Asia Pacific region. With the combined strength of AVEVA and Schneider Electric Software, Citect SCADA became Plant SCADA to continue its legacy as a reliable, flexible, and high-performance SCADA software solution for industrial process users.

With the launch of AVEVA Plant SCADA 2020 R2, Citect SCADA took on a new name and a new role as an integrated part of the AVEVA Operations Control portfolio. Plant SCADA includes upgrades that allow users to access the full value of AVEVA's operations control software, from the edge to the enterprise.

AVEVA Plant SCADA continues to provide secure and safe supervisory control and monitoring of disparate critical infrastructure for industrial processes to increase returns and reduce operating costs, while improving productivity and product quality.

AVEVA Plant SCADA enhances excellent capabilities

The AVEVA Plant SCADA web client provides a new thin client solution with HTML5 visualisation to desktop browsers and mobile devices. The modern graphics editor, new graphics technology like Industrial Graphics, and new web runtime experience are available alongside the legacy graphics tools and high-performance desktop runtime users are already familiar with.

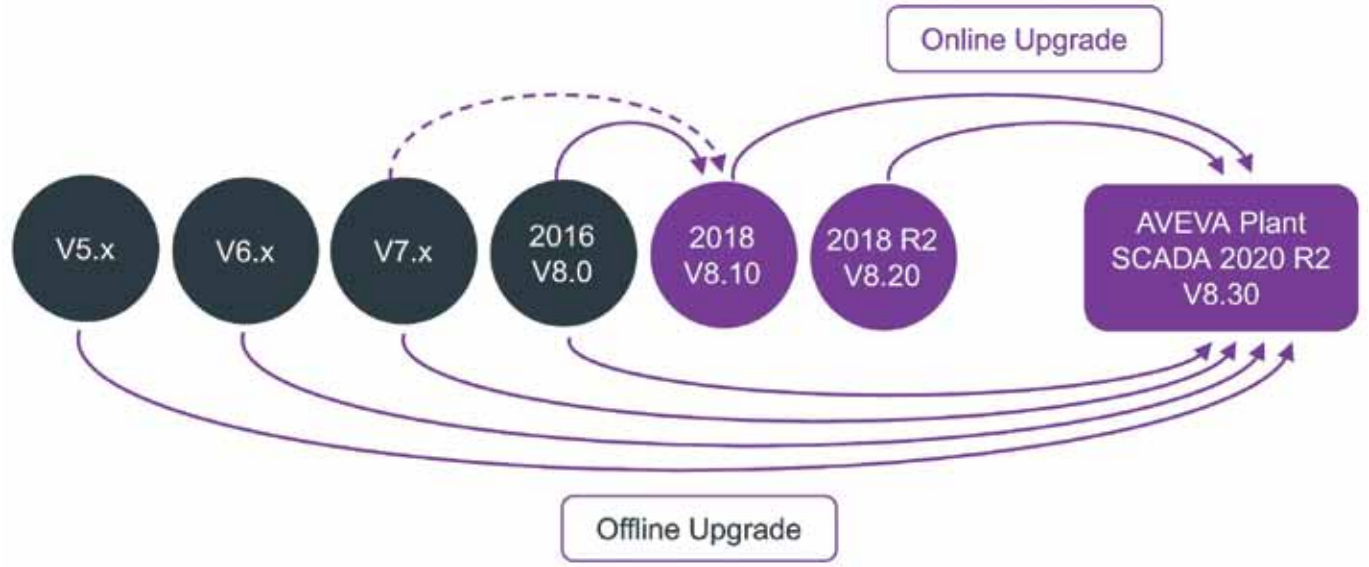
Improved connectivity (IPv6, OPC-UA Server)

Plant SCADA 2020 R2 IPv6 addresses are supported throughout the configuration, including PC network addresses, I/O devices (for supported drivers), servers and clients. Plant SCADA also supports native OPC-UA server functionality so users can share plant data throughout the organisation on unified data platforms.

Security enhancements

The following security enhancements have been included with Plant SCADA 2002 R2:

- Permissions are reduced for Plant SCADA, and support was added for virtual service accounts.
- User groups can restrict access to configuration files (including those on deployment server/client) and Plant SCADA configuration tools.



- Enhanced IT management supports mapping security groups to Windows Domain groups, including security configurations for deployment, support for Domain groups within Local groups, and support for authentication of Windows users through CtAPI (so local users don't have to be managed).
- Encryption has been extended through ActiveX Web Server connections.

Other enhancements

The following enhancements have also been added to Plant SCADA 2020 R2:

- Users can determine how graphics library items are used throughout the project (integrated for both legacy graphics and new Industrial Graphics libraries) within Plant SCADA Studio development.
- Persistent GoTo Object dialog settings were added to the graphics editor.
- Display dialogs from the graphics editor on any chosen monitor.
- Hide the 'Add' button in Special Days view of the BACnet Scheduler during the runtime.

More than a name change

The name may have changed to AVEVA Plant SCADA, but everything that made Citect great remains, helping it retain its position as a reliable, flexible, and scalable SCADA solution.

Long-time users of Citect SCADA will find even more capabilities with AVEVA Plant SCADA. That's because AVEVA is committed to investing in the future development of AVEVA Plant SCADA, with a roadmap that focuses on technological trends for a SCADA software ready for anything.

Online upgrade

Online upgrades are available for version 7 and above to AVEVA Plant SCADA 2020 R2 (version 8.3).

Get ready for more

The same team that developed Citect SCADA is dedicated to the future development of AVEVA Plant SCADA as a world-class industrial software solution, ensuring a seamless transition from one version to the next. With continued R&D and investment there will be more features, functionality and releases.

Schneider Electric – AVEVA Select Distributor

Schneider Electric recently announced that they signed on as the first AVEVA Select distributor in the Asia Pacific region.

This agreement gives Schneider Electric access to the full portfolio of AVEVA's leading-edge industrial software solutions. The combined strength of the partnership accelerates the journey to industry 4.0 and helps to meet end-to-end digital transformation requirements with unified platforms for operations.

The AVEVA Select partnership helps Schneider Electric's customers optimise engineering, operations, and asset performance using both proven and cutting-edge technologies like artificial intelligence, industrial IoT, big data, cloud, and hybrid-cloud capabilities.

Bringing together the expertise and leading-edge industrial software of the two companies, the partnership delivers scalable and flexible end-to-end solutions that power workforce, information and technology capabilities to support the complete industrial lifecycle — on budget and on time.

Joint customers will benefit from proven best practices, finely-honed efficiencies, and extensive sector-specific expertise. With Schneider's strong ecosystem of delivery and technology partners, the new partnership will help you expedite your digital transformation.

Ready to find out more or upgrade to AVEVA Plant SCADA?

AVEVA and Schneider Electric always recommend using the most recent versions of software to mitigate security risks and ensure organisations have access to all the latest features and capabilities. For current users of Citect SCADA, now is a fantastic time to consider an update to AVEVA Plant SCADA. Prospective new users can contact Schneider Electric to request a demo to see how AVEVA Plant SCADA can reduce operating costs and improve productivity and product quality.

Discover more.

AVEVA Schneider Electric

Schneider Electric
se.com/au/getreadyformore

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OPINION

REMOTE COMMISSIONING WILL CONTINUE AFTER COVID-19

The COVID-19 pandemic has had huge effects on economies around the world, including reducing raw material production, limiting workforce availability, supressing demand for many products and services, and reducing the ability to travel. Businesses have adapted to these challenges in numerous ways, changing working procedures, stockpiling goods and working remotely where possible.

In many cases working remotely is straightforward with good levels of online communication and access to the necessary technology. For many office-based workers it is as easy to complete their jobs from home (provided domestic distractions can be minimised) as from their desks. Restrictions on global travel have also increased the use of remote working by international businesses: while holding online meetings may be more convenient and better for the environment than flying halfway round the globe for a half-day conference, there are some things that, according to conventional wisdom, can only be carried out successfully in person.

Until recently several stages of production and installation of manufacturing equipment would have fallen firmly into this category. Clients would have travelled to manufacturers' facilities to carry out factory acceptance testing (FAT) as new projects were begun, and manufacturers' engineering staff would visit the client to assist with the final installation and commissioning of the finished equipment. Over the last two years, COVID-19 has made many of these trips impossible, or harder to justify.

Technology has once again come to the rescue, with remote metrics and connections to machinery and equipment allowing the equipment manufacturer's own staff to assist local on-site engineers with the connection, installation and commissioning of new equipment.

A FAT helps verify that newly manufactured and packaged equipment meets its intended purpose, validating the operation of the equipment and making sure that customers' purchase order specifications and other requirements have been met. Later in the supply process, commissioning can be defined as a systematic process of verifying that all equipment and facilities perform interactively in accordance with the design and intent, and in accordance with the client's operational needs, including the preparation (and training) of operational personnel. It is usually carried out between the design phase and up to one year after installation.

Thanks to remote telemetry, engineers and others can perform virtual inspection of assets and can see virtually what works and what doesn't, including fault finding and identification. These digital solutions help to reduce the number of personnel onsite as well as the duration of tests and can be applied to both FAT and final commissioning.

Remote commissioning is becoming one of the most visible aspects of Industry 4.0 and the Internet of Things (IoT). Although each case will be different, there are several stages which are common to most remote commissioning processes, including verification that the plant or equipment has been installed in accordance with the plans and piping/instrumentation

diagrams. There is also likely to be a pre-commissioning stage, which includes systematically checking connections, wiring and HMIs as well as installing and updating software components, cleaning and flushing equipment, etc.

The actual remote commissioning process will also consist of various steps but is greatly assisted by remote monitoring and telemetry of equipment using either an ethernet connection or an integrated data SIM. This allows system software to be adjusted as necessary while the equipment is operating. Other parameters and physical adjustments can be discussed during online meetings facilitated by conferencing systems and other forms of communication, such as WhatsApp.

One practical aspect that must be considered when operating internationally is the potential time difference between the onsite engineering team and the equipment supplier and overcoming this presents some logistical challenges and additional costs. However, none of these issues are insurmountable. When additional out-of-hours overtime charges are compared to the costs of travel and accommodation, there are often financial benefits, not to mention the considerable reduction in carbon emissions and unproductive time spent travelling. These benefits are undoubtedly one of the drivers that will ensure that remote commissioning continues to be carried out in the future — whether or not our ability to travel is limited by the COVID-19 pandemic or other unforeseen factors.

Matt Hale is the International Sales & Marketing Director at HRS Heat Exchangers.

REFRIGERANT DRYERS

Boge says its DS-2 series refrigerant dryers are more environmentally friendly than their predecessors. They come with refrigerant R 513 A as standard, which has a lower global warming potential than the refrigerants previously used. They are also said to offer economic advantages, with a smart control system that adjusts to demand and reduces power consumption at a constant pressure dewpoint.

The smart control automatically switches off the cooling compressor at partial load as soon as the required dewpoint has been reached. The cooling temperature is stored in the heat exchanger, and this cold reserve cools the incoming compressed air until the dewpoint rises again. The cooling compressor only starts up again to maintain the required temperature level, and thus only begins consuming energy at this point. This principle allows energy savings of up to 79% compared to a dryer in continuous operation. The frequency-controlled fan provides a stable condensation pressure and reduces energy consumption by up to 25%. Additionally, the design of the heat exchanger combined with low differential pressures and a low refrigerant requirement results in lower power consumption.

The systems can be easily incorporated into an existing infrastructure due to various interfaces. Communication takes place by Modbus RTU, USB ports or optionally by Modbus TCP/IP.

Boge Compressors Ltd
www.boge.net.au

LINEAR POSITION SENSORS WITH IO-LINK

Turck has upgraded its Li-Q25 inductive positioning systems and equipped the contactless linear position sensors with IO-Link. COM3 of the new Li-Q25L allows it to support the latest and fastest IO-Link interface.

The company says the inductive measuring principle outperforms alternative systems, particularly in terms of shock resistance and sampling rates. Due to the contactless coupling between positioning element and linear position sensor, the device outputs a reliable position signal even with vibrations or shocks of up to 200g.

The sampling rate of 5 kHz reduces position error to a minimum and it is constant over the entire measuring length. A 16-bit converter is designed to provide accurate measuring results.

The Li-Q25L can be integrated in Profinet systems via Turck's Simple IO-Link Device Integration (SIDI) software without the need for any additional software. The IODD Configurator simplifies commissioning and maintenance. Besides cyclical data, the linear position sensor can also transfer diagnostic data to the cloud via IO-Link.

The robust sensor complies with protection type IP67 and can be used in temperatures from -25 to +75°C. Turck is offering the device in measuring lengths of 100 to 2000 mm. The Li-Q25L is insensitive to magnetic fields and is suitable for use in demanding applications with a severe shock load such as in the metal and woodworking industries.

Turck Australia Pty Ltd
www.turck.com.au

HYDRAULIC SECTIONAL CONTROL VALVE

The LCX-6 valve series is based on the existing LX-6 valve series and is designed for closed-centre hydraulic systems with variable displacement pumps while providing a compact design with space and weight reduction.

The LCX-6 valve series' nominal pressure is 350 bar, and maximum flow rate at the pump port is 250 L/min (or 180 L/min with a pressure peak protection unit) and at working ports is 180 L/min with compensator and load holding function.

Features of the LCX-6 valve series include flow-optimised valve design; high mechanical and electrical resolution; compact size and low weight; modular design for up to 10 working sections; manual, hydraulic, electrohydraulic (on/off, proportional) types of operation (with or without hand lever); application-specific main spools with adjustable stroke limiter; and shock/anti-cavitation valves for protection of actuators.

Other features include adjustable load sense pressure limitation (mechanically or electro proportionally) that cause the compensator to block flow to the working A or B; and optional flange blocks for LS remote control of single sections.

The individual single sections of the LX-6 valve series are used 1:1 in the LCX-6 valve series and are therefore interchangeable; however, the inlet and end modules cannot be combined or exchanged between two valve series.

If only one hydraulic function is needed, the LCX-601 is the right choice. It consists of one mono section that does not require separate inlet and end plates as everything is included. It can be customised to different applications and machines.

HYDAC International

www.hydac.com.au

RUGGED TABLET FOR HAZARDOUS ENVIRONMENTS

Getac has announced the launch of the F110-EX, an ATEX and IECEx Zone 2/22 certified version of its F110 fully rugged tablet, aimed at professionals working in or around hazardous environments.

Features of the F110-EX include an 11th generation Intel Core Processor with integrated Iris Xe Graphics, PCIe NVMe SSD storage as default, WLAN Wi-Fi 6, Bluetooth 5.2 and 4G LTE WWAN. An integrated Thunderbolt 4 port provides a 40 Gbps connection for expanded end-to-end solution capabilities, while its 11.6″ LumiBond 2.0 screen offers high brightness (1000 nits) and readability in all weather conditions.

The F110-EX also features a range of intrinsically safe design elements that enable it to meet ATEX and IECEx certification standards for use in Zone 2/22 hazardous environments. These include rubber coverings on all ports, guide pins and exposed metal parts; and enclosed connectors and screen protection, helping to eliminate the risk of electrical sparks that could potentially ignite explosive atmospheres.

The tablet has MIL-STD-810H and IP66 certification, drop resistance from 1.3 m while in use and an operating temperature range of -21 to +60°C.

Getac Technology Corp
www.getac.com/apac/

STAINLESS STEEL PANEL PCs

Aplex has added the ViTAM-9B to its ViTAM Series panel PC range, offering higher CPU performance. The ViTAM-9B features fanless PCs that attain all-around IP66/IP69K certification and stainless steel construction with M12 connectors, making them suitable panel PCs for industries with hygiene considerations as a top priority, such as food, beverage and laboratories.

In addition to features such as anti-corrosion, green materials, rugged enclosures, low maintenance, being easy to clean, SUS315 anti-oxidation and wide-range temperature resistance, the IP66/IP69K stainless steel panel PC also supports versatile mounting, auto-dimming, an RFID system, PCT/RT touchscreen options and various sizes of display.

The product has an 8th Gen Intel Core i3/i5 processor, 64 GB DDR4 memory and 2.5″ SATA3 HDD storage.

Backplane Systems Technology Pty Ltd
www.backplane.com.au

HART MULTIPLEXER SOFTWARE

Softing Industrial has introduced smartLink SW-HT, HART multiplexer software for accessing configuration and diagnostic data via Emerson's AMS Device Manager or other HART IP-enabled plant asset management applications. Version 1.10 supports Allen-Bradley controllers and remote I/Os in addition to Schneider Electric M580 controllers and drop I/Os.

An increasing number of modern remote I/Os are using Ethernet as the connection to the controller. smartLink SW-HT addresses this trend by providing an Ethernet connection to tunnel the HART commands to the remote I/Os. smartLink SW-HT provides access from Emerson's AMS Device Manager to HART field devices connected to Allen-Bradley or Schneider Electric M580 controller HART I/O modules or remote I/Os. An integrated HART IP server ensures transparent access to configuration and diagnostic data. Users save time and costs as they do not need additional HART multiplexer hardware. The software comes as a Docker container and is deployed with additional virtual machines, making it easy to use under Windows.

smartLink SW-HT scans all configured HART modules for the connected HART devices and maintains a live list of the devices. This eliminates the need to scan the entire AMS Device Manager device tree when a new HART device is added. The application converts the incoming HART IP commands into the Ethernet-based communication used by the Allen-Bradley and Schneider Electric HART modules. Optimised scheduling of the commands is performed to achieve the optimal communication performance.

Ti2 Pty Ltd
www.ti2.com.au

BIN AERATORS

The OLI range of bin aerators has been developed to assist in the eradication of problems associated with product flow from bulk storage of dry, fine and granular powders, such as ratholing and bridging. The VBS Aerator is used extensively throughout the food, chemical and grain processing industries worldwide.

Using an FDA-approved food grade silicone membrane with aluminium or food and pharmaceutical grade stainless steel stems, they are suited to a wide range of applications where fluidisation is paramount to encourage product flow.

The VBS and VBSI aerator ranges offer low air consumption, require no maintenance and are compact in design. The advanced one-way directional air flow boosts powder discharge from silos, hoppers or bins. The Tramontana design maximises unloading efficiency due to its unique shape.

With an operating pressure of 0.8–4 bar and a continuous and discontinuous duty cycle, they come in two sizes — the VBS Standard (104 mm) and the VBSM Micro (60 mm) — and are available in high temperature (170°C), food grade metal detectable and the standard food grade model with aluminium or stainless steel stem.

Using the VBS RP Kit the aerator range can also be retrofitted to silos, bins or hoppers while full or where internal silo access is difficult or impossible. Constructed from stainless steel and supplied with internal seals and fittings, they are easily installed.

Oli Vibrators

www.olivibrators.com.au

NEW PRODUCTS

BOOSTER FOR HIGH AIR DEMAND

Kaeser Compressors has announced its DN 37 C XL booster designed for applications such as PET bottle production, process air applications and nitrogen generation that require high air demand up to 25 bar.

Premium Efficiency (IE3) drive motors, equipped as standard, contribute to energy-efficient performance, as does the large axial fan, which also helps with temperature control.

The DN C series boosters also feature separate cooling air flows for the compressor block, drive motor and control cabinet, which are drawn in through openings in the right-hand side of the enclosure. Once they have been used for cooling, the separate air flows are combined and then discharged upwards through the exhaust air outlet in the top of the enclosure.

This design prevents cool inlet air from mixing with warm exhaust air, improving efficiency. Thermal overload is therefore kept to a minimum and a separate, energy-consuming cooling system for idling is only necessary under extreme conditions.

DN C series boosters are delivered as complete turnkey systems, matched to the upstream compressor. With the Sigma Control 2 controller, they are ready for connection and self-monitoring.

All maintenance-relevant components, such as cylinders and venting valves, filters, condensate separators, oil drain and filler openings are easily accessible due to large maintenance doors.

Kaeser Compressors Australia
au.kaeser.com

DECENTRALISED POWER SUPPLIES

PULS has released its decentralised FIEPOS power supplies for flexible use directly in the field, with IP54, IP65 or IP67 protection classes. Puls FIEPOS, short for FIEld POwer Supply, represents a new type of power supply that was developed for a decentralised environment. They are designed to be easy to install and flexible enough to meet the diverse requirements of modular factory automation.

Decentralisation improves efficiency and lowers cost by removing the need for oversized supplies and long runs of large cross-section cables.

The field power supplies are available in either Basic Series or eFuse Series. Both series are available with power of 300 or 500 W for single-phase or three-phase systems and as IP54, IP65 or IP67. Both can be DIN rail or surface mounted, with up to 200% power reserve for 5 s and have a wide operating temperature range up to 70°C with derating. The Basic series models have a single DC output. They can be connected in parallel to increase total performance or create a redundant system.

The eFuse supplies have up to four individually current-limited DC outputs, removing the need for external protection. Faults can be monitored and controlled via IO-Link or Output OK signal, plus LED indicators and pushbuttons. In the event an overload, the individual output switches off and needs to be reset manually via pushbutton or remotely via IO-Link.

The use of IO-Link allows for the remote monitoring of output current, quality of the mains voltage, temperature, load variability and status.

Control Logic Pty Ltd
www.controllogic.com.au

MODBUS/TCP TO RTU/ ASCII GATEWAY

The ICP DAS tGW-735i is a small Modbus/TCP to RTU/ASCII Gateway with PoE and 3-port RS-485. It enables a Modbus/TCP host to communicate with serial Modbus RTU/ASCII devices through an Ethernet network and eliminate the cable length limitation of legacy serial communication devices.

The module can be used to create a pair-connection application (as well as serial-bridge or serial-tunnel application) and can then route data over TCP/IP between two serial Modbus RTU/ASCII devices, which is useful when connecting serial devices that use Modbus RTU/ASCII protocols and do not themselves have Ethernet capability.

The tGW-735i module features a 32-bit MCU to enable efficient handling of network traffic and has a built-in web server that provides a management interface for users to modify the configuration of the module.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

AUTOMATING FILL LEVEL MEASUREMENT FOR GRANULATES

Long-range laser sensors are a flexible solution for monitoring fill levels of granulates in silos.

Powder granulation is one of the most viable methods to produce granulates by blending multiple types of materials. This process is developed with the intention of easing the handling of raw materials and making them easier to be transported. This technique has been applied in manufacturing dairy, fertiliser and pharmaceutical products to improve their bulk storage quality in silos or tanks.

To avoid manufacturing and logistics problems, manufacturers must first ensure that the product quantity in the tank is precisely measured. These measurements are performed continuously to ensure sufficient volume in the tank. Industrial weighing load cells have been used in the past for this measurement, and although they can accurately measure the weight of materials in the tank, they cannot be used to measure the fill level of the tank.

An alternative is to use ILR2250 long-distance laser sensors on the lid at the top of the silo to perform continuous measurement towards the bottom of the tanks. The measured distance calculates the volume of materials remaining in the tank or the amount displaced for processing. This compact sensor offers a stable measurement signal over continuous exposure and can accurately detect coarse grain and dark surfaces, making it suitable for this application.

These long-range laser sensors operate based on the phase-comparison principle, where distance is measured by determining the phase shift from the reflected high-frequency modulated laser light with the reference signal. The ILR2250 offers the capability of measuring down to millimetre precision up to a distance of 100 m, which makes it ideal for this type of measurement application.

Material discharged from silos is expected to follow a funnel-shaped discharge pattern. Therefore, laser sensors must measure at numerous points to get accurate measurement results. At least three laser sensors are required to generate accurate data. This industrial laser sensor can also be fitted with an air purge cleaning system and protective glass to ensure adaptability in filling level measurement applications.

Ease of monitoring and control

Once the measured results are obtained, they can be looped in real time to the process control system via a USB, Ethernet or digital RS422 interface. The system can use this data to calculate the exact filling level, the residual volume and the volume of granulates needed to replenish the tank. The results can be transferred and displayed at the central control room, allowing the operators to monitor the filling performance in real time and take immediate intervening actions if required.

This autonomous, real-time monitoring system offers the advantage of avoiding the overfilling, slipping and emptying of bulk materials. It ensures that there is always sufficient material in the tank, preventing manufacturing delays that could occur due to a shortage of raw materials.

The system can be configured to trigger an early warning alarm when the fill level falls below the desired level. With the flexibility of this automated measurement system, operators can plan for materials replenishment at an earlier stage and avoid production downtime.

The ease of installation, commissioning and integration of the ILR2250 means that manufacturers can develop, expand or retrofit their current equipment without complex reset and commissioning work for the new system. The flexibility of this system introduces a significant cost saving for the manufacturer.

Bestech Australia Pty Ltd
www.bestech.com.au

BESTECH
Sensors & Teaching Equipment

VIBRATING FORK LEVEL INSTRUMENTS COME OF AGE

*Brent Frizzell, Endress+Hauser**

Vibronic point level instruments, popular since the 1980s, can now diagnose themselves, meet safety requirements, and support Industry 4.0 and IIoT initiatives.

Vibrating fork level instruments — also called vibronic instruments — are widely used in the process industries. Available from multiple manufacturers, millions of these devices have been installed worldwide over the past few decades.

While the basic technology of vibronic instruments hasn't changed much over the years, today's instruments now employ technological innovations to bring them into the digital age, meet the needs of Industry 4.0 and the Industrial Internet of Things (IIoT), provide diagnostics themselves, and provide access from mobile devices. This article describes those developments and shows how they benefit end users.

Inside vibronic instruments

Vibronic instruments consist of a transmitter and a sensor. The sensor portion of the instrument uses a tuning fork (Figure 1) that's excited at its resonant frequency by a piezoelectric crystal, with a second crystal detecting the vibration produced by the first. The frequency reduces when the fork is covered by a liquid, and this change is analysed and translated into an on/off output signal by the instrument's transmitter.

Vibronic instruments are well suited to liquid level applications, including point detection at the top and bottom of tanks, certified leakage monitoring and overfill prevention, use in hazardous environments, and applications requiring safety integrity level (SIL) 2 and 3 certification. These instruments can be used in storage tanks, containers and pipes for point level detection of all types of liquids.

In the oil and gas sector, refineries rely on vibronic instruments because they are among the most reliable of measuring instruments. This allows these devices to be used in critical applications such as overfill protection and pump dry run prevention.

Unlike float switches, vibronic instruments do not require maintenance and have a long service life. In addition, most are corrosion resistant.

Other advantages of vibronic instruments include:

- Unaffected by media: Vibronic instruments can be used to measure the presence of liquids with viscosities up to 10,000 mm^2/s and densities greater than 0.3 g/cm^3.
- Unaffected by media properties: A vibronic instrument is not affected by changing flow, turbulence, gas bubbles, foam, vibration, solids content or build-up.
- Easy installation and ready for use without calibration: In most cases, a vibronic instrument works in the application without any required adjustments or calibration.
- No wear and tear, maintenance-free: A vibronic instrument has no moving parts and requires no maintenance other than periodic cleaning.
- Self-monitoring: New vibronic instruments are equipped with internal diagnostics and the ability to automatically perform proof tests and verification.

Checking for corrosion

Vibronic instruments have no moving parts, so the only physical problems they might encounter are corrosion and build-up of process materials on the tuning forks.

Most vibronic instruments are available with tuning forks made of corrosion-resistant metals, such as 316/316L stainless steel, alloy C22 and PFA coatings, but aggressive chemicals can eventually eat through even these types of materials. When tuning forks corrode, they can break off, vibrate erratically or fail completely.

Build-up of process materials on the forks can also occur, especially in processes with entrained solids, turbulence or foam. A limited amount of coating changes the frequency of the probe but does not cause it to fail, ie, a lightly coated instrument can still operate. But when build-up on the tuning forks becomes excessive, it can cause the device to fail and not detect changes in liquid level.

Modern vibronic instruments have built-in diagnostics to detect corrosion and build-up by monitoring the frequency of the tuning fork. Early detection allows plant personnel to address issues in a proactive manner prior to failure.

Proof testing

A proof test confirms the SIL rating of a safety instrumented function (SIF). NAMUR provides guidelines on what proof testing is needed to meet the requirements of IEC 61508-6, B3.2.5. NAMUR Worksheet NA-106 (Issue: 2018-09-06), Annex D, is typically referenced in the process industries — such as chemical, petrochemical, and oil and gas — as well as in other process plants with hazardous operations.

Point level instruments in these and other similar applications may have to be periodically proof tested to meet various safety regulations. This can pose a problem with older instruments as they may have to be removed from the process for testing.

Fortunately, many new vibronic level instruments have the ability to perform a proof test on demand which complies with IEC 61511 and ISA 84 safety standards. For example, a proof test for some vibronic instruments can be activated from a control room by sending a command over a wired connection, from a mobile device via wireless Bluetooth (Figure 2) or directly at the device.

When the test is activated, the transmitter tests the instrument's level notification and fault notification (alarm) functions. After interrupting power to the instrument supply, a test cycle is activated which checks the instrument and electronics.

Validating verification

Process manufacturing and other industrial facilities must often provide documented evidence of level instrument performance to maintain compliance with various regulatory agencies. Typical requirements are:

- Level instruments have to be verified at regular intervals.
- Verification has to be performed by a qualified third party and with an accepted inspection method based on quality regulations such as ISO 9001.
- A test report needs to be provided for documented proof of verification.

Figure 1: The oscillation of a tuning fork instrument changes when a liquid reaches the two forks.

Figure 2: With Bluetooth communications, a proof test can be activated from up to 12 m away, making it easier to perform tests on instruments installed at the top of tanks or in inaccessible locations.

The chemical and oil and gas industries have requirements for proof testing per IEC 61511, ISA 84 and other standards, while the oil and gas industry must also adhere to contractual agreements between buyer and seller, and comply with government agency mandates.

Most level instruments at the bottom or high point of a tank are frequently immersed in liquid and regularly activated. But some high-level instruments are seldom or never immersed in liquid, so they require periodic verification.

Validating verification

Regulatory requirements are commonly fulfilled by removing the level instrument, taking it to a lab and immersing it in a liquid to verify operation (commonly called a 'bucket test'). Damages during transport or handling can sometimes stay undetected, and lead to a situation where a recently tested instrument is not performing to specifications. Performing verification in this manner is also costly and time-consuming, and it requires field work to remove and reinstall the instrument. Operator exposure to the chemical process is also a safety concern.

To address these issues, many modern vibronic instruments can perform onboard verification in situ. The instrument's transmitter electronics run an onboard diagnostics program, where all relevant components of the instrument are checked to confirm and document that it is still in calibration, with none of the components drifting outside of original tolerances.

This should include testing all electrical connections and power against factory specifications.

Meeting IIoT demands

The demands of Industry 4.0 and IIoT are limited for point level instruments. However, predictive maintenance and process optimisation software programs need data relating to instrument performance.

Most instrument manufacturers have extensive software to acquire, store and analyse data from smart devices, such as vibronic point level instruments. These software packages are able to analyse data from proof tests and verifications.

Mobile computers and wireless technology make it possible for a technician on the plant floor to identify a device, commission it, check the status, perform a proof test or verification, and download verification documentation. Then, if the situation warrants further attention, the technician can download the relevant manuals, certificates or other documentation related to the instrument.

These types of digital capabilities allow vibronic instruments to meet Industry 4.0 and IIoT requirements.

Summary

Point level instruments once led a simple life, only indicating if a liquid was present or not. Today, level instruments have to conform to various safety regulations, diagnose themselves, perform self-testing, and provide data for IIoT and other digital initiatives. Modern vibronic instruments are up to the task, continuing to provide reliable operation for level detection, with added functionality to meet current and future demands.

**Brent Frizzell is the Product Marketing Manager for Level at Endress+Hauser USA. His responsibilities include developing the strategy and marketing material for level, tank gauging and terminal automation solutions for the US market. Brent has a bachelor's degree in chemical engineering from Rose-Hulman Institute of Technology and graduated in 2012.*

Endress+Hauser Australia Pty Ltd
www.au.endress.com

PCAP TOUCHSCREEN HMI

IDEC Corporation has expanded its HMI product range with the HG2J Series 7″ touchscreen HMI.

IDEC says the HMI's projected capacitive touch panel (PCAP) technology requires fewer layers than traditional analog resistive plastic films, and the self-capacitance technology can also prevent accidental input due to water droplets. Fewer layers and better light transmission ratings also mean less backlight power is needed while providing 500 cd/m^2 brightness level and 50,000 h backlight life.

The HG2J offers a TFT LCD display resolution of 800x480 pixels and an overall HMI depth of 30 mm. It is rated for operation in a wide temperature range of -20 to +60°C, and it carries IP66/67, UL and CE ratings, with a Class I Div 2 hazardous location rating.

HG2J HMIs feature a full complement of connectivity options, including two USB A ports, serial connectivity (RS485/422 and RS232C) and an Ethernet port. Push-in wiring connectors are used for power and serial connections, while the USB ports enable connectivity with Linux-compatible accessories such as Wi-Fi and Bluetooth dongles, speakers and barcode readers.

A single reset button is used for rebooting the unit, and a multifunction front LED light provides status information. The HG2J also requires no batteries as it uses MRAM to maintain data stored in internal data registers in the absence of power, and it features a hypercapacitor to maintain clock operation for up to two weeks without line power.

IDEC Australia Pty Ltd
www.idec.com/australia

OPC UA I/O MODULE

The ICP DAS U-7560M is an OPC UA I/O module that provides six digital input channels and six digital output relay channels. It also has a built-in two-port Ethernet switch to implement daisy-chain topology.

U-7560M follows the IEEE 802.3af-compliant Power over Ethernet (PoE) specification and can receive power from PoE-enabled networks. This feature provides greater flexibility and efficiency to simplify system design, save space, and reduce wirings and power sockets. It provides a web UI to configure, control and monitor the modules, connections and I/O status via a web browser.

In industrial communication, UA I/O provides OPC UA Server and MQTT Client protocols, and can execute both communication processes simultaneously. Users can choose the networking mode according to their application. It also supports logic function rule-setting with IF-THEN-ELSE, which can be used to set up logical conditions and actions for I/O and virtual points. Support for a RESTful API function means that it can read and write I/O and virtual points via HTTP.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

SAFETY GATE MODULE FOR ETHERCAT P

Euchner has added the MBM bus module to the MGB range of its modular multifunctional safety door system. The MBM bus module MBM is available in a version that connects to EtherCAT P, which means that every function of the Multifunctional Gate Box 2 (MGB2 Modular) safety door system can also be used with EtherCAT P.

The MGB safety door system employs a modular design to make the MGB2 Modular fully customisable, and features a separate locking module, bus module and submodules, making it suitable for implementing a wide range of additional functions.

In this latest update to the system, comprehensive diagnostic functions in the form of EtherCAT messages and the integrated web server are said to provide a fast and detailed overview of the device status. Due to the ease with which parameters can be set, replacing the system during servicing is simplified.

Treotham Automation Pty Ltd
www.treotham.com.au

DesignBUILD RETURNS IN 2022

The DesignBUILD event is part of Australia's week of built environment events in May 2022.

Running from 10–12 May, the DesignBUILD event for the architecture, building, construction and design communities is back. DesignBUILD will be one of four events hosted at the Melbourne Convention and Exhibition Centre, as part of a week of events for professionals across the built environment.

Covering industries ranging from planning and construction to technology and facilities management, DesignBUILD, Total Facilities (TFX), the Be Summit and Digital Construction Week will join forces to create a unique built environment event for Melbourne.

DesignBUILD 2022 has adopted a renewed focus on quality products, sustainable solutions and smart tech from some of Australia's best businesses. Exhibitors represent the best of Australia's built environment industries. Expect to see Australia's best brands represented on the show floor including Rentokil, Bluebeam, Payapps, Binq, Hyne Timbers and Market Timbers.

Plus, visitors will be able to see the latest in digital tech and smart buildings with the new Digital Building Zone, sitting seamlessly between the two shows. They will have the opportunity to connect with enterprise companies and startups in the construction tech market.

Returning to the show floor is the Design+Build Theatre, a carefully curated speaker series covering hot topics in the building and construction industries. And new for 2022 is the DCW Theatre, covering next-generation technology to keep you abreast of developments in BIM.

Registration for DesignBUILD 2022 is now open: find out more and register free at https://designbuildexpo.com.au/register/

Diversified Communications Australia
www.divcom.net.au

NEW PRODUCTS

ULTRASONIC CLAMP-ON FLOWMETER

The Krohne OPTISONIC 6300 is now available with updated stainless steel sensor rails and an enhanced signal converter for quick and easy set-up. The ultrasonic clamp-on flowmeter is suitable for temporary or permanent installation on virtually any pipe up to DN4000 with process temperatures up to 200°C. It allows for flow measurement of liquids in main and utility applications where inline measurement is not possible or desirable.

The 316L stainless steel sensor rails are designed for quick installation and the same rail type can be used in hazardous areas, in extended temperature applications, in harsh conditions like offshore environments or as IP68/NEMA 6P version in submerged applications. For connection to the signal converter they feature a fixed signal cable of 6 or 10 m, optionally up to 30 m. As an alternative to coupling grease, solid coupling pads can be chosen as contact material for the ultrasonic transducers, eg, for high-temperature applications.

The signal converter has also been improved for quick and easy set-up of the measurement point with pre-programmed pipe parameters and an installation wizard. It controls either single-path or dual-path/dual-pipe applications simultaneously: for demanding applications, the product offers dual-path or X-mode configurations (two paired sensor rails with crossed measuring paths) for a stable measurement. It also features diagnostics in accordance with NAMUR NE107 and can be used as a heat energy calculator. All measured or calculated values can be displayed customised or made available as an output value.

KROHNE Australia Pty Ltd
www.krohne.com.au

ELECTRONIC PRESSURE TRANSMITTERS FOR ALL INDUSTRIES

HYDAC's HPT 1000 pressure transmitter is based on a robust and long-life thin-film sensor.

According to a HYDAC spokesperson, there are various options available for the analog and digital versions, including a standard version, a version with pressure and temperature, a smart version, and a version for functional safety.

"The variations available for the HPT 1000 include measuring ranges from 2.5 to 600 bar, thread variations as per the HDA 8000 series, and the M12 connector is basically the standard for industrial applications," they said.

Accuracy as standard is 1% and 0.5% accuracy versions are available if necessary.

For connectors, HYDAC offers most typical connector types, except for large connectors and integrated cables due to the pressure transmitter's compact size.

The analog version is available as a standard pressure sensor, with HYDAC also offering a pressure and temperature version, a version with smart information, and a safety sensor. Various analog outputs are available such as voltage, current and ratiometric.

As for the digital version, HYDAC offers pressure, temperature, smart and safety versions. HYDAC also offers a solution with an IO-Link digital interface or with 'Can' and 'Send' interfaces.

Various architectures

"The standard version sensor is Category 1 and, within a safety environment, Category 1 means there are no diagnostics," said the HYDAC spokesperson. "The signal simply comes in one side and goes out the other side.

"The first stage is the sensor cell itself. This signal is then passed to a stage that amplifies and calibrates the signal, which means that it corrects any errors in the signal. This information is then passed to the output interface, which converts it to a signal type that's suitable for running along cables, which can then be interpreted by, for instance, a PLC."

HYDAC offers a version that also provides on-board temperature sensing.

The version with on-board temperature sensing is available with a 0.5–4.5 V output. A version is also available where the temperature signal is available on the digital interface.

"The digital interface is the interface that also provides the additional information," said the spokesperson. "The pressure signal is actually provided as an analog signal 0.5 to 4.5 V."

The safety-certified versions meet safety requirements by including a diagnostic test within the sensor. This diagnostic test fulfils performance level SIL 2/PLd for functional safety.

"The output signal represents the health status of the sensor. If it has a fault then a safety PLC can interpret this and respond accordingly," they added. "HYDAC is in the process of developing a performance level D Category 3 sensor, which includes two separate circuits; two Wheatstone bridges on the one sensor cell, with two 4–20 mA outputs. Diagnostics are then carried out by the safety PLC."

HPT 1000 digital version

The architecture of the standard digital version of the HPT 1000 is the same as the analog version.

"In as much as we've got a sensor cell, we've got a section for amplification and calibration, and we've got a section that converts this information into digital data.

"In addition to standard pressure information available over IO-Link, the temperature is also available along with smart data so that the type of sensor you might be looking at or the material code you might be looking at in SAP can be recognised.

"As to coding, if there is an A in the code then it's 4–20 mA as per all the other sensors. It's the same with the B signal, being 0–10 V, and the G signal is a voltage signal other than 0–10 V — normally for user-specific output signals."

The spokesperson says R indicates a ratiometric output signal. "On the digital side, IO-Link is indicated by F31."

How the HPT 1000 competes with the HDA 8000

The spokesperson says a common question is how the HPT 1000 is related to the company's HDA 8000 series pressure transducer. The HPT 1000 was developed to offer a sensor at a lower price point than the HDA 8000.

"The way we've solved this was through developing a fully automated production system," said the spokesperson. "To maintain prices, the automated production system needs to run at full capacity, which means the largest quantities possible have to run at a time — costs increase significantly if smaller quantities are run in automated production systems."

Other pressure sensors in HYDAC's range include the HDA 4000, the HDA 7000 and the HDA 8000. The HDA 4000 is still the standard sensor for many rugged applications such as in the steel industry, while the HDA 7000 has the advantage of being extremely small. The HDA 8000, with a slightly larger housing, offers a solution with a cable output or larger connector.

HYDAC International
www.hydac.com.au

Automotive parts manufacturer combines IT and Operations

Established in 1965, MTM Pty Ltd is a proudly Australian, family-owned parts manufacturer that supplies components to all parts of the globe. While the company is primarily an automotive parts supplier, they have expanded to cater for rail, recreation, water conservation and safety.

"Our product range is vast, and as our operations have grown, so has the need for an equally advanced system to capture and visualise the data produced on the factory floor," said Darren Symington, MTM Information System Manager.

For many years MTM relied on File Transfer Protocol (FTP) modules for data transfer. Here, they would manually connect to the PLC on the machine to create a file every time they made a part. Thereafter, data would be manually extracted and be used to populate the databases. This system, used for various processes such as making bookings and calculating cycle times, had many drawbacks.

The data collection and visualisation system was based on slow, unreliable industrial hardware and could only be accessed from outside the factory via a VPN. It also occasionally impacted MTM's production output.

"If the FTP system failed to collect the data every two hours, we would end up with over 15,000 files to download at night, and it would take 5–10 seconds to download an individual file. Because a part would be completed on average every 4.5 seconds, the data collection process would not index this information in time and workers would still be trying to extract the previous night's data when it would be time for the next run to begin," Symington said.

Symington describes the day that he met with Jim Wallace, Sales Manager of Balluff Australia, as a "lightbulb moment".

Jim Wallace, who is a member of the Industrial Internet of Things (IIoT) advocacy group Open IIoT, helped Darren and his team integrate the code that they had been running to transmit the data previously into Balluff's Industry 4.0 technologies using JSON: JavaScript Object Notation. Using this technology allowed them to automatically capture 10,000 records a second and upload the data to the database every five seconds.

The first step in Industry 4.0 implementation at MTM required the team to transmit their existing data into easy-to-use, automated data capturing tools.

"As part of Balluff's Mold-ID tool management system, we fitted a Balluff RFID tag on each tool and a reader on each of MTM's press machines," Wallace said. "The system writes the number of operations to the tag so each tool knows exactly how many operations it has done, so if the tool is swapped out, this data is not lost because it is held in the RFID tag. As the press moves back and forth the reader increments the number of operations counted on the tag and then reads this back to make it available to the controller dashboard and as a JSON file. This data was then visualised by MTM in the form of a mobile app, allowing them to access a whole new range of insights into their business that they had not had previously."

The second major Industry 4.0 implementation involved the installation of a 'Smartlight' system on the factory floor (a part of the Mold-ID tool system) to alert operators when tools needed maintenance — turning a light orange when the time was approaching and red when maintenance was overdue. The system is also linked to an email alert system to ensure efficiency.

"There are many benefits we've seen to our business since taking the plunge and starting the Industry 4.0 journey, but one of the most crucial benefits is that all our data capturing, recording and analysing processes are automated using a single system," Symington said. "To add to this, manually entering data can have an inaccuracy rate as high as 38%, but by automating the process we have 100% accuracy, reducing wastage and time spent on administration processes.

"The Balluff Industry 4.0 implementation turned out to be less expensive than we'd originally anticipated, and it has already paid for itself in terms of improved production and reduced labour costs," he added. "The benefits of the implementation have been felt across our entire business. The Smartlight maintenance system has been great for factory operations and those of us in IT have loved the insights we can extract from the data. Based on this success we're going to prioritise IIoT integration across the plant."

For a longer and more detailed version online, go to https://bit.ly/3KbLSi3

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The camera's hardware-coded region of interest (ROI) enables the user to choose between a full frame rate of 340 fps and a windowed rate of up to 3000 fps. Users can also choose to use Photon etc's PHySpec camera control software or develop their own using a software development kit (SDK).

The computer interface is either CameraLink or USB 3.0. The camera measures 169 x 130 x 97.25 mm and weighs 2.6 kg.

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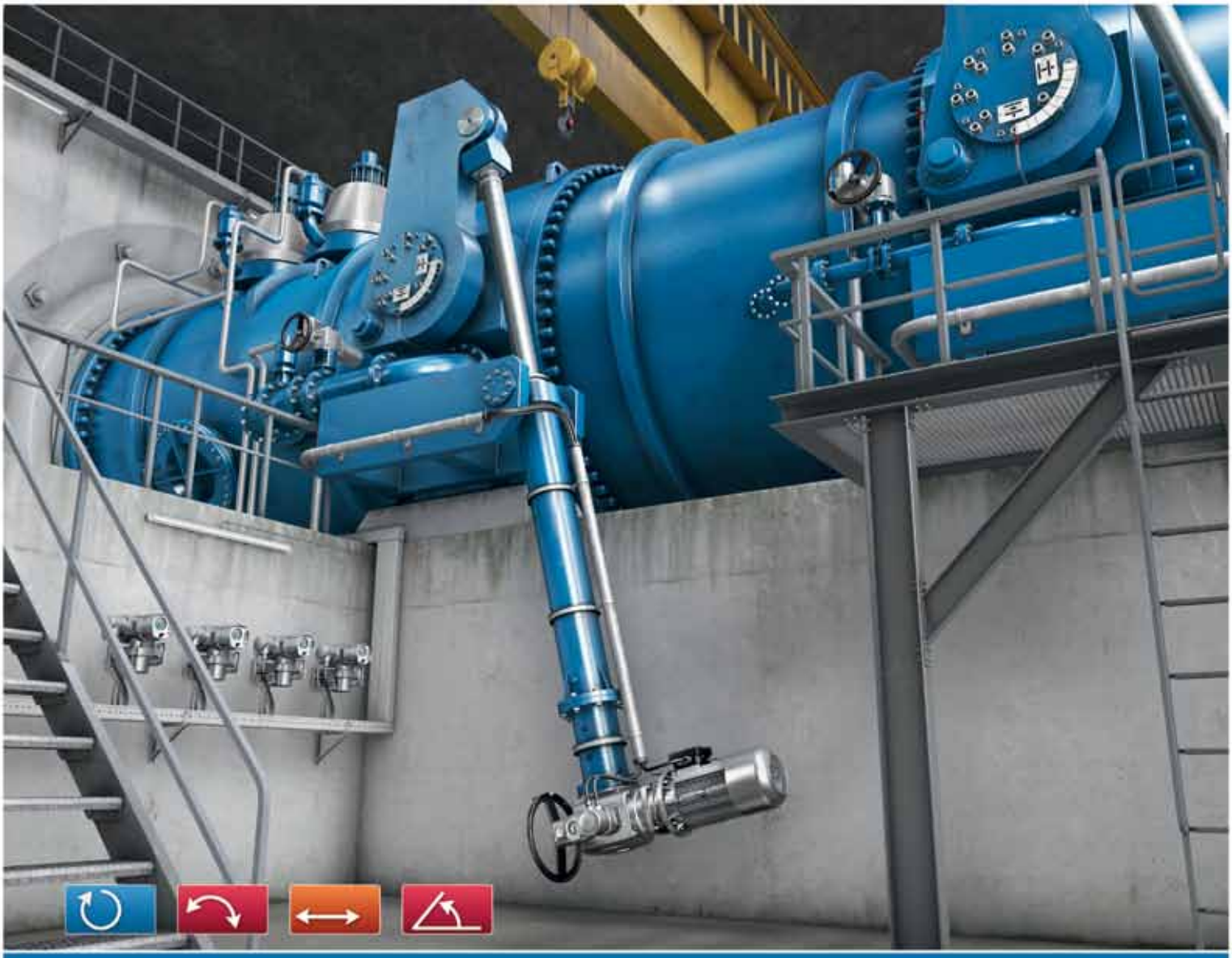

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