PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

February 2019 vol.32 no.8

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GOT2000 Rugged

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PROCESS TECHNOLOGY
FEBRUARY 2019

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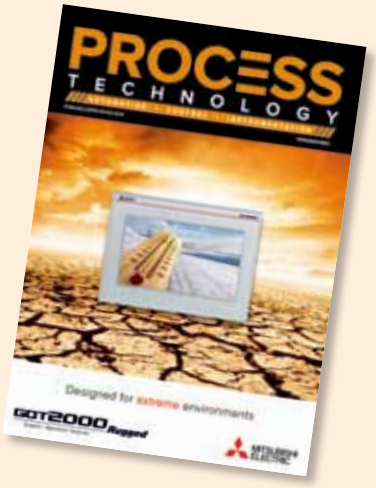
ON THE COVER



Designed for extreme environments, the GOT2000 Rugged is the latest addition to Mitsubishi Electric's GOT2000 range of HMIs. With extended operating temperatures from -20°C to 65°C and resistance to approximately 95% of ultraviolet rays, the GT2000 Rugged model can be used in the harshest of environments. Water jet resistant, the aluminium front panel complies with IP67F and IP66F, while providing strong resistance to vibration and shock. The 7″ widescreen TFT on the GOT2000 Rugged includes over 65,000 colours to create the most impressive displays. The extra bright LCD panel provides a clear screen view even under strong sunlight.

The GOT2000 range is an integral part of the Mitsubishi Electric iQ platform, which brings together a full automation suite, including the powerful compact automation controller iQ-F series, the revolutionary iQ-R next-generation controllers, the FR-A800 range of high performance inverters, and the high function MR-J4 servo systems — developed to provide a next-generation automation environment focused on adding value while reducing TCO.

Mitsubishi Electric is one of the world's leading names in the manufacture and sales of electrical and electronic products and systems used in a broad range of fields and applications. As a global company, we're applying our technologies to contribute to society and daily life around the world.

MITSUBISHI ELECTRIC
Changes for the Better

Mitsubishi Electric Australia
www.mitsubishielectric.com.au/fa/products

INNOVATION THAT WILL TRANSFORM THE ENERGY FUTURE

PART 1

How digitalisation enables oil and gas operators to transition to a new energy ecosystem.

In 2016 the World Energy Council captured the energy transition challenge when it coined its "energy trilemma", which involves balancing three seemingly conflicting, yet intertwined objectives:

- **Energy security** — ensuring the reliability of energy supply to meet current and future demand.
- **Energy equity** — ensuring the world has access to energy at an affordable cost.
- **Environmental sustainability** — ensuring that global warming calls for improved energy efficiency and the development of renewable low-greenhouse energy sources are met.

The realisation that fossil fuels are a limited resource, however long supplies might last, and the growing awareness of the negative impact that their emissions have on the planet, has impacted every oil and gas major.

These companies have now issued their own 'energy transition' strategies that outline plans to migrate their core business to new energy sources between now and 2040.

There is a realisation among the majors that their dependency on oil or gas as their main source of revenue needs to evolve. Nearly 70% of respondents to a Wood Mackenzie survey[1] said investing in renewables to reduce carbon footprints was a more progressive pathway towards transforming the energy ecosystem.

Over the past year, European-based oil majors that include BP plc, Royal Dutch Shell plc, Equinor ASA (formerly Statoil ASA) and Total SA have emerged as leaders in alternative energies investments, a strategy highlighted as a priority by 15% of the survey's respondents.

In fact, BP's annual review of world energy published in June 2018 revealed 17% of the world's energy growth in 2017 came from renewable sources, the largest increase on record. New renewable energy installations were equivalent to the energy output of 69 million tonnes of oil — the annual energy consumption of Sweden and Denmark.

What the oil majors also agree on is that there is no single mix of energy sources that would be ideal worldwide. The energy transition is specific to each country or continent, with some advocating emission-free facilities, others opting to grow markets for hydrocarbons, while the rest aim to get people out of energy poverty.

Energy transition is a slow process, but the enabler is most definitely today's technology and future breakthroughs supported by radical changes in energy use by consumers.

As the world demands more energy, it also demands that it be produced and delivered in new ways, with fewer emissions. Digital technologies are going to play a key role in this.

Changing landscape

For many years the oil and gas industry has confronted many diverse challenges, whether that be between onshore and offshore, different geographies or national versus international oil companies. As the industry looks towards transitioning to a different energy mix, adding to these challenges will be local versus global energy policies, the reliance on oil and gas for national budgets and employment, the skills shortage and the uncertainty over oil and gas prices and demand.

It is forecast that the shift to renewables, along with the emergence of electric vehicles, could lead to profits of US$65–70 billion[2] migrating from oil and gas companies to the broader energy ecosystem. Upstream players stand to be most at risk, with approximately US$60 billion[2] of their profits potentially migrating to this broader ecosystem.

However, this shift is expected to benefit the environment, with a potential reduction of 900 million tonnes of CO_2 emissions[2].

Another positive is that an estimated 35,000 jobs[2] will be created, as generation from renewables tends to be more people-intensive than that from fossil fuels.

There are many trends accelerating the introduction of new energy sources and delivery platforms into the global energy system. Four stand-out developments can potentially transform the global energy landscape:

Global population growth brings new expectations and requirements

By 2025[3], the population born early 1980s to early 2000s — commonly known as millennials — are expected to make up 75% of the global workforce. They bring with them their own expectations about technology, collaboration with colleagues, the pace of work and accountability.

As energy consumers, this generation have different preferences for energy sources and embrace the idea of energy from solar, wind and tidal. They are focused on global issues such as climate change and air pollution. They are prepared and willing to make bold changes, such as switching to eco-friendly energy providers or brands to help tackle these challenges.

These developments are already affecting demand for oil and natural gas.

However, it is not all about the millennial. Equally important, is the very different

progress of developing countries. Africa, for instance, is the fastest growing continent with more than half of global population growth expected between now and 2050. It is highly likely that these countries will bypass, altogether, any involvement building a hydrocarbon-based energy infrastructure, turning instead to the power of renewables.

Electric vehicles

Road transport, aviation and shipping account for more than 60% of the world's oil consumption and approximately the same proportion of emissions. Introducing a sustainable transport solution is seen as an important part of the strategy to limit the impact on the climate.

At the 2015 United Nations Climate Change Conference in Paris, the United Nations Environment Programme set a target for at least 20% of road transport vehicles to be driven electrically by 2030.

This would require an increase in the number of electric vehicles (including hybrids) on the road from the 1.5 million electric cars registered worldwide in 2017 to 100 million in 2030, which could result in a reduction in demand for oil by 1.5 million barrels per day[4].

While e-mobility and e-transportation will have a dramatic negative impact on the demand for oil, in the short to medium term global gas and coal demand could increase if the transition happens faster than the change to renewables.

To meet increasing demand, the big automobile manufacturers are investing billions in the conversion of their product ranges and production facilities. Analysts predict that by 2040 more electric cars will be produced worldwide than petrol or diesel vehicles. Volvo has announced that as of 2020 all vehicles rolling off its production lines will be electrified.

Cost of power generation

Beyond the charging infrastructure, e-mobility requires a transformation of the energy system, both to ensure that the grid can cope with the increased demand for power and to expand the contribution of renewables. Otherwise the world will simply be using fossil energy to power our new electric vehicles.

According to Bloomberg New Energy Finance[5], US$7.4 trillion will be invested in renewable energy projects by 2040. This makes up 72% of the US$10.2 trillion that will go towards new power generation worldwide.

Utilities are successfully lowering the cost of generating power from renewables.

- Cost of solar panels has fallen by 26% each time global solar-panel capacity has doubled.
- Solar capacity has increased sevenfold over the past 15 years.
- Investment in renewables is expected to reach US$7.4 trillion by 2040.
- US$2.1 trillion is the predicted spending on fossil-fuel projects to 2040.
- Over the next decade, the average levelised cost of electricity generated from solar and onshore wind energy is expected to come down by 59% and 35% respectively[6].

Distributed generation

Energy supply has shifted from large-scale, one-way and centrally driven supply (from energy producers' large power plants to consumers) towards generation closer to the point of consumption and bidirectional in nature (consumers selling excess energy back to the grid), such as rooftop solar and self-generation by industrial consumers.

These renewables need to be integrated into grids that are able to manage new complexities such as intermittent supply, more distributed power generation, demand management and electric vehicles. The transformation necessarily involves the application of advanced digital technologies.

Technologies that enable effective energy transition

Headwinds over the past several years have taught oil and gas companies to maintain strict cost disciplines and be more efficient than ever. Organisations and budgets were cut, and investments were limited.

Yet, at the same time demand for energy continued to grow. And now as the oil and gas companies expand their portfolios towards future energy markets, like renewables, there is a realisation that the need for efficient operations and maximised production uptime is more prevalent than ever.

As oil prices begin to rise, producers are firmly adopting digital technologies to impact planning, building and operations of assets while maintaining their capital discipline. Producers have already made great strides in technologies and applications in which plants with volatile processes or remote locations can be operated with low or no local human involvement. This trend will progress for more than just safety or cost reasons, but also for the productivity benefits.

It is these same technologies that will provide the transformational step change to enable oil and gas companies to move into the broader energy ecosystem.

However, the real game changer — or disruption — lies in integrating these technologies in a way that drives the evolution from connected operations, to collaborative operations and ultimately autonomous operations to achieve maximum value.

Visualisation, analytics and machine learning

These technologies are moving companies to an era where critical assets equipped with smart sensors now tell people what is wrong, long before failures even occur.

Providing operators with quick access to hundreds of years of data and analytics, rather than relying on the experience of individual employees, increases efficiencies, reduces downtime and avoids costly shutdowns.

Cloud-based technology

This technology creates an ecosystem connecting the workforce in a way that enables it to collaborate anywhere — and in real time. For example, moving SCADA to the cloud allows managers and operators to have complete information for their facilities while on the go.

Connected operations

The future will bring more enterprise-wide use of remote-enabled condition monitoring technologies, predictive and descriptive data analytics, and advanced process control applications so that operational effectiveness of plants can be understood in near-real time. This provides the right blend of technology, expertise and information. Providing the correct information when it is most needed means the best decisions can be taken. By continuously collecting and analysing data, and through special algorithms, early warnings can be in place to reduce any risk to a process or plant.

Artificial intelligence

New digital technologies and the rise of artificial intelligence (AI) are enabling totally new designs and concepts.

Industrial Internet of Things (IIoT)

Connecting field assets and equipment using sensors enhances monitoring and diagnostics. The IIoT helps build real-time insights on the operation of assets and whole processes, thereby helping to optimise utilisation and maintenance planning.

However, digital success, and ultimately the profitability of a business, hinges not on individual technologies but the integration of the IIoT. Key to this are collaborative operation centres and control rooms which pull the data from these sensors and devices together.

Digital twin applications

A good digital infrastructure is almost impossible to implement without a digital model of the plant. A digital twin is a complete and operational virtual representation of an asset, subsystem or system, combining digital aspects of how the equipment is built (PLM data, design models, manufacturing data) with real-time aspects of how it is operated and maintained. The capability to refer to data stored in different places from one common digital twin directory enables simulation, diagnostics, prediction and other advanced use cases.

Collaborative operations

This approach transforms how every member of the supply chain works together during operation. Collaborative operation enables remote operations and fleet wide management. It uses digital technologies to monitor and analyse assets and processes. Collaborative operation centres help to maximise productivity and ensure safety always. They achieve this through decision supporting tools and the 24/7 remote availability of process and data engineers located in collaborative operations centres globally. These centres pave the way for the application of further technology advancements such as AI.

Intelligent project execution

Digital technologies are successfully streamlining project execution and integrating traditionally separate systems in the planning and build phase. Studies show that 64% of oil and gas projects experience cost overruns and 73% of them have scheduling delays. Streamlining project execution uses smart engineering technology to combine people, processes, tools and standards. This not only results in 25% quicker schedule completion but can also reduce change orders by 50% and decrease costs up to 30%.

Taken together, intelligent projects and collaborative operations are perfectly complementary, spanning the full life cycle of an asset with cost savings alone exceeding 35% if applied consistently.

Part 2

This article will conclude next month, discussing the hurdles to be overcome and the business changes needed.

References

1. Wood Mackenzie 2018, *'State of the Upstream Industry' survey*.
2. World Economic Forum 2017, *Digital Transformation Initiative, Oil and Gas Industry*.
3. EY 2015, *Global generations: A global study on work-life challenges across generations*.
4. World Economic Forum 2017, *Digital Transformation Initiative, Oil and Gas Industry*.
5. Randall, T 2016, *The World Nears Peak Fossil Fuels for Electricity*, Bloomberg, 13 June 2016, «https://www.bloomberg.com/news/articles/2016-06-13/we-ve-almost-reached-peak-fossil-fuels-for-electricity».
6. International Renewable Energy Agency (IRENA) 2016, *The Power to Change: Solar and Wind Cost Reduction Potential to 2025*, «http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Power_to_Change_2016.pdf».

ABB Australia Pty Ltd
www.abbaustralia.com.au

HOT PRODUCTS
ON WWW.PROCESSONLINE.COM.AU THIS MONTH

POWER QUALITY ANALYSER

The Elspec G4500 utilises the PQZIP algorithm, enabling users to continuously measure, store and analyse waveform signals regardless of their size.

TechRentals

https://bit.ly/2sDq0pz

SAFETY SOLENOID DRIVER

The FD2-RCI-EX1 is a solenoid driver for safety applications up to SIL 3 according to IEC 61508 with HART positioners in SIL 3.

Pepperl+Fuchs (Aust) Pty Ltd

https://bit.ly/2Cwnhmw

IOT WIRELESS SENSOR DEVICES

Advantech's WISE-4210 series of IoT wireless sensor devices includes a wireless LPWAN-to-Ethernet AP and three wireless sensor nodes.

Advantech Australia Pty Ltd

https://bit.ly/2CBkZCw

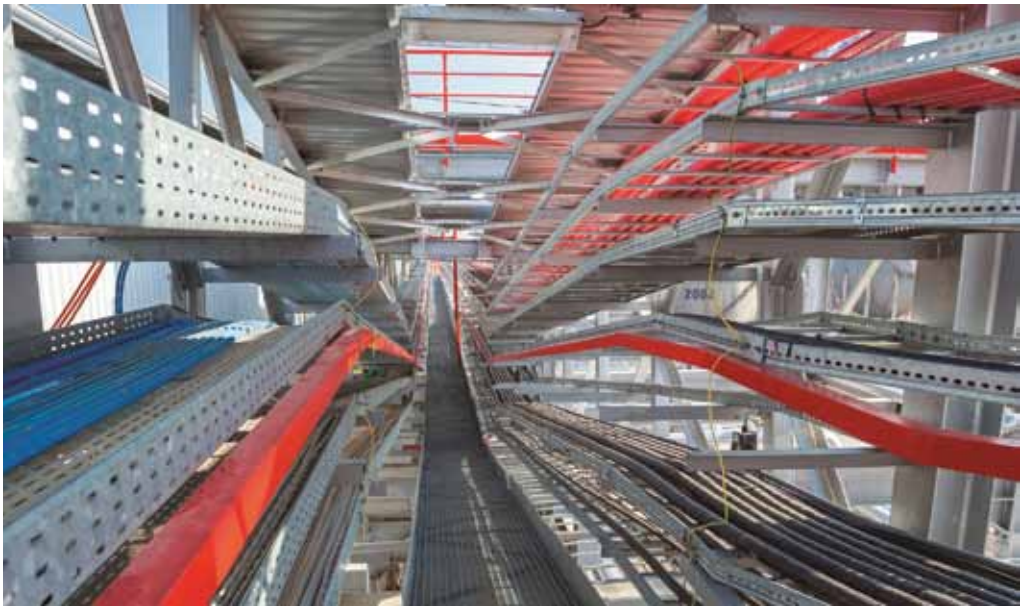
HYBRID MOTOR STARTERS

Phoenix Contact CONTACTRON pro hybrid motor starters have additional simple safety integration and modular extension options.

Phoenix Contact Pty Ltd

https://bit.ly/2CDutx4

Oil and gas integrator improves processes with visual engineering



The quantity of data involved with any engineering project creates a focus on attention to detail that can test even the most experienced engineers. One of the main concerns requiring extreme sophistication in the early design stages is the reliability and trustworthiness of information shared between documents. Large projects involve a complex interchange of documents and multidisciplinary information — an area where the slightest error can cause the biggest delays.

KTY Engenharia has served the oil and gas, energy and infrastructure industries both in Brazil and abroad for over 30 years. It is constantly evaluating new technologies to improve its working practices. The company considers mastering the use of AVEVA tools core to this strategy and believes it demonstrates to its customers that KTY is always evolving.

Multiple projects, running concurrently, require that the firm's teams and its systems are in regular contact with external partners, that the tools used by all parties are fully capable of interoperability, and that collaboration is best supported by shared data across all project workflows.

Fellipe, an electrical engineer at KTY, considers the company's commitment to best practice a key part of its competitive advantage. For KTY's electrical engineering teams, understanding cable routing, producing datasheets, equipment and load lists, and often importing data from diverse systems required greater clarity to improve design quality. It became clear that gaining the ability to see potential errors, clashes and dead ends in cable routing could only be achieved with tools able to deliver a complete view.

AVEVA consultants introduced Fillipe and his teams to the advanced dimension of design direction that could be achieved by integrating AVEVA Electrical with AVEVA Instrumentation to harness the process improvements achievable with visual engineering. The two solutions share the same SQL database, enabling the firm to share and control equipment and connections, besides making cable management via 3D models.

"Working with software developed exclusively for electrical projects, we're able to produce better results at various stages of the project. We learned that AVEVA Electrical can share information with AVEVA Instrumentation and AVEVA PDMS, which makes our processes faster and integrates information between documents," said Fellipe

Applying the cable routing solution via a 3D model enabled the KTY electrical team to route more than 4000 cable runs (more than 200 km of cables) and obtain more accurate data from voltage drop calculations and precise materials lists, generating savings for its customers.

KTY's Instrumentation Manager, Roberto, explained the scope of benefits the company has achieved using AVEVA Instrumentation, particularly with regard to compatibility of the materials catalogues across different projects by noting they have developed projects with 172 plants, over 1300 instruments and 170 datasheets, and that more than 500 cables have been connected quickly and efficiently.

Such achievements represent a significant improvement on previous practices where each discipline had its own catalogue of materials for cables and cableways, describing the same material differently.

Based on its experience of the process improvements driven by AVEVA tools, the KTY team is looking to enhance its future operations and provide a highly efficient engineering and design phase for the company's clients.

KTY Engineering seeks to surprise its customers, not only with its track record of proven technical quality in over 30 years of activities, but also with its ability to work with new technologies that improve production processes.

"We intend to continue using AVEVA tools and adopt them as a working standard," said Valter, Systems Administrator at KTY Engenharia. "Satisfaction with the results will lead us to adopt the other AVEVA solutions to integrate with all other disciplines at the same level of quality."

AVEVA

www.aveva.com

VALVE ISLAND

The pneumatic valve island Type 8647 AirLINE SP is a modular, electropneumatic automation system consisting of connection and valve modules. It has been especially developed for safe and complete integration into the SIMATIC ET 200SP decentralised peripheral system from Siemens.

Type 8647 is used to integrate pneumatic pilot valves directly into the SIMATIC ET 200SP and to control them via the ET 200SP. Pneumatically operated process valves (including safety shutoff valves), pneumatic cylinders or other pneumatic components can be connected to the pneumatic outputs. If the pneumatic components are installed with position feedbacks, the position of the actuated pneumatic components can be displayed on the associated pilot valve. This can save time on start-up and maintenance.

Burkert Fluid Control Systems
www.burkert.com.au

AI-READY PANEL PCs

The iEi Integration PPC-F-Q370 series of panel PCs is based on the Intel OpenVINO toolkit and supports Intel 8th Generation Core desktop processors. As an AI-ready solution, the panel PC is suitable for applications such as AOI defect classification, facial recognition, and machine vision for sorting and grading of products.

The series features IP66 front panel protection with a projected capacitive touch screen and front aluminium bezel connected by waterproof glue, internal dust-sealing poron from the LCD to the touch screen and rubber sealing on the screen's back edge to create an extra seal when the PC is mounted. The touch screen is anti-glare and UV resistant, making it suitable for outdoor applications, and meets the ASTM G154 performance criteria Cycle 1 for 1000 h. The series comes in six sizes — 15″, 15.6″, 17″, 18.5″, 21.5″ and 23.8″.

The series comes with HDMI output, six USB 3.0 ports, two GbE LAN ports, two RS-232 COM ports, four hot-swappable HDD bays, four PCIe 3.0 low-profile expansion slots, two M.2 PCIe NVMe SSD slots, microphone in and line-out ports, an AT/ATX switch and a reset button. It is also compatible with standard server rack cabinets and comes with an optional rack-mount and wall-mount kit.

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

CLOUD SUPPORT FOR INKJET PRINTERS

Domino has introduced Domino Cloud to help manufacturers maximise the uptime of their continuous inkjet printers through remote connectivity.

As part of the SafeGuard service and support package, Domino Cloud provides comprehensive protection for Domino's Ax-Series continuous inkjet printer. The Domino Cloud interface plugs into the inkjet coder and uses a secure and safe network connection to transmit data to the cloud.

Manufacturers can then access this data in real time from their connected desktop or mobile device to view the printer's OEE (overall equipment effectiveness) information, and review printer and ink performance. insignia's Help Desk enables maximum uptime of the printer's performance through remote monitoring and can initiate action to prevent faults from occurring. Through identifying minor faults, these can be actioned before they become major faults that impact production.

Domino Cloud records and reports on all the printer's key metrics, providing automated weekly reports and email notifications. Along with the printer's performance, the reports incorporate OEE calculations and printer usage charges, providing insights for line improvement and lean manufacturing initiatives.

insignia Pty Ltd

www.insignia.com.au

IS REMOTE I/O SYSTEM

The IS1+ Remote I/O system from R. Stahl allows Ethernet communication in hazardous areas via Profinet, Modbus TCP and EtherNet/IP.

Optical cables with transmission rates of 100 Mbps are used for fast, explosion-protected data transmission in Zone 1. The fibre-optic technology, which can cross distances of up to 30 km depending on the optical fibre used, has the type of protection defined as 'inherently safe' according to DIN EN 60079-28. Along the lines of intrinsic safety 'i', this type of protection ensures that potentially ignitable optical energy is limited to a non-ignitable level even under error conditions.

For Zone 2 and distances of up to 100 m, the more affordable Cat 5 copper cables with protection type 'ec' can also be used. Even in explosive atmospheres all modules can be exchanged during operations (hot swapping), and IS1+ stations can always be easily expanded without disconnection.

For the connection of field devices in Zone 0, 1 or 2, R. Stahl also has a range of I/O modules in the IS1+ series with up to 16 channels that are available with intrinsically safe, non-intrinsically safe and pneumatic interfaces. With Profinet connection and comprehensive diagnosis functions, IS1+ is suitable for predictive maintenance applications as well as for the implementation in plant asset management systems.

R. STAHL Australia Pty Ltd

www.stahl.com.au

CARBON FIBRE RACK SERVERS

Crystal's RS114PS18 has high computing performance in a 1U chassis with a depth of 45.7 cm and will fit most rack spaces, and uses carbon-fibre and coating technologies to deliver a rugged carbon fibre server.

An ultra-lightweight (5.44 to 6.35 kg) chassis providing EMI/EMC protection and shock and vibration resilience make carbon fibre servers suitable for airborne, shipboard, land-based and transit case applications.

The range is engineered and tested to withstand challenging environments, meet and exceed military and industrial standards, and provide the latest COTS technologies and benefits, such as cost, availability, upgradability and flexibility.

The RS114PS18 has up to 512 GB of RAM and up to six removable 6.35 cm drive bays. Processor options include Intel Sandy Bridge, Ivy Bridge, Haswell or Broadwell CPUs.

Metromatics Pty Ltd

www.metromatics.com.au

COMBINED UPS AND POWER SUPPLY

Phoenix Contact has released a TRIO UPS module and power supply combined in a single housing. Only one energy storage is required to complete the UPS system.

A large selection of suitable VRLA energy storage units for the three devices with 5, 10 and 20 A output current ensures long buffer times. Connected industrial PCs can be shut down easily via the integrated USB interface. An input grid is no longer necessary to start up the uninterruptible power supply, because the BAT-START function enables users to start the UPS up from the energy storage system. The dynamic boost supplies up to 150% of the nominal current for 5 s, making it possible to start heavy loads. The tool-free push-in connection makes installing the device quick and easy. The units offer a wide operating temperature range from -25 to +70°C.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

DATA LOGGERS

Delta Ohm has introduced the HD50 series of web-based data loggers. Several versions are available, allowing measurement of temperature, atmospheric pressure, humidity, lux, CO_2 and industry-standard voltage and current signals from a wide variety of industrial sensors. All versions feature a large graphic display, internal memory for up to 1 million readings, an internal buzzer and email transmission of alarms.

Loggers can be connected to a local network via Wi-Fi or Ethernet. With the integrated web server, configuration can be undertaken and real-time measurements can be viewed on any internet-connected device without the installation of any specific software.

For secure historical data storage, a number of software packages are available with optional FDA 21 CFR part 11 compliance available. The Delta Ohm cloud portal allows the device to send data to a HTTP server, allowing the data to be viewed from any smart device.

W&B Instruments Pty Ltd

www.wandbinstruments.com.au

NITROGEN GENERATING SYSTEMS

Nitrogen is used in multiple applications every day, with organisations often relying on the gas being shipped to them in cylinders, which can prove expensive and logistically challenging for remote locations due to conditions en route and storage space, not to mention the health and safety risks for staff manually moving the cylinders from one place to another.

Oxair offers nitrogen generators that give a continuous flow of gas for industrial sectors where it is vital — such as food packaging and processing to keep items fresher for longer; mines and chemical plants for displacing oxygen to prevent explosions; and pharmaceutical production where almost every major drug class contains some nitrogen.

Nitrogen generators are also an environmentally friendlier way of delivery by reducing the carbon footprint associated with having cylinders transported from an off-site facility and then the return journey when they are empty.

Oxair's nitrogen generators use pressure swing adsorption (PSA) or membrane technology, cost-effective filtration methods for on-site nitrogen production for a wide range of high purity and flow requirements, to be used directly by the end user on demand.

Oxair Gas Systems Pty Ltd

www.oxair.com.au

BELT-DRIVEN 3-AXIS ACTUATOR

Nook has released the ELZU range of belt-driven modular linear actuators. The 3-axis system consists of two y-axes and one x-axis that uses two motors and is driven by only one belt. The carriage is secured using T-slots. The system is capable of high acceleration rates to 8 m/s, maximum lengths or widths of 3 m and can move loads up to 4000 N.

Multi-axis travel is achieved with the belt running around different deflection pulleys. Using steel-reinforced drive belts, the system exhibits no backlash when changing directions and has a repeatability accuracy of ±0.1 mm. The ELZU multi-axis system is available with corrosion protection, making it suitable for most applications.

Motion Technologies Pty Ltd

www.motiontech.com.au

IONISING BAR

EXAIR's Gen4 ionising bar eliminates static electricity 25% faster than previous models. It has improved range and is effective when mounted up to 102 mm from a charged surface. Production speeds, product quality and surface cleanliness can improve dramatically. It eliminates static on plastics, webs, sheet stock and other product surfaces where tearing, jamming or hazardous shocks are a problem.

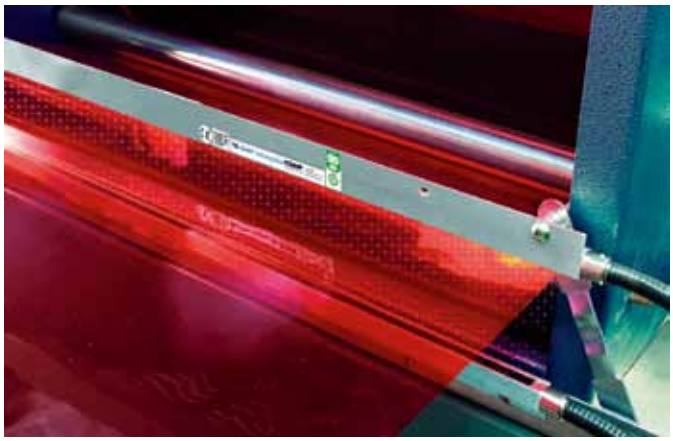
Design features include a metal-armoured, high-voltage cable to protect against abrasion and cuts, integrated ground connection and electromagnetic shielding.

The Gen4 ionising bar is compact and has an integrated mounting flange, which allows it to fit in the confined spaces of machinery where a static charge is generated. A high concentration of positive and negative ions produces fast static decay, neutralising surfaces which are causing production, quality or safety problems.

The range is offered from stock in 76 to 2743 mm lengths. The electrical ion source is shockless and there is no radioactive element.

Compressed Air Australia Pty Ltd

www.caasafety.com.au



MIXPROOF VALVES

SPX FLOW has launched a range of mixproof hygienic valves, the D4 Series, from APV and Waukesha Cherry-Burrell process technologies. Used to separate dissimilar products, the series is designed to offer production flexibility, productivity and reduced product and personnel risk across the food and beverage, dairy, personal care and brewing process industries.

The valves are balanced for dependable operation against pressure spikes and flow in any direction. They have automated processing with the option of a control unit with integrated seat lift detection and no external sensors. Maintenance is optimised as no compressed air or lifting tools are required for removal and service. They help reduce inventory costs as the same seal kit is used across multiple valve sizes.

The complete range includes the primary D4 model, which meets the basic needs for product separation and seat lift (SL) or non-seat lift (NSL) cleanability, and the DA4 ultrahygienic model for critical applications requiring enhanced cleanability of all product contact surfaces.

The series offers customers dependable processing, cleanability and minimised CIP fluid losses.

SPX Flow Inc

www.spxflow.com/au

CONVEYOR CLEANING SYSTEM

Material carryback is one of the main causes of potential problems in belt conveyor systems. To prevent this, operators rely on precleaners for coarse materials and secondary cleaners for fine cleaning, and in many cases these cleaning systems can remove more than 90% of carryback.

Flexco's Y-Type flexible secondary cleaner can be equipped with various polyurethane or carbide blades, giving users a system that meets their particular requirements in an efficient way. Where large quantities of dry foodstuffs have to be conveyed, Flexco also offers its secondary cleaner with chemical-resistant polyurethane blades meeting food industry regulations.

Flexco offers this flexible solution for both normal and heavy usage, so it is available with a maximum belt speed of between 3 and 3.8 m/s. A spring tensioner maintains a constant blade pressure on the belt at all times, providing a high degree of fine cleaning. The pressure of the tensioner ensures that the 75 mm blade segments adapt to worn and damaged belts too.

The pole has a diameter of 60 mm for standard loads and 72 mm for heavy-duty loads. Depending on usage, the Y-Type is suitable for belt widths of 450–1200 mm (normal loads) and 900–1800 mm for heavy-duty loads. It can be used at temperatures from -35 to 82°C. Clearly visible wear marks indicate when the segments have to be replaced.

Flexco (Aust) Pty Ltd

www.flexco.com.au

STAINLESS STEEL PANEL PC

The ViTAM-921A 21.5″ stainless steel HMI panel PC is a fully sealed IP66/IP69K all-in-one computer with M12 sealed connectors for all I/O connections. The result is a panel PC that can withstand high-pressure hosedown cleaning.

The PC is based on sixth-generation Intel Core 13-6100U or Core i5-6300U processors with up to 16 GB of DDR4 memory to provide a high-performance industrial control solution. Standard I/O connections provided include two USB 2.0 ports, a LAN port, one RS232/422/485 and 9–36 VDC power. Two optional I/O connections can also be installed. An internal 2.5″ HDD/SSD drive bay and mSATA slot are provided for storage. A Mini-PCIe slot is provided for Wi-Fi/BT cards and an RFID front panel module is also available. The 21.5″ 1920x1080 flat panel LCD screen touch panel options include resistive touch, projected capacitive touch or a no-touch glass front bezel.

Housed in a grade 304 or optional grade 316 stainless steel enclosure, the ViTAM-921A will not corrode and is easy to clean. To assist the cleaning of the display it includes a touch on/off button that allows the touch screen to be temporarily disabled during the cleaning process. This allows the display to be hygienically wiped down without having to shut down any process control applications.

Standard 300 nits and optional sunlight-readable 1000 nits display brightness is available. VESA 100 mounting holes allow the ViTAM Series to be arm or wall mounted. Optional ergonomic yoke mounting is also available.

Interworld Electronics and Computer Industries
www.ieci.com.au

ULTRASONIC GAS LEAK DETECTION

WHAT IT IS AND HOW IT WORKS

Ultrasonic gas leak detection differs from conventional gas detection by responding to the acoustic sound from the gas leak, not by sensing the gas molecules.

Ultrasonic gas leak detection (UGLD) has emerged as an effective means of establishing the presence of gas leaks. It works especially well in open, ventilated areas where other methods of gas detection may not be independent of ventilation. Because UGLDs respond to the source of the leak, rather than the gas itself, they complement sensors that measure gas concentration.

This article provides an overview of the operation and use of UGLD. The principles of ultrasonic detection and its strengths and limitations are also discussed.

How UGLD works

Fixed gas detection in open ventilated areas like offshore or onshore oil and gas facilities is generally considered problematic because the gas easily dilutes and drifts away from conventional gas sensors. Ultrasonic gas leak detectors solve this problem by detecting the airborne acoustic ultrasound generated when pressurised gas escapes from a leak. When a gas leak occurs, the ultrasound generated by the leak travels at the speed of sound, through the air, from the source to the detector.

Ultrasonic gas leak detectors are non-concentration-based detectors. They send a signal to the control system indicating the onset of a leak. The use of UGLDs depends on the following criteria being met:

- The target element must be in the gas phase; it cannot be a liquid.
- 150 psi is typically required to generate enough ultrasonic sound to produce a sufficient area of coverage.

Speed of response

The main advantage of a UGLD compared to a conventional gas detector is that it does not need to wait for a gas concentration to accumulate and form a potentially explosive cloud before it can detect the leak.

The total speed of response for a UGLD can be calculated as:

$$T_{total} = T_{detector} + T_{ultrasound}$$

$T_{detector}$ for a UGLD is the alarm delay time implemented on the instrument, commonly 10–30 seconds, while $T_{ultrasound}$ represents the time it takes ultrasonic noise to travel from the leak source to the detector. This is typically measured in milliseconds.

The response of the UGLD is not dependent on the gas to travel to the detector, which means that it reacts much faster to the dangerous gas leak.

Detection coverage

Since the sound pressure level decreases over distance at a predictable rate, operators and engineers can establish detection coverage before ultrasonic gas leak detectors are installed. The location and number of detectors can be planned based on plant drawings when the facility is in the design stage, and UGLDs can be used to cover both large outdoor facilities and single installations. UGLD detection coverage also depends on the ultrasonic background noise level of the area and on the minimum gas leak rate to be detected.

For the purposes of sensor allocation, plant environments can be divided into three types: high noise, low noise and very low noise, as represented in Figure 1.

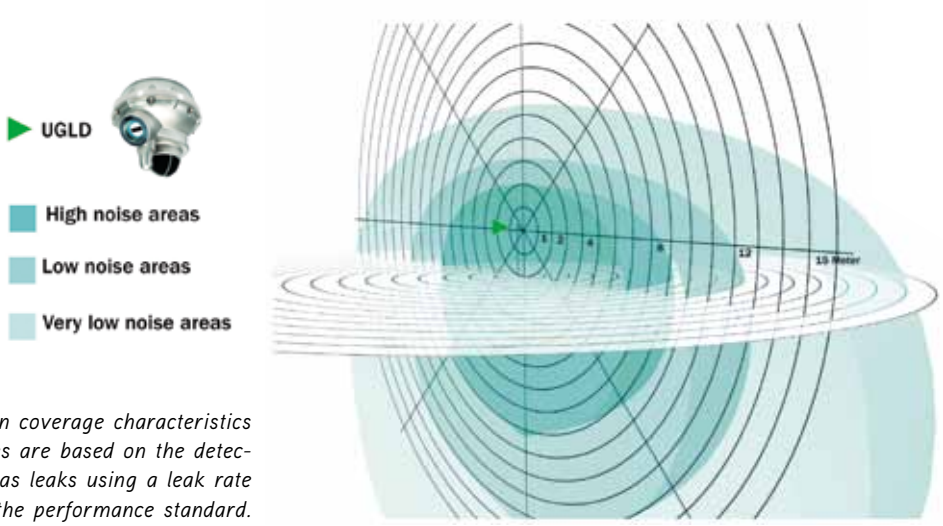


Figure 1: The detection coverage characteristics for UGLD. The distances are based on the detection of methane-based gas leaks using a leak rate of 0.1 kg/s as the performance standard.

FIXED GAS DETECTION IN OPEN VENTILATED AREAS LIKE OFFSHORE OR ONSHORE OIL AND GAS FACILITIES IS GENERALLY CONSIDERED PROBLEMATIC BECAUSE THE GAS EASILY DILUTES AND DRIFTS AWAY FROM CONVENTIONAL GAS SENSORS.

Figure 2 shows a detector installed on a mounting pole 2 m above ground as seen from the front. Because the sensor points down when installed, the detection coverage is greater below and to the sides of the sensor than above. Notice that when not obstructed by a floor, the detection coverage is 'apple shaped'.

From the illustration it could be implied that the detector detects gas leaks below ground, but this is rarely the case. The only instance in which a detector responds to gas leaks below ground is when the device is installed on a grid floor, which allows ultrasound to travel through the cells in the grid with minimum impairment. A UGLD may, for example, be installed on an upper platform deck while providing coverage to lower decks as well. In the same way the detector could be installed over the top of a separator tank and provide coverage over the top of the tank as well as down to the ground level.

As shown also, the shape of the detection coverage is the same for the three plant areas, but the maximum detection range varies according to ultrasonic background noise.

Detection coverage for high, low and very low noise levels as illustrated in Figure 2 is based on detection of methane leaks using a leak rate of 0.1 kg/s as the performance standard.

High noise areas (eg, compressor area):
- Audible noise: 90–100 dBa
- Ultrasonic background noise <78 dB
- Alarm trigger level = 84 dB
- Detection coverage = 5–8 m

Low noise areas (eg, normal process area):
- Audible noise: 60–90 dBa
- Ultrasonic background noise <68 dB
- Alarm trigger level = 74 dB
- Detection coverage = 9–12 m

Figure 2: Detection coverage for different ambient noise levels.

Very low noise areas (eg, remote onshore wellhead):
- Audible noise: 40–55 dBa
- Ultrasonic background noise <58 dB
- Alarm trigger level = 64 dB
- Detection coverage = 13–20 m

Note that for a more than 20 m detection coverage the leak would need to be greater than 1.0 kg/s, and that very low noise areas are generally only found in onshore installations.

LEL vs leak rate

Conventional gas detectors measure gas concentrations as a percentage of the lower explosive limit (LEL) or in parts per million (ppm). The performance of ultrasonic gas leak detectors is based on the leak rate, usually measured in kilograms per second.

LEL

For conventional gas detection, gas concentration is measured in either LEL or ppm. The term LEL is used for combustible gases and is measured as a percentage. When the concentration of combustible gas in air reaches 100% LEL, an ignition of the gas causes an explosion.

Leak rate

The term leak rate describes the amount of gas escaping from a leak per unit time. A leak can be considered large, for instance, if a large quantity of gas escapes every hour or every second. Conversely, a leak can be said to be small if a small amount of gas jets out from the pressurised system over a given period.

The leak rate, which defines how fast a potential dangerous gas cloud accumulates, can be divided into three categories according to hazard severity:
- Minor gas leak <0.1 kg/s
- Significant gas leak 0.1–1.0 kg/s
- Major gas leak >1.0 kg/s

The categories developed by HSE[1] in the UK are used to define the guidelines for UGLD. For methane-based leaks then UGLD must respond to small leaks at a minimum of 0.1 kg/s.

Notice a UGLD does not measure the leak rate. The leak rate is used to set the performance criterion, and in effect defines which leaks the UGLD must pick up. The UGLD provides a measure of the ultrasonic sound measured in decibels (dB). When there is a gas leak with a leak rate of 0.1 kg/s inside the detector's coverage area, the sound level will exceed the trigger level of the UGLD and cause an alarm. As a result, in order to prevent injury or loss of life, UGLDs must detect methane leaks of at least 0.1 kg/s.

Leak size and influence on UGLD

The leak size influences the performance of the UGLD in the following way: the greater the leak size, the bigger the leak rate and thus the greater the detector's coverage (assuming the gas pressure is kept constant). Some of the most frequently asked questions pertain to the leak size and whether the opening can be too small or too large to create adequate levels of sound.

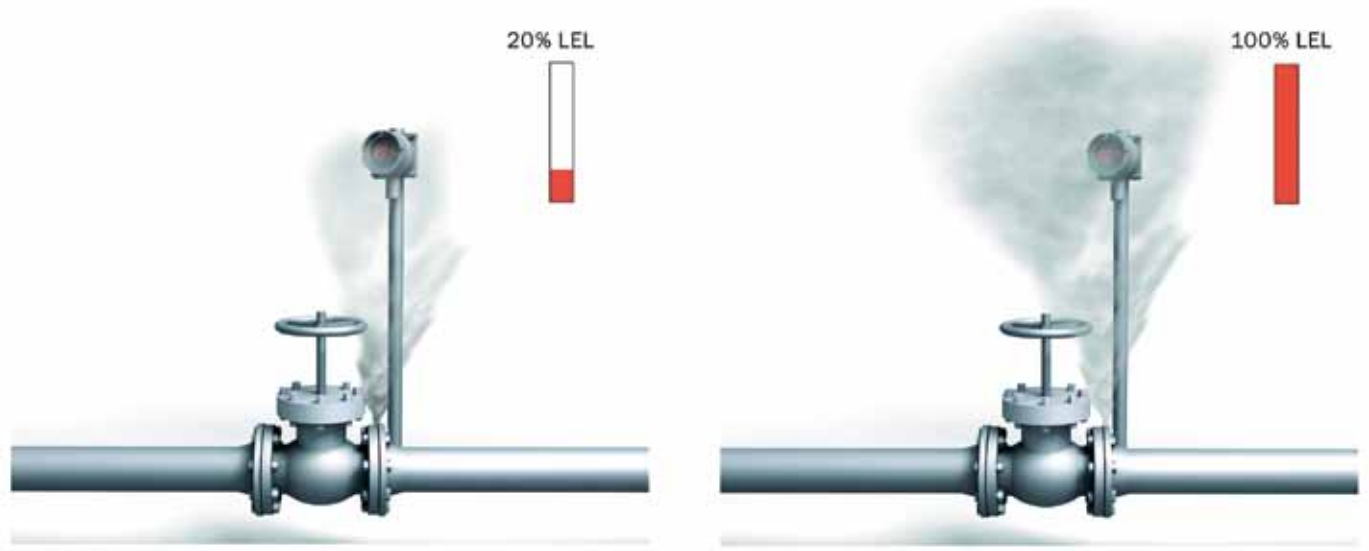


Figure 3: The LEL level measured by a conventional gas detector depends on the leak rate (mass flow rate), leak directionality and where the sensor is positioned relative to the leak.

The most important thing to understand is that the leak rate can derive from an infinite number of combinations of leak size and gas pressure. Gas properties also have some influence. As the hole becomes larger, the leak rate increases. However, with extremely large leaks it becomes more and more difficult to sustain the system's pressure. When the system pressure starts dropping it causes a reduction of the leak rate and thereby decreases the ultrasonic sound level.

In theory, there is no limitation to the rule when the leak becomes small. However, to achieve the commonly used leak rate for methane of 0.1 kg/s for a leak with a small hole size such as 0.5 mm, the system's pressure must be almost 3000 bar (or around 43,500 psi). Since tiny pinhole leaks are found in fittings especially on offshore facilities, UGLDs are neither designed for pinhole leaks nor for big pipe ruptures. Pinhole leaks increase in size over time and become easier to detect while pipe ruptures can be identified by the pressure drop. Instead of considering specific hole sizes or pressures, UGLD should be related to the leak rate.

Frequency and amplitude

Ultrasonic gas leak detection differs from conventional gas detection mainly because it responds to the airborne acoustic sound from the gas leak, and not by sensing the gas molecules. Two parameters are therefore fundamental to understand ultrasonic technology — amplitude and frequency.

1. **Amplitude:** The term amplitude, measured in decibels (dB), is the parameter that describes the sound level or volume of the acoustic sound.
2. **Frequency:** The human ear can hear both high and low frequencies, but only within a certain frequency range, typically from 20 Hz to 20 kHz — the audible frequency range, while frequencies above 20 kHz up to 100 kHz are called ultrasonic frequencies.

UGLDs are designed to ignore audible and lower ultrasonic frequencies and only sense ultrasonic frequencies in the range 25 to 70 kHz.

Frequencies in plant environments

In normal industrial plant environments there can be a wide variety of acoustic sound frequencies present or there may be only a limited number. Basically it depends on the process equipment installed in various parts of the plant. In some areas there is a complex mixture of sound frequencies at high amplitude (high dB level); for example, in spaces with turbines, compressors and other high-speed rotating machines. In other areas there is a simple mix of sound frequencies at low decibel levels. This is the case in process areas with no rotating equipment or in remote installations in outdoor locations.

In very noisy plant locations where the audible noise level may be around 95 dB (very loud), the ultrasonic sound level will, as a rule of thumb, be 20–30 dB lower (65–75 dB) simply because the machine-made noise does not generate a lot of ultrasonic frequencies — only a lot of audible sound frequencies.

For this reason, UGLDs can be installed in very noisy locations without interference from the normal audible background noise.

Conclusion

Ultrasonic gas leak detection (UGLD) is a very effective means of establishing the presence of gas leaks that is commonly used in chemical, power plant and numerous oil and gas applications. It features a rapid response rate, is unaffected by audible noise and works especially well in open, ventilated areas where other methods of gas detection may not be independent of ventilation. The main advantages can be summarised as:

- Rapid response speed.
- Outdoor applications are ideal as the technology is immune to the effects of wind diluting the gas leak.
- Not affected by audible sound.
- Coverage area can be confirmed using an inert gas.
- No routine calibration is necessary.

Reference:

1. Health & Safety Executive (UK) 2004, *Fire and Explosion Strategy, Issue 1*. Hazardous Installations Directorate, Offshore Division.

MSA Australia Pty Ltd
www.MSAsafety.com

3D STREAMING CAMERA

The Sick Ranger3 is a 3D streaming camera with Sick's ROCC technology (rapid-on-chip-calculations) that can process up to 15.4 GP/s, enabling full-frame 3D imaging (2560 x 832 pixels) at 7 kHz. 3D object data is measured regardless of the colour, contrast, the optical appearance of surfaces or the ambient brightness. The Ranger3 forwards the measurement data to an external PC via Gigabit Ethernet, using the established standards GenICam and GigE Vision.

The mechanical integration is easy, since the 3D vision camera, at 55 x 55 x 77 mm in size, saves space, and can also be configured optimally into different application-specific set-ups due to exchangeable sensor components. The ProFlex concept contains exchangeable modules including a wide range of lenses, lens covers with enclosure ratings IP65 and IP67, replaceable threaded filters and multiple Scheimpflug adapters. This allows the Ranger3 to adjust and optimise the focal length for each specific set-up to ensure that the entire object height can be recorded perfectly.

SICK Pty Ltd
www.sick.com.au

ALL-IN-ONE STEP-SERVO MOTORS

JVL has released its all-in-one step-servo motor with built-in encoder, drive, controller, Ethernet switch and Safe Torque Off option. This integrated design with enclosure ratings up to IP65 comes with automatic tuning, smaller control cabinet size and lower cooling, system and running costs.

JVL's servo-step motors offer lower cost performance and deliver a high-torque, direct drive unit without gearing, in a compact solution.

JVL's closed-loop servo-step technology eliminates loss of steps and never stalls. The Ethernet interface allows users to switch between Profinet, EtherCAT, Powerlink, EtherNet/IP, Modbus TCP and SERCOS. It offers lowers power consumption and a 100% duty cycle without overheating. The motors have a resolution of 409,600 steps per revolution — resulting in a smoother running motor — and a speed range of 0 to 3000 rpm. They have eight programmable I/Os (analog and digital), an EtherNet/IP interface and are IIoT and Industry 4.0 ready. The motors can be supplied with Add-On-Instructions for Rockwell Studio 5000, which assures fast and easy commissioning.

Motion Technologies Pty Ltd
www.motiontech.com.au

INDUSTRIAL IoT GATEWAY

The Winmate EAC Mini EACIL22S is an Industrial IoT gateway featuring a low-power Intel Apollo Lake N3350 1.1 GHz processor to maintain efficient power usage and USB Type-C video output to facilitate easy connectivity with devices such as USB Type-C displays. The USB Type-C connector works in Alt mode, meaning it can provide display A/V output, transfer USB data and deliver up to 10 W of power.

Other features include a fanless cooling system and various mounting options (desk, wall, VESA). Further, the product is compatible with the Windows 10 IoT Enterprise, Linux and Ubuntu operating systems for easy integration into established IT infrastructures.

Wireless connectivity and all necessary connectors allow the device to send data from manufacturing facilities directly to a cloud server. Its compact size makes it suitable for IoT, smart factory and machine automation applications.

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

ETHERNET EXTENDERS

Phoenix Contact TC extenders extend simple point-to-point Ethernet paths and can be easily monitored remotely using a single managed device via IP. In the case of unexpected events such as a weakening of the path, this information is available via SNMP trap and can be issued as a warning to one or more freely selectable network devices.

In addition, the managed Ethernet extenders feature integrated, replaceable surge protection. The intelligent Plugtrab PT-IQ technology can also call up the status of the surge protection remotely at any time and, in emergencies, can also transit this status as an SNMP warning. This means that the devices independently provide information on which surge protection should be replaced soon or where immediate replacement is required.

Using automatic topology and data rate detection, extender applications can be expanded into line and ring topologies during operation, easily and without configuration, and without impact through the addition of up to 50 extenders. The use of special cables is not required — any existing two-wire cables can be used for Ethernet networking. This enables transmission ranges beyond the corresponding standard and up to as much as 20 km per extender segment.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

OPINION

WHY AUSTRALIAN MANUFACTURERS MUST IMPROVE CYBERSECURITY

Australia's manufacturing industry is resurging following a difficult few years. To maintain this positive momentum, it's essential for manufacturers to understand the risks of cyber attacks, especially as they adopt new and emerging technologies, and take appropriate steps to protect themselves.

The manufacturing industry is benefiting from automation and the Industrial Internet of Things (IIoT), but that also means manufacturers are being exposed to more cyber threats. Each automated and connected device is a potential entry point into a company network and must be treated as such.

Manufacturing is Australia's sixth-largest employer by industry, employing up to 1.3 million people in Australia[1] and accounting for 8% of all employment[2] and about 7% of GDP[1]. Since 2007, the sector's real output declined by 13% but, in the 2016–17 financial year, the value of Australian-made goods sold to international markets hit a record high of more than $100 billion, demonstrating a strong resurgence.[2]

Australia's manufacturing industry is likely to continue to improve as manufacturers adopt new types of technology that streamline operations and help to identify new opportunities. For example, Australia has a $2.1 trillion market opportunity if it uses artificial intelligence (AI) and related technologies to transition its industry base and accelerate automation.[3]

Gartner predicts that more than 20 billion devices will be connected by 2020, by which point it expects that more than 25% of all attacks on enterprises will come via IoT devices.[4] If every device is a potential weak point, the broader use of automation and IIoT will continue to be held back until companies figure out a way to protect themselves.

High-tech manufacturers are an increasingly tempting target for attackers because they possess valuable intellectual property. The adoption of new technologies delivers competitive advantages, so it's important for manufacturers to know how to secure their networks and critical infrastructure before they deploy it.

Operational technology and critical infrastructure can't go offline, so it's important to be able to monitor the security status of this infrastructure without causing downtime. Passive security techniques let businesses see, classify and monitor network-connected devices without disrupting operations.

Legacy devices that were never meant to be connected to the internet, such as manufacturing systems, weren't designed with security and today's sophisticated cyber attacks in mind. It's essential to monitor their activities and look out for uncharacteristic actions to protect the business.

Many organisations invested in equipment with the expectation that these machines would last decades before being replaced. Upgrading this equipment to make it more secure requires additional investment, which may not have been budgeted for.

Investing in modern security infrastructure is essential; however, many manufacturers don't see the urgency. Creating a business case for investment is complicated by the fact that, rather than demonstrating a net gain for the company, it is considered to merely prevent a loss. Mitigating cyber attacks can save manufacturers time and prevent costly downtime, and those are key reasons why this shouldn't be underestimated.

To ensure the maximum benefit from technology such as IIoT, coupled with minimal risk, it is critical for manufacturers to take the time to understand the security implications, and take steps to mitigate them.

References

1. Mather J 2018, 'Manufacturing growth quickens to 12-month high', *Australian Financial Review*, ‹http://www.afr.com/business/manufacturing/manufacturing-growth-quickens-to-12month-high-20180101-h0ca9p›
2. Stanford J, Swann T 2017, *Manufacturing: A Moment of Opportunity*, The Australia Institute: Centre for Future Work
3. AlphaBeta 2016, *The Automation Advantage*, ‹http://www.alphabeta.com/wp-content/uploads/2017/08/The-Automation-Advantage.pdf›
4. Gartner 2016, Gartner Says Worldwide IoT Security Spending to Reach $348 Million in 2016, ‹https://www.gartner.com/newsroom/id/3291817›

Steve Hunter is a Senior Director of System Engineering Asia Pacific and Japan at ForeScout Technologies.

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HYGIENIC DIAPHRAGM PRESSURE GAUGE

The WIKA model PG43SA-S hygienic diaphragm pressure gauge is now also available in a version with ATEX approval. The pressure gauge can thus be used in hazardous areas for ignition protection type Ex h Zone 1 (gas) and Zone 21 (dust).

For safety-critical processes in the pharmaceutical and food industries, the model PG43SA-S and the other instruments in the series are suitable as a result of their dry measuring cell, the robust diaphragm element and the high overload protection. In addition, the model PG43SA-D features integrated diaphragm element monitoring — a diaphragm rupture is flagged by an indicator on the dial. In the event of such a failure, a second barrier keeps the process sealed.

All hygienic pressure gauges of the series fulfil the 3-A Sanitary Standard and are certified in accordance with EHEDG. They are CIP and SIP capable, and optionally they are also completely autoclavable.

WIKA Australia
www.wika.com.au

3D PROFILE SENSORS

Wenglor has expanded its range of weCat3D MLSL2 profile sensors with 10 additional models that have larger visual field widths.

The MLSL series sensors have thus far been capable of covering visual field widths of up to 280 mm in the x direction. The 10 updated models offer visual field widths of up to 1350 mm in the x direction, so that significantly larger objects can now be detected.

Diverse applications such as bin picking, pick-and-place, gap measurement, object counting and 3D sealant bead monitoring represent only a small portion of the possible uses for this technology. With compact dimensions of 200 x 67 x 38 mm, the 10 updated models represent a mixture of performance and compact design. Variants with different laser classes including 2M, 3R and 3B and red or blue light also provide users with diversity of product selection.

The high speeds and accuracy offered by the sensors result from their functional principle: the 2D/3D sensors project a laser line onto the object to be measured and then record it by means of an integrated camera. Two and three-dimensional surface and volume profiles can thus be calculated with the help of point clouds, quickly and accurately. There are now a total of 81 different variants in the weCat3D series.

Treotham Automation Pty Ltd
www.treotham.com.au

TOTAL ORGANIC CARBON SENSOR

The 6000TOCi, the latest total organic carbon sensor from METTLER TOLEDO Thornton, provides continuous, real-time measurements in pure and ultrapure waters. Advanced UV oxidation technology provides a rapid response time.

Total organic carbon monitoring is vital for the measurement and control of organics contamination in pure and ultrapure waters used in industries such as pharmaceuticals, microelectronics and power generation. To ensure changes in TOC levels are not missed, constant results are required. The 6000TOCi sensor uses conductivity measurements before and after oxidation of organic material via ultraviolet light to provide continuous, real-time determination of TOC.

METTLER TOLEDO's UV oxidation technology ensures a measurement in less than a minute of sample water entering the sensor. When paired with the M800 multiparameter transmitter, the system offers an accurate TOC measurement solution that is compliant with all global pharmacopeias.

Flexibility of the 6000TOCi allows installation anywhere on a water system, with the option to display results at the point of measurement or at a more convenient location for operators.

Intelligent Sensor Management (ISM) advanced diagnostics included in the 6000TOCi offer constant sensor status and preventive maintenance notifications, which allow operators to anticipate and plan for routine service.

Mettler-Toledo Ltd

www.mt.com

HYGIENIC INSTRUMENT RANGE

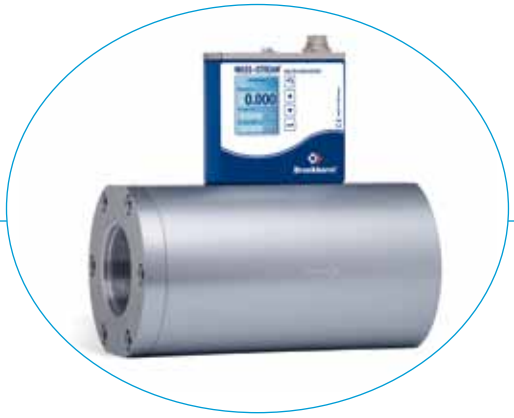
Emerson is now offering a line of Rosemount transmitters that support features required by most hygienic applications, but in a more compact form factor.

The Rosemount 326P pressure, Rosemount 326T temperature, Rosemount 327T temperature and Rosemount 326L level instruments are designed to operate in the hygienic environments required by food and beverage manufacturers.

All comply with 3-A and FDA specifications and are available with nine common industry process connections to ensure the right fit for new tanks and pipe fittings, as well as capability to be retrofitted on legacy systems. These small transmitters can also be mounted in tighter locations common on packaging machinery. Conventional 4–20 mA outputs and IO-Link connectivity make the transmitters easy to integrate with automation systems.

Emerson Automation Solutions

www.emerson.com/en-au/automation-solutions



MASS FLOW METERS FOR GASES

MASS-STREAM instruments from Bronkhorst operate on the basis of direct through-flow measurement in accordance with the constant temperature anemometer principle.

The instruments contain no moving parts and the measured gases pass the two stainless steel sensor probes directly, without bypass. As a result, the gases are entirely unhindered on their flow path, making the series particularly suitable for applications requiring low pressure loss as well as less sensitivity to moisture and particulate contamination than thermal mass flow instruments with a bypass sensor.

The electronics casing has a robust design with an IP65 level of protection (dustproof and splash waterproof). The mass flow meters and controllers can be supplied with an optional integrated multifunctional display. On the D-6390 model, the maximum measuring range has been expanded to 10,000 ln/min air equivalent. Analog I/O signals as well as an RS232 interface are provided by default. In addition, an interface with DeviceNet, Profibus DP, Modbus or Bronkhorst's FLOW-BUS protocols can be integrated. Typical applications include gas consumption measurements, aeration and purging processes or natural gas/biogas applications.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au

ULTRASONIC FLOWMETERS FOR TEMPERATURE CONTROL

Temperature control processes, such as the cooling or heating applications used to process metals or plastics, must function smoothly to ensure quality products. At the same time, however, wide measuring ranges are required to ensure that operating volumes as well as minor leaks are correctly recorded.

Bürkert Fluid Control Systems is offering ultrasonic flowmeters for temperature control processes with measuring ranges of 0.3 to 75 L/min or 0.05 to 10.5 L/min, and suitable for dynamics of 1:250 with flow rates large and small. Since ultrasonic technology based on the TDOA method works without moving parts, the flowmeters are insensitive to contamination, making them virtually maintenance-free. A temperature sensor is already integrated, and the modular design allows the ultrasonic flowmeters to be mounted quickly and easily, in vertical as well as horizontal pipelines.

The ultrasonic flowmeters consist of an electronics module, a measuring element, and a brass or stainless steel fitting for connection to the pipeline. In the cartridge variant, the measuring module is simple to remove from the fitting if required. This streamlines the assembly process in many cases and allows the measuring element to be cleaned. However, the measuring element can also be welded in block solutions without a fitting.

On request, Bürkert combines the ultrasonic flowmeter to create application-specific complete systems. The company also validates and certifies the respective requirements. This means that flexible flowmeters with a wide measuring range are available for all types of temperature control processes.

Burkert Fluid Control Systems

www.burkert.com.au

STAINLESS STEEL MAGNETIC SAFETY SWITCH

Pilz has expanded its PSENmag range of non-contact, magnetic safety switches to include a stainless steel variant. The stainless steel version reliably monitors safety gates and positions in harsh industrial environments up to 120°C and the robust stainless steel housing withstands extreme temperatures, impacts or vibrations.

The stainless steel housing offers minimal scope for deposits to form and is resistant against aggressive cleaning methods such as sterilising with hot steam. With protection level IP67/IP69K it can be used in areas with high contamination and high cleaning requirements such as the food industry, pharmaceutical production or cosmetic industry.

The stainless steel variant of PSENmag is available in two different versions — with a cable or plug-in connection. For applications under extreme temperatures, the cable version is resistant to heat and cold for temperature ranges of -25 to 80°C. The plug-in version can be used up to 120°C. It can also be used in explosive environments. The magnetic safety switch is vibration and shock resistant and has a high B10D value.

With additional signal contacts and an integrated LED, user-friendly diagnostics and thus rapid fault rectification are possible.

Pilz Australia Industrial Automation LP

www.pilz.com.au

PORTABLE ULTRASONIC FLOWMETER

The Series PUF portable ultrasonic flowmeter kit utilises the transit-time difference for measuring flow rates in pipes non-invasively.

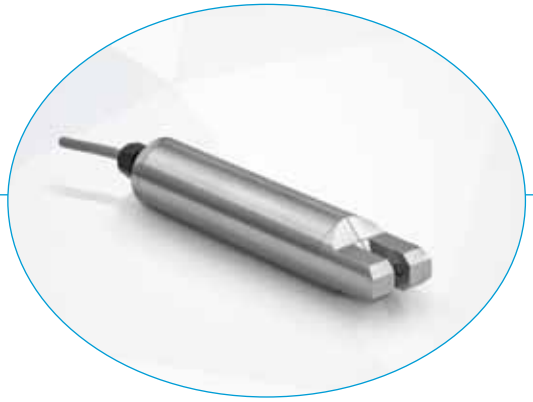
It is a compact and lightweight instrument incorporating the latest electronics and signal processing technologies, realising high performance and easy operation. The device is capable of 20 h continuous operation with its built-in battery.

The PUF comes with an IP67-rated carrying case with moulded foam inserts to hold and protect all equipment against dust and water. The screen offers easy-to-read text with a convenient backlight for visual comfort. The efficient layout of the function keys adds to the unit's easy-to-use programming. It comes with RS232 and USB connections to allow for easy connection to any personal computer or printer.

To operate the product, place two sensors on the exterior of the pipe; each transmits an ultrasonic pulse through the pipe and fluid to the other. The velocity of the liquid flowing through the pipes causes the pulse to accelerate or decelerate. The difference in the transit times of the two pulses is used to calculate the flow rate. The use of transit time allows the flowmeter to be unaffected by pressure or temperature changes.

Product applications include treated water, river water, sea water, potable water, demineralised water, glycol/water mix, hydraulic systems and diesel oil. For the non-data logging version, see the Series PUB.

Dwyer Instruments (Aust) Pty Ltd
www.dwyer-inst.com.au



TOTAL SUSPENDED SOLIDS SENSOR

The Krohne OPTISENS TSS 2000 total suspended solids sensor features a fast response time and can be used to optimise processes, increase yield or monitor limits. Target applications in the water and wastewater industry include mixed liquor suspended solids (MLSS) monitoring, sludge discharge of primary and secondary sedimentation (clarifier) tanks, or monitoring of biological treatment in wastewater aeration basins. The sensor can also be used to monitor product loss in open channels in the food and beverage industry, effluent in chemical, white water in pulp and paper, or thickeners in metals and mining.

In combination with the MAC 100 transmitter, the sensor offers a complete TSS measuring point for ranges 0–4 AU or 0–18.5 g/l. The single-beam sensor comes with a rugged stainless steel body, scratch-resistant sapphire windows and automatic sensor cleaning option. Using near-infrared (NIR) technology, it is not affected by colour or natural ambient light. It is factory calibrated with up to six linearisation points with linear or non-linear fitting. Installation without assembly (hung-up cable installation) is possible, but the use of the fibreglass telescopic sensor assembly SENSOFIT IMM 2000 is recommended.

KROHNE Australia Pty Ltd
www.krohne.com.au

LEVEL TRANSMITTER

The LUC-M** is a compact measuring device for continuous, non-contact level measurement of fluids, pastes and coarse bulk materials. The non-contact measurement method significantly minimises service requirements.

Depending on the sensor, the measuring range is up to 15 m in fluids and up to 7 m in bulk solids. By using the linearisation function, the LUC-M** can also be used for flow measurements in open channels and measuring weirs. A linearisation function (up to 30 points) allows for conversion of the measured value into any unit of length, volume or flow rate. It features quick and simple commissioning via menu-guided on-site operation with a four-line display and envelope curves for simple diagnosis.

There is an optional remote display (up to 20 m from transmitter), and an integrated temperature sensor provides automatic correction of the temperature-dependent sound velocity. The system integration is ensured via HART (standard), 4–20 mA and Profibus PA. The instrument is suitable for use in explosive hazardous areas for both gas and dust.

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

DISTANCE SENSOR

The ifm OGD Precision is a compact colour-independent laser sensor with a standard M18 thread that utilises time-of-flight technology.

Due to the on-chip time-of-flight principle with PMD technology (photonic mixer device), the sensor offers all the capability of a precise measurement system, and is capable of measuring distance to the nearest millimetre up to a range of 300 mm. The distance information can determine the presence of parts or their correct installation. The high reflection resistance and background suppression, together with a high excess gain, enable ongoing operation.

The distance value is shown on a two-colour display and sent via IO-Link. Settings are configured also via IO-Link or via three integral push-buttons.

ifm efector pty ltd
www.ifm.com/au

Highly durable pH sensor delivers critical measurement

Production of neopentyl glycol requires tight control of pH in tough process conditions. For Sweden's Perstorp Group, a robust and intelligent pH measurement system was needed to provide assurance of product quality.

Neopentyl glycol (NPG) is an organic chemical compound that is widely used in base resins in the manufacture of coatings and paints, and as an ingredient in synthetic lubricants.

One of the major producers of NPG is the Swedish Perstorp Group, a world leader in several sectors of the specialty chemicals market. Starting as a small family business over 130 years ago, it has developed many innovative products and now has interests including polyols, biofuels and feed additives. It employs about 1600 people and has manufacturing units in Asia, Europe and North America.

NPG synthesis involves an aldol condensation of isobutyraldehyde and formaldehyde, followed by a hydrogenation step. The pH level during production greatly affects final product quality and, in one particular stage, Perstorp technicians found that pH must be maintained between pH 8 and 9 or else the product becomes unusable. The technicians were finding obtaining reliable pH measurements in this step to be very problematic.

The 120°C temperature and oily process medium meant the lifetime of the various pH sensors they tried was no better than one week, despite regular cleaning. As a result, Perstorp approached Mettler Toledo to see if it could provide a better solution.

Mettler Toledo installed a system based on the InPro 4260 i sensor. This probe was selected for a number of reasons. It has a solid polymer electrolyte that provides good resistance to contaminating substances, and instead of having a diaphragm that would quickly become clogged, it has an open junction. These two features provide the extended sensor service life Perstorp were looking for. In addition, the InPro 4260 i includes Mettler Toledo's Intelligent Sensor Management (ISM) technology.

One of ISM's main benefits is predictive diagnostics that provide real-time information on sensor condition. The Dynamic Lifetime Indicator (DLI) tool uses past and present process conditions to predict the remaining reliable lifetime of the sensor. This means that Perstorp technicians can see from the display of the connected transmitter when the sensor will need to be replaced. The Adaptive Calibration Timer (ACT) also informs them when sensor calibration should next be performed.

Due to the DLI and ACT, technicians know well in advance when sensor maintenance or replacement will be required; therefore, they can plan maintenance accordingly.

Another valuable feature of ISM is sensor calibration away from the process. Using iSense software for ISM sensors running on a standard PC or laptop, the InPro 4260 i can be calibrated in any convenient location. Once calibrated, the sensors can be stored for quick exchange at the measurement point when required.

Testing of the system showed that reliable process control could be achieved if the sensor was installed in the medium for only five minutes out of every hour. Therefore, Mettler Toledo fitted the sensor to an InTrac 777 retractable housing, which allows removal of the sensor without process interruption or danger of the escape of medium. Once extracted, the sensor can be rinsed in hot water then reinstalled in the housing, ready for the next measurement.

Perstorp is very pleased with the performance of the system and the technical support and service Mettler Toledo provided during the project. The combination of a process-tolerant sensor, retractable housing and ISM has given Perstorp the dependable, durable, pH measurement system it needs to produce high-quality NPG.

Mettler-Toledo Ltd
www.mt.com

POWERFLO
SOLUTIONS

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- FRP Piping and Fittings;
- PTFE Sleeved FRP Piping and Fittings;
- PTFE Expansion Joints up to 42" – 1 to 12 convolutions – optionally with liners and vaccum support;
- PTFE Strainers, Sight Glasses and Sampling Systems;
- Ceramic Valves and Piping Solutions;
- PTFE Lined Isolation and Control Valves;
- Exotic Alloy Valves.

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Total Engineered Control, Shut-off and Over-Pressure Protection Devices

1300 658 701
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CERAMIC SENSOR CAPS

Often made of aluminium and magnesium/aluminium alloys — which decrease weight but also reduce sensing capabilities — sensors are being placed in tight proximity to the parts being monitored. The face of the sensor is the most vulnerable area and when the face gets damaged, the sensor will start to misread or stop working entirely. The addition of a ceramic cap can help prevent this damage and, therefore, extend the life of the sensor and minimise downtime.

Balluff has released ceramic caps that can increase sensor life, by withstanding high temperatures, weld spatter and abrasives. They are suitable for welding applications and install easily, with M8, M12, M18 and M30 sizes available.

The ceramic caps provide end protection for flush-mount and cylindrical-style inductive proximity sensors. The caps can simply be threaded in place to protect the most vulnerable area of a cylindrical bodied sensor — where the face meets the barrel. The caps are compatible with any brand of sensor.

Balluff Pty Ltd

www.balluff.com.au

SAFETY CONTROLLER

Mosaic is a safety hub that is designed to manage all safety functions of a machinery or plant. The modular controller is configurable, scalable and expandable with minimal wiring.

The MOSAIC M1S joins the existing range of Reer Mosaic safety controllers. Due to an enhanced microcontroller, the M1S offers enhanced features compared to the M1, including four single OSSD safety outputs (or two pairs), up to 128 logic operators, four inputs for Start/Restart interlock and EDM, four test outputs and four status outputs.

The MI804 expansion module (with eight additional inputs and four additional outputs) is also available. The Reer M1S Master Unit as well as the MI804 I/O Expansion Module are TÜV and UL certified.

Treotham Automation Pty Ltd

www.treotham.com.au

DIGITAL OPTIONS FOR NON-IEC 61850 SUBSTATIONS

ABB has expanded its ABB Ability System 800xA Power Control Library (formerly MIDAS Library) software to include more options to communicate with and control electrical devices throughout the power infrastructure for mining and mineral processing operations. The digital solution now supports the PLC Connect functionality to extend power automation beyond IEC 61850 devices and infrastructure. The addition of PLC Connect support enables digitalisation for substations that were built without IEC 61850, making it possible to digitalise existing brownfield sites.

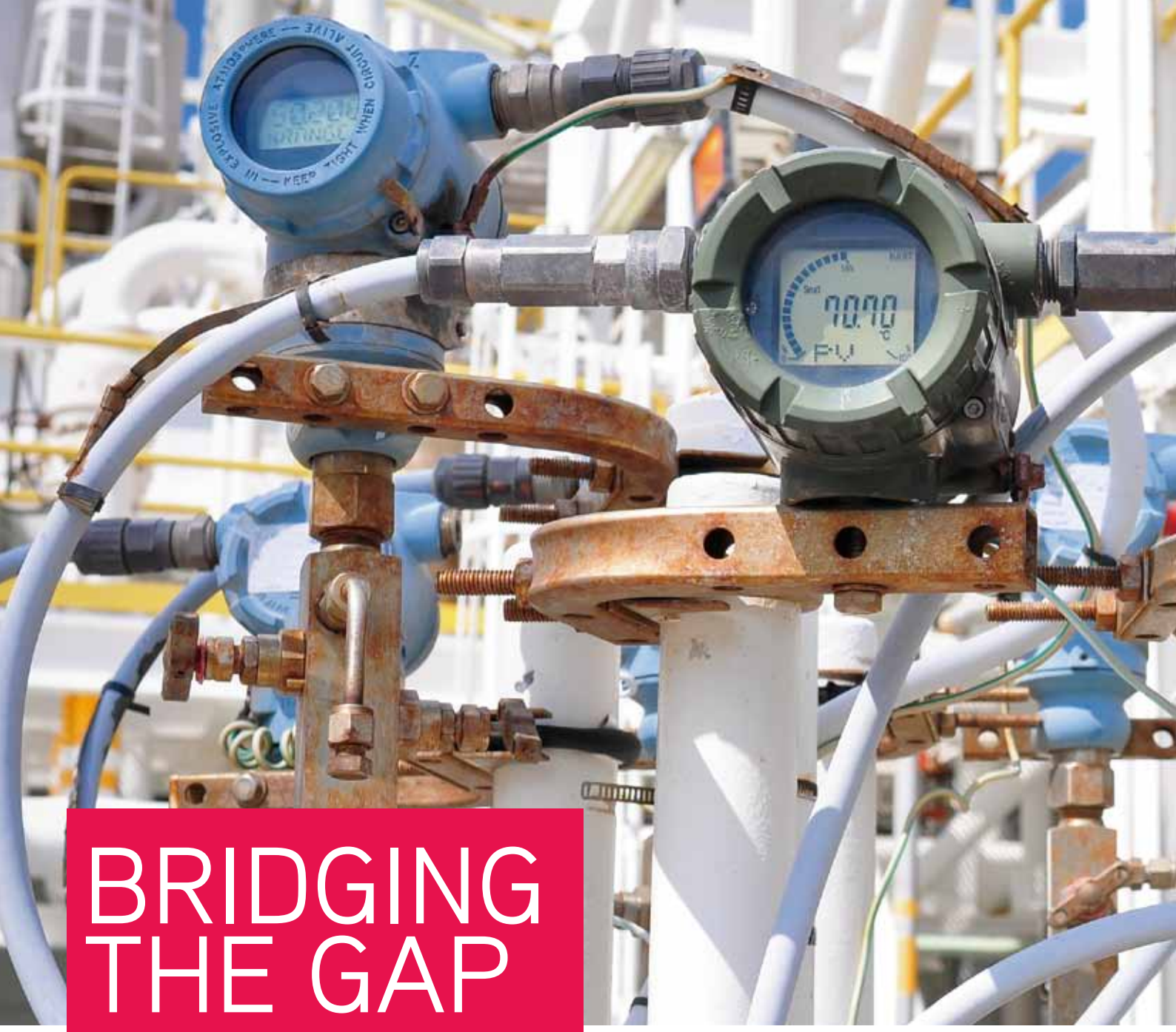
ABB Ability System 800xA is a platform for monitoring and controlling a wide range of automated industrial processes. The Power Control Library is based on the IEC 61850 standard, which creates a common language for automated substations and power distribution systems so that technologically advanced mines around the world are able to take advantage of its capabilities.

The updated version supports non-IEC 61850 substations through the PLC Connect functionality of System 800xA, to communicate with and control a broader range of intelligent electronic devices (IEDs).

The Power Control Library provides engineers that operate automated mines with the ability to rapidly troubleshoot electrical system issues through an enhanced substation control and monitoring environment in one control room. It allows a broader range of electrical and substation equipment to be monitored and managed remotely, so that potential issues can be resolved quickly. This remote monitoring allows the plant team to solve problems safely, away from the electrical substation, thus reducing the time for electrical fault diagnosis and problem solving.

ABB Australia Pty Ltd

www.abbaustralia.com.au



BRIDGING THE GAP

BETWEEN HART DEVICES AND THE IIoT

The gradual introduction of Industrial Ethernet and wireless networks in process plants has meant that data exchange with corporate networks is becoming common.

Over the last couple of decades, with industrial networks changing to facilitate greater data exchange within a facility and even throughout global corporate networks, the separate information hierarchy levels related to process data exchange within a manufacturing facility, as outlined in the ISA 95 model (Figure 1), have started to coalesce. This free flow of information has introduced a new set of ubiquitous terms, standards and phrases such as IIoT (Industrial Internet of Things), Smart Factory, Cloud Automation and Industry 4.0.

Plant of the future

The typical process control model that involves decision-making for the process at the local or centralised level by PLCs or process control system is quickly changing. These systems installed in the past were never intended to deal with or even realise the amount of data they would have access to in the near future. There are certainly newer ERP, MES and asset management systems that collect some of this data now, but the more critical challenge that manufacturing facilities face is manpower.

Because the streamlining of costs and overheads has left many manufacturing facilities with just enough personnel to keep the plant running, facilities no longer have the extra resources required to analyse data. For this reason we are seeing third-

party companies, and even some of the larger process control vendors, offer leasing or annual agreements that involve collecting, storing and analysing all sorts of process data. This data is part of a larger predictive analytics strategy that can not only forewarn operators of impending problems to come, but is also being used to optimise the process itself. This type of cloud automation looks to gather as much data as possible to reduce operating expenditures and future capital expenditures for future plant builds.

So the challenge remains: how do existing and new manufacturing facilities find a cost-effective way to get critical plant floor data up to higher level information systems? The answer is to take advantage of the digital HART data you already have installed but either didn't know it was there or couldn't afford the equipment upgrades to gain access to it.

HART's persistence

The process industry has had no lack of digital instruments and protocols introduced to market over the last 30 years. However, there is only one smart instrument communication protocol that has outlasted and outsold all of these alternative options: HART, and the devices that use it. With over 40 million installed HART devices worldwide, HART is not only here to stay but, unlike other protocols, it also continues to get updated revisions that continually enhance data exchange capacity, speed, number of devices on a network, support over Ethernet and wireless capability. There is no other protocol that has the massive installed base, is open to all vendors, has proven worldwide end-user support and continues to get updates and unilateral support from nearly all mainstream device manufacturers.

HART primer

With over 40 million HART instruments installed worldwide, one might conclude that everyone understands HART protocol and what data is available from HART smart devices. Unfortunately, that conclusion is too often false. Even though HART has been around since the early '80s, end users are often surprised when they realise the amount of data they actually have access to.

HART-enabled devices superimpose a digital signal on their 4–20 mA process signal. The HART digital signal often contains additional process measurements and other variables that may include instrument status, diagnostic data, alarms, calibration values and alert messages.

Many HART field transmitters are hard at work measuring process parameters and producing a 4–20 mA signal that is being used for process control by a PLC or some other control system.

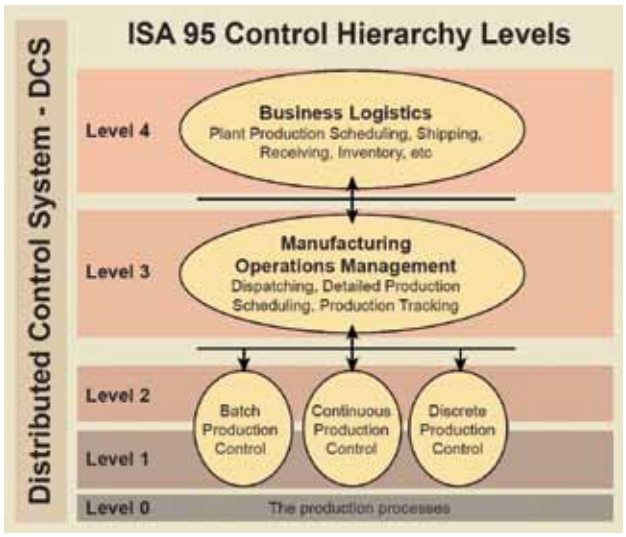


Figure 1: ISA 95 Model showing control and information levels.

> ... HOW DO EXISTING AND NEW MANUFACTURING FACILITIES FIND A COST-EFFECTIVE WAY TO GET CRITICAL PLANT FLOOR DATA UP TO HIGHER LEVEL INFORMATION SYSTEMS?

In many cases, HART instruments were installed simply because they could be configured and diagnosed easily with a HART handheld communicator. There are several reasons that the rest of the HART data often goes unused. One of them is the prohibitive cost of installing a plant-wide HART monitoring system and lack of familiarity with alternatives.

A simple and cost-effective solution for gathering HART information is to use a HART interface device. These HART interface devices make acquiring HART data a fairly simple proposition. This HART data can then be made available to the control system, asset manager or plant Ethernet backbone where it can then be shared with higher level systems or corporate WANs (Figure 2).

The data gathered from smart HART interfaces or HART-enabled hosts uses specifically defined universal and custom commands outlined within the HART specification. The HART specification has also had updates to the protocol, referred to as revisions, which have additional capabilities. Most HART devices operating in the field today utilise revision 5, 6 or 7. For the sake of this article we will limit the discussion to three universal commands routinely used with revisions 5, 6 and 7 to gather process and diagnostic data from field devices. Those three commands are command 3, 9 and 48.

HART revisions and compliance

HART field devices are compliant to a certain HART revision. Each new revision of HART offers different features and capabilities, but all field devices — regardless of revision — still support backwards compatibility with HART hosts and handheld communicators. It is important, however, to verify what revision of HART the field device contains to ensure that the HART interface device is using the appropriate commands and receiving the expected results.

HART Dynamic and Device Variables

HART devices can provide much additional data to the primary variable which is read on the 4–20 mA loop. In addition to diagnostic and status bits and bytes, there are two types of HART variables that you can retrieve from HART devices: Dynamic Variables and Device Variables.

All of these HART variables support IEEE 754 floating point values and are retrieved by HART hosts or interface devices (commonly referred to as gateways or multiplexers) from the field device by utilising HART Command 3 or Command 9.

Dynamic Variables consist of the primary variable (PV), secondary variable (SV), tertiary variable (TV) and quaternary variable (QV). These variables are most often obtained from field devices using HART Command 3. However, the HART specification also makes them available in later revisions as Device Variables (see below) so they could also be retrieved using Command 9.

Device Variables may also be used in more sophisticated or multi-variable field devices to provide additional process, diagnostic or status related information. Device Variables are only available in HART 6 and 7 revision field devices and are read using HART Command 9. Each field device can define up to 240 Device Variables (HART 7) numbered consecutively from 0 to 239. The Device Variable Codes (HART memory map location identifier) are unique

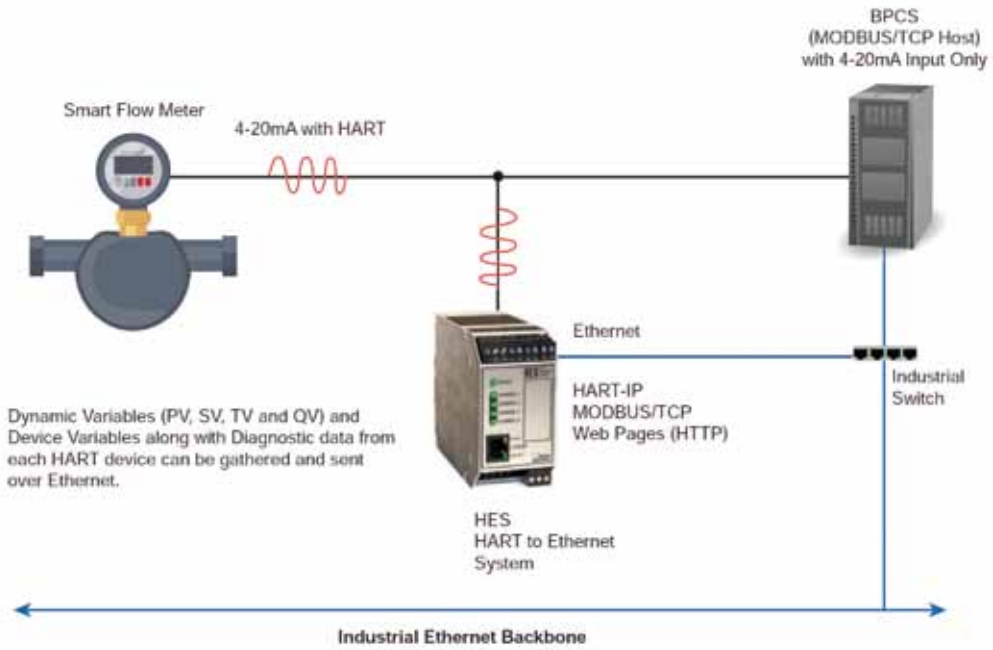


Figure 2: A HART interface device connects to the 4–20 mA process signal and extracts HART process and diagnostic variables and makes them accessible via Ethernet.

to each field device and may be defined in the operation manual or obtained from the manufacturer. In addition, the Device Variable Codes shown in Table 1 are defined in the HART specification.

Note that on some HART field devices the Dynamic Variables — PV, SV, TV and QV — can be assigned and represented as any of the Device Variables.

HART hosts and revisions

Most HART hosts and interface devices can be configured as a Primary or Secondary HART host and can poll between 16 and 64 field devices (dependent on revision). Since HART Commands 3, 9 and 48 that are used for the reading of Dynamic Variables, Device Variables and Additional Status (respectively) are universal commands, most hosts and interface devices support them. The HART revision of the field device will determine how it supports these commands. This brief summary of the three HART revisions outlines which commands each one supports:

HART 5 Devices support Command 3 only. Using Command 3, the host or interface device will read the Dynamic Variables and loop current from the field device.

HART 6 Devices support Command 3 and Command 9. Using Command 3, the host or interfacing device will read the Dynamic Variables and loop current from the field device as for HART 5. Using Command 9, the host or interfacing device can read up to four Device Variables from the field device. To use Command 9, the number of Device Variables and each Device Variable Code from the specific field device need to be specified.

HART 7 Devices supports the same Command 3 and Command 9 capabilities as HART 5 and HART 6 with the exception that Command 9 can be used to read up to eight Device Variables from the field device.

All HART revisions support the Additional Status Command 48. HART protocol allows the manufacturer to report as many as 25 bytes of diagnostic data from each HART field device. This plays a key role in performing the overall health and status of field devices.

For multivariable and more complex HART field devices, where data is required from more than eight Device Variables, the field device can be polled multiple times by a HART host or interfacing device with each poll specifying up to eight unique Device Variables.

HART interface options

There are several ways to interface with HART smart field devices in order to acquire the digital process and diagnostic information. They vary from HART-enabled 4–20 mA input cards, HART multiplexer systems, slide-in PLC gateway cards, custom-coded software interfaces for asset management and MES/ERP systems and standalone gateways that typically convert the HART data to some other proprietary or open industry format. Many PLC and control system cards that are installed in legacy systems don't have the capability to read the HART data that is superimposed on the 4–20 mA signal. However, each vendor usually has an alternative card that is more expensive or offers a full upgrade path for the CPU/controller and input cards that read HART.

Device Variable Code	Description
242	Battery voltage (optional)
243	Battery life (optional)
244	Percent range
245	Loop current
246	Primary Variable (PV)
247	Secondary Variable (SV)
248	Tertiary Variable (TV)
249	Quaternary Variable (QV)

Table 1: Additional device variable codes from the HART specification.

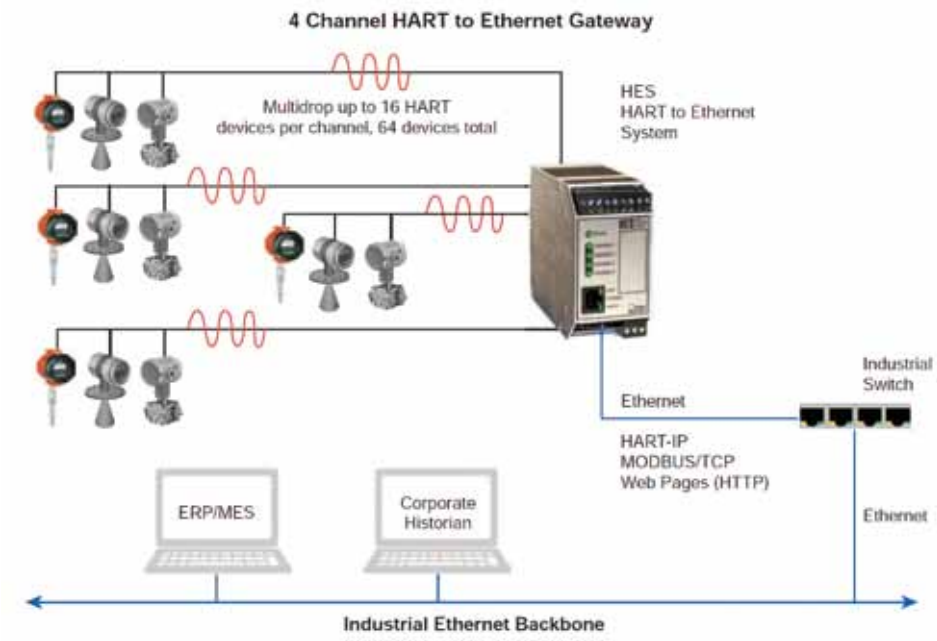


Figure 3: HART-to-Ethernet Gateways offer a quick and economical way of sharing critical HART data with higher level systems.

HART multiplexers are common and typically their interface is a custom RS-422, RS-485 or RS-232 serial connection and is custom configured for a particular vendor's hardware interface, asset management system or control system. Some PLC and control system companies offer slide-in chassis-type gateway cards that read the HART data and offer a proprietary backend communication connection to the system. Usually each of these options is quite costly and therefore often avoided.

Lastly are standalone HART gateways that most often provide the most economical pathway to extracting HART data from field devices, making the data readily available to higher level systems. These products usually offer one to four channels or ports that allow several HART devices to be multi-dropped for maximum data concentration (see Figure 3).

Employing the extracted HART data

Once HART data is extracted from field devices it is essential that the information is made available in an open and easy-to-interface manner. Now that Ethernet backbones (often further propagated by fibre and wireless modems for longer distances) have become the standard for in-plant communication links, it seems only reasonable that any interface device should include an Ethernet port. Likewise, these same devices should support open protocols that run seamlessly over Ethernet networks.

At a minimum, Ethernet devices should offer the viewing of its collected HART process and diagnostic data via web pages supported by any PC, tablet or mobile device. Efforts should be made by device vendors to lay the information out in a table format with easy-to-understand headers and address locations (for other supported protocols) so that additional hosts can be configured more easily.

Now that HART supports Ethernet with HART-IP, it seems only logical that any device supporting the HART protocol with an Ethernet port would support HART-IP. HART-IP devices typically allow for any HART field device data to be mapped to a number of Device Variable locations for reading by a HART-IP host.

One of the most installed and supported industrial Ethernet protocols is MODBUS/TCP, which makes implementation by both host computer and field device manufacturers quick and abundant due to the popularity of MODBUS.

Cybersecurity considerations

IIoT, cloud storage, big data and a host of other interconnecting methods and strategies has led to no shortage of production and efficiency increases. Unfortunately, these have not been, nor do they continue to be, realised without a cost and threat from cybersecurity issues. For these reasons it is more important than ever that Ethernet-based devices include safeguards within their products to ensure that network bandwidth is protected, viruses or malware cannot be loaded, unwanted access is not granted, unauthorised reconfiguration of device is not allowed and unauthorised writes to memory locations are not accepted by the device. In addition, physical security of such devices must be restricted to authorised personnel only and process values should be read only — unless the device is required to perform control. Post installation considerations should also be taken to assist on-site protection of site data and property. At a minimum, a two-layer protection scheme should be put in place for any Ethernet-enabled device that includes software and physical hardware restricted access.

Conclusion

Taking critical plant floor data from smart HART field devices and sharing it with higher level control and information systems within a manufacturing facility and further no longer has to be difficult or expensive. With the acceptance of Industrial Ethernet backbones and wireless networks, IIoT HART interface devices, open industry protocols and ease of programming provide a quick and seamless way to share process data with the entire corporate infrastructure.

Moore Industries Pacific Inc
www.miinet.com

WINDOWS-BASED PACs

The ICP DAS XP-9x71-WES7 series are WES7 (Windows Embedded Standard 7) based PACs that combine computing, I/O and operator interface into a single unit. They provide a suitable solution for integrating HMIs, data acquisition and control in an individual PAC.

All three systems are equipped with an Intel E3827 Atom CPU running at 1.91 GHz quad core processor. There are three distinct models in this series: the XP-9171-WES7 comes with one expansion slot, the XP-9371-WES7 comes with three expansion slots and the XP-9771-WES7 comes with seven expansion slots.

All models in this series have a variety of I/O including dual Gigabit Ethernet, VGA, USB port, RS232 and RS485 interface. Local I/O slots are available to use with ICP's I-9K and I-97K series I/O modules, and remote I/O expansions are available to support further Ethernet I/O modules and RS485 I/O modules.

All models feature redundant power inputs and an operating temperature range of -25 to +75°C.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au

MACHINE VISION SYSTEMS

Advantech's AIIS product series aimed at vision inspection applications is suitable for food and beverage industry needs. Powered by a 6th Gen Intel Core i/Celeron SoC processor with rich I/O and flexible extendibility, the AIIS series enhances operations by providing machine vision performance, state-of-the-art computing and flexible expandability. The AIIS series products also support PoE/USB 3.0 camera interfaces equipped with a dedicated controller for maximising the image acquisition bandwidth and preventing frame losses.

Categorised into two design architectures — ruggedised (AIIS-5410P and AIIS-1200P/U) and high performance (AIIS-3400P/U and AIIS-3410P/U) — AIIS machine vision systems are suitable for various machine automation operations, including automated optical inspection (AOI), vision guidance robotics (VGR) and alignment inspection applications. Additionally, Advantech's machine vision systems have undergone tests for compatibility with its Tier 1 camera partners, Basler and Point Grey, to ensure convenient integration and implementation.

To satisfy demands for ruggedised machine vision systems, the palm-sized AIIS-1200P/U and fanless AIIS-5410P models feature durable architecture, protection from dust, as well as a compact space-saving design. Additionally, the wide operating temperature (-20~60°C) and input power (9~36 VDC) range of AIIS-5410P and AIIS-1200P/U make them suitable for operation in harsh industrial environments.

The AIIS-3400P/U and AIIS-3410P/U models are equipped with a 6th Gen Intel Core i processor and 4-channel GigE PoE/USB 3.0 camera interface for high-performance machine vision systems. In addition to delivering high computing power, AIIS-3410P/U can be integrated with advanced expansion modules (such as iDoor) for installing extra add-on cards to support diverse applications.

Advantech Australia Pty Ltd
www.advantech.net.au

ETHERNET SWITCH

Belden has released the Hirschmann BOBCAT switch, a managed compact switch that is also an appliance providing advanced security and real-time communication through time-sensitive networking (TSN) technology on all of its ports to standardise Ethernet usage in any application.

With the Hirschmann BOBCAT switch, industrial facilities can simultaneously support multiple services on one network through TSN technology; limit downtime and ensure network protection through advanced security features; and prepare for future network growth with increased bandwidth and speed capabilities.

The Hirschmann BOBCAT switch is put forward as a solution for classic automation applications that require real-time communication, low latency and the simultaneous synchronisation of data and information to control operations. This switch appliance is relevant to many industrial markets, including automotive, manufacturing, machine building, water management, security, oil and gas, power and energy, transportation and consumer packaged goods.

Belden Australia Pty Ltd
www.belden.com

TWIN SCREW CONVEYOR WITH COMMON HOPPER

The Flexicon Twin BEV-CON flexible screw conveyor system with a common hopper and mobile base is supplied ready to plug in and run, and the self-contained system can fill two vessels with the same material simultaneously. Mounted on a frame with locking castors for in-plant mobility, it can be utilised in multiple locations and rolled to a washdown booth.

The hopper is equipped with dual discharge adapters, each of which charges a BEV-CON flexible screw engineered to move free- and non-free-flowing bulk materials that pack, cake, smear, fluidise, compress or are otherwise problematic to convey. The screws are the only moving parts contacting material and are driven beyond the point at which material is discharged, eliminating wear and contamination related to product contacting seals and bearings.

Discharge housings of the conveyors are supported by dual booms cantilevered from the mobile base, allowing discharge of material into processing equipment or storage vessels up to 3.5 m above the plant floor.

The hopper has a capacity of 550 litres and is designed with divergent angles causing non-free-flowing material to topple into the conveyor charging adapters. The unit is constructed of 316 stainless steel and features sanitary quick-release clean out caps, quick-disconnect discharge box access covers, washdown motors and a stainless control panel with stainless conduit and liquid-tight compression fittings that permit washdown during changeovers and/or when conveying of corrosive materials. HMI controls allow manual and automatic start/stop and speed adjustment.

Flexicon Corporation (Aust) Pty Ltd

www.flexicon.com.au

EMBEDDED COMPUTER

The RE1014 is part of a range of rugged industrial computing products that have been engineered and tested to withstand challenging environments, which meet and exceed military and industrial standards, providing the latest COTS technology and benefits, such as cost, availability, upgradability and flexibility.

Field-tested to withstand shock and vibration, extended temperature ranges, harsh elements and harsh environments, Crystal Group Embedded Computer Systems follow the Intel Roadmap to ensure access to the latest, powerful Intel chipsets and processors.

The RE1014 embedded computer has a compact construction with a footprint of 6.096 x 41.91 x 27.94 cm, and comes in panel or rackmount options with power dual and Quad Core i7 CPU options, with up to four SSD hard drives. Billet construction is from milled strain-hardened 6061T651 structural aircraft aluminium.

Metromatics Pty Ltd

www.metromatics.com.au

PORTABLE PRESSURE CALIBRATOR

WIKA has expanded its range of portable calibrators to include an instrument with an integrated electric pressure pump. The model CPH7650 pressure calibrator is also multifunctional in that it fulfils test tasks for the measurement of voltage and current.

As a reference, the CPH7650 uses the model CPT6000 sensor with an accuracy of 0.025% FS. The sensor is exchangeable, which increases the versatility of the instrument and optimises recalibration. With the electric pump, users can generate a test pressure of -0.85 to +20 bar on site, and control it precisely at the touch of a button. The pump power is continuously adjustable.

Like the CPH7000 handheld model (with mechanical pressure pump), the CPH7650 has an electrical module for measuring voltage (0–30 VDC) and current (4–20 mA) as well as supplying power to test items. All pressure and electrical values are simultaneously shown in the display and read via a USB interface.

WIKA Australia
www.wika.com.au

STAINLESS STEEL FORK SENSORS

Balluff has released the F Series stainless steel fork sensors with resistance to aggressive cleaning agents, chemicals, coolants and other media. The series provides a viable solution for demanding environments in a wide variety of applications, including hygienic.

Available in 50 and 80 mm widths, the sensors feature normally open and normally closed outputs for easy integration into control systems. Multiple light sources — red light for easy set-up or infrared light for highly contaminated or environments with water or mist in the air — enable the sensor to be used in a wide range of applications. The pigtail with M12 connector and integral LEDs for output function and power-on indication aid in fast and easy troubleshooting. There is no alignment required with a self-contained through-beam sensor.

PMMA optic lenses and 316L stainless steel housing make the sensors suitable for food and beverage applications, and the IP67/IP69K housing offers washdown resistance.

Versions are available for transparent detection and liquid detection, and analog outputs for edge positioning are also included in the range.

Balluff Pty Ltd
www.balluff.com.au

LIGHT CURTAINS WITH BODY PROTECTION

The Pilz PSENopt II safety light curtains are now available as versions with body protection. With a protected field height of up to 1500 mm, the light curtains are now suitable for body protection up to the highest safety category PLe.

With a shock resistance of 50g, the product is robust with regard to shocks, vibrations and collisions. This ensures the availability of the machine even in rugged industrial environments. The light curtains with body resolution are suitable for ranges of up to 55 m and safeguard the access to robot cells, packaging machines or presses, for example.

Users are free to choose the physical arrangement of the light curtains. Due to the built-in coding, the light curtains do not interfere with each other, even in close proximity. This is particularly true if the transmitter of the first pair of light curtains emits beams in the direction of the receiver of the second pair of light curtains. In this case, the light curtain pairs can be configured with different beam codes. The coding is integrated into all PSENopt II light curtains.

In order to secure several sides of a hazardous area, the light curtains can be combined with the PIlz PSENopt II mirror columns. Up to three sides of a hazardous area can be monitored with one pair of light curtains and two mirror columns.

Pilz Australia Industrial Automation LP
www.pilz.com.au

MULTIPURPOSE SIGNAL CONDITIONER AND GENERATOR

The Dart Controls DP10 is a panel-mounted, multipurpose signal conditioner and signal generator that allows the operator easy access to required system adjustments. The product has many uses in machine control applications and may be used in OEM equipment designs, plant operation or laboratory applications.

Most other signal conditioners are DIN rail-mounted types which need to reside inside a panel and are designed to be set up once. Many applications however require frequent adjustments to meet application needs, and the workaround is to have a potentiometer wired on the front panel for regulation.

The DP10's front panel design addresses this by making output adjustment easily accessible via convenient up and down push-buttons with a large, easy-to-read LED display. The device is configurable for several modes of operation: signal conditioning to scale or attenuate incoming process signals (analog voltage or current); signal conversion of incoming signals to another format (voltage to current or current to voltage); and analog signal generation (voltage or current).

The signal generator mode is especially useful for ECM/brushless DC motor applications where the motor includes integrated commutation electronics. These applications typically require an analog voltage input to change the motor speed. Set up as a voltage generator, the product not only provides a repeatable setting, its display can also be configured to any engineering units meaningful to the application, such as L/min for pump applications or m/min for conveyors applications.

Motion Technologies Pty Ltd

www.motiontech.com.au

INVERT-MOUNT SCARA ROBOT

ABB has announced the invert-mounted IRB 910INV SCARA robot, the latest addition to its SCARA range. By mounting the IRB 910INV on the ceiling, manufacturers can increase the space efficiency and flexibility of each cell and do more complex tasks even in confined spaces. The ceiling mounting also allows the IRB 910INV to collaborate with other robots and machines simultaneously in the same footprint, further boosting productivity.

The IRB 910INV has the same motion control system as the original IRB 910 family, for repeatable point-to-point accuracy in picking and placing, assembly, and testing. This includes electronics small parts assembly tasks such as screwdriving, inserting or mounting components, and automated inspections solutions for quality control.

The IRB 910INV will be certified for cleanroom applications in the future. The compact and lightweight IRB 910INV is available in two variants — one has a maximum payload of 3 kg with 350 mm reach and one has a maximum of 6 kg payload with 550 mm reach. ABB's SCARA robots are suitable for applications that require fast yet highly accurate point-to-point movements, such as electronics assembly, laboratory automation and dispensing.

ABB Australia Pty Ltd

www.abbaustralia.com.au

Winery increases productivity with bottling line upgrades

Yalumba winery redesigned its bottling plant to include new drives for the bottle-conveyor system, air conditioning and hospital-grade air filtration. After three years, this has increased productivity by 50%, reduced energy consumption and created a safer work environment.

Jesse Auricht, Engineering Manager at Yalumba, said that typically half the cost of energy is based on network charges, so it is important to avoid any spikes in consumption as the wine bottles are filled, capped, labelled and packed in the bottling plant. "In the energy market, 50% of your cost can be dictated by a half-hour event," he said. "If you hit that peak once, depending on the time of day, you'll see an ongoing energy cost increase."

SEW-EURODRIVE MOVIGEAR mechatronic drive units were used in the upgrade to keep the conveyor lines and bottles moving. The MOVIGEAR units are designed to minimise the use of energy and can reduce energy costs by up to 50%. Auricht said these energy savings were beneficial for both the environment and the commercial bottom line.

Starting with their own design concepts, Yulamba issued a tender for detailed design and implementation of the project and awarded it to Foodmach, an Australian provider of machinery design, manufacturing and control services.

Foodmach designed and installed the new conveyor and line control system that combines old and new equipment. Line 1 had the original bottling line with new controls, a new conveyor and new palletisers, and Line 2 was a new line with a new de-palletiser, filler and packer. The upgrade not only saved costs by reducing energy consumption but also created a safer work environment — as forklifts no longer entered the bottling operator area — as well as solving a labelling challenge and reducing noise.

One of the problems for wine bottlers is condensation build-up in the labelling area due to the prevailing dewpoint temperature. If the wine temperature is lower than the dewpoint, it is likely that the labels won't adhere properly. Auricht and his team introduced an enclosed air-conditioned room around the bottling area set to the correct dewpoint, and a positively pressured, hospital-grade filtration system to maintain clean conditions.

However, the fully enclosed air-conditioned room caused additional noise. Auricht explained: "By effectively putting it in a big esky, all the noise in the bottling area was amplified."

Line 2 runs at 12,000 bph, and glass bottles banging into each other at that rate can be noisy and dangerous. To address these issues, Trevor Burgemeister, Process Control Technician at Yalumba, said the system detects when bottles are about to collide and sets a maximum collision speed.

Noise can be reduced by creating a pressureless line, in terms of the accumulation of bottles on the conveyor system. If a processing machine for filling, capping or labelling is operating at a slower speed than bottles are being delivered, the bottles bump into each other causing noise. Auricht said that if the conveyor keeps running when this happens, the pressure continues to build, causing energy wastage, inefficiency and noise, along with wear and tear on all the conveyors.

On Line 1, the flow is between 5000 and 9000 bph. While the aim is zero pressure on the conveyors, the processing machines require a degree of pressure to function correctly. To achieve this, the conveyors on this line run at set speeds, while the line's process machines vary their speed as necessary to maintain head pressure of between five and eight bottles.

In the Foodmach line control system, speeds are controlled by software programmed according to a 'recipe' that varies for each production variety. The recipe specifies which processing machines are required for the product and also their operating parameters. Recipe data — speed, diameter of bottle, gap between bottles — is communicated from the PLC to the SEW-EURODRIVE units. These are calibrated so that the speed of the conveyor is set correctly.

If further calibration is required during production or if pressure build-up does begin to occur at one of the process machines, the conveyors are progressively halted to correct the situation. At the same time, the machine will be instructed to operate faster, so that the flow evens out again.

Correct flow is set up at the start of the operation on the Foodmach depalletisers, where thousands of bph are fed into the two bottling conveyor lines. At this point, several 'mini' conveyor lines, running side by side and at different speeds, cause bunched-up groups of bottles to be fed into a single line. Complex programming, communicated to each MOVIGEAR drive in the system, makes the operation look easy.

Auricht concluded it was the right decision to use the high-efficiency, low-energy drives, stating, "This was probably one of our most successful projects undertaken — both in time frames and outcomes."

A longer version of this story can be found online at https://bit.ly/2RnVSbJ

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AS I SEE IT

DIGITAL TWINS IN THE FOURTH INDUSTRIAL REVOLUTION

Australia is set to embark on the Fourth Industrial Revolution, otherwise known as Industry 4.0; a journey to remain competitive and relevant in the global world of manufacturing.

Imagine a world where everyone can design their own product that can be produced in any modern factory around the world. All this is made possible by the concept of digital twins. Researchers Bolton, McColl-Kennedy, Cheung, Gallen, Orsingher, Witell and Zaki[1] defined a digital twin as "a dynamic virtual representation of a physical object or system across its life-cycle, using real-time data to enable understanding, learning and reasoning". Technology such as digital twins could offer the next frontier of productivity and economic uplift for Australia. Digitisation could contribute $140 billion to $250 billion to Australia's GDP on an annual basis by 2025, according to a report published by McKinsey and Company.[2] By 2025, almost 80% of the industrial production line in Australia will have digital twin running in the cloud.

The advent of social media platforms such as Facebook, Twitter and LinkedIn has provided a sneak preview of digital identities in human life by new means of interaction, communication and collaboration. Extending the idea of digital identity to machines with sensors and automation leads into remote, self-configuring manufacturing lines based on machine learning algorithms. To understand the impact of digital twins, let's consider an example where a smart three-dimensional vision sensor on a food packaging line is identifying a potential quality defect on the line. While the 3D sensor is detecting contamination of a product, its digital pair in the cloud is analysing all of the data from its physical partner, collaborating with other sensors and running predictive algorithms. The physical sensor is able to mitigate the real-time quality defects, while its digital partner is able to perform predictive analysis, and simultaneously informs its physical counterpart of possible failures in the future. The cooperation of physical and digital sensor twins makes the packaging line more robust and better suited to identify and mitigate quality issues in real time and in the future.

Digital twins will make manufacturing agile, dynamic and profitable, and the benefits of digital twins will be felt across the length and breadth of Australian manufacturing. Larger production houses will move towards ZERO: zero downtime, zero quality issues and zero safety incidents. The smaller manufacturing plants will become agile and able to make varieties of new product range driving towards ONE: one unique product designed and manufactured for one customer.

Smart sensors and cloud technology will play a key role in providing the digital identity for machines. Early adoption of digital twins will provide a significant first-mover advantage to Australian companies to compete globally, and should be on top of the agenda for Australian manufacturing CEOs.

In order to start the digital twin journey, it is best to start small by identifying the right technology partners, and look for business value beyond the standard financial calculations. The benefits of digital twins often come from outside the standard operating procedure, resulting in transformation capabilities, and will prepare Australian industry for the fourth industrial revolution.

References

1. Bolton R et al. 2018, *Customer experience challenges: bringing together digital, physical and social*, Emerald Publishing.
2. Blackburn S, Freeland M and Gärtner D 2017, *Digital Australia: Seizing the opportunity from the fourth industrial revolution*, McKinsey & Company.

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Audited Media Association of Australia
cab

March 2018 total CAB audited circulation (Aust + NZ)
4,754 readers (80% personally requested)

Contact the editor

Printed and bound by SOS Print+Media Group
Print Post Approved PP100007403
ISSN No. 0819-5447

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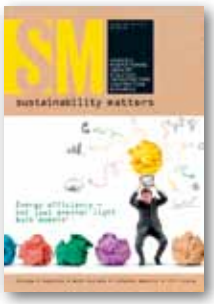

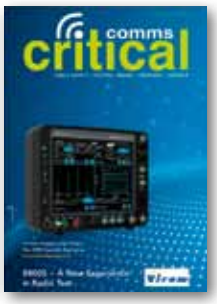

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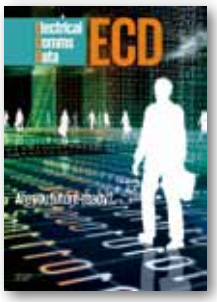

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