PROCESS
TECHNOLOGY
AUTOMATION + CONTROL + INSTRUMENTATION

STRAIGHT TO THE CLOUD

Data Digitization made Simple with a Universal IIoT
Solution for Machines, Systems and Buildings

WAGO

0819

PROCESS TECHNOLOGY
AUGUST 2019

CONTENTS

ON THE COVER

Do you want to use your machines, systems and building data for monitoring and analysis in the cloud?

In addition to WAGO IoT hardware platforms, PFC100/PFC200 controllers and TP600 control panels, WAGO is expanding its digital performance portfolio with the WAGO Cloud Data Control capability — a forward-looking method for enabling equipment and systems in a chemical facility to function more efficiently.

Take advantage of our open solutions for an easy and secure connection. In a few steps, you have a site-independent overview of all the relevant information, can identify opportunities for optimisation and initiate changes directly. You alone decide which cloud system to send your data to via MQTT — for example, Microsoft Azure, Amazon Web Services, IBM Cloud or SAP Cloud. The ability to view process data from anywhere in the world — it sounds practical, but is it secure? Cybersecurity is an important topic at WAGO. WAGO's IoT platforms comply with the highest security standards, as they both encrypt data via on-board SSL/TLS 1.2 security protocols, and also securely transmit data to higher-level systems via VPN tunnels. They are characterised by a cross-platform real-time Linux operating system, which has been available for a long time as an open source operating system that can be scaled and updated — as well as supporting tools such as rsync, allowing them to be used as secure gateways.

WAGO Pty Ltd
www.wago.com.au

WAGO

EVOLVING FROM SAFETY RELAYS

TO SAFETY PLCs

As machine tools and process operations become more complex, the shortcomings of traditional safety relays become more obvious.

Consider the LED light bulb. Technology advancements have greatly improved light quality, extended life and reduced the price of these high-efficiency bulbs. Still, the fact that they cost more than twice as much as older technology has deterred most people from making the transition. That's unfortunate, because average annual energy savings in a typical home amount to approximately $100, providing one-year ROI. More importantly, there is a tenfold savings over their typical 10-year life.

The situation is similar with safety control systems. Manufacturers hesitate to incorporate what they believe to be the more expensive technology represented in safety PLCs, despite guaranteed and measurable lifecycle savings. Beyond the cost savings, this technology also dramatically speeds troubleshooting, resulting in reduced downtime.

As safety control systems become more common in machine and industrial environments and as the automation tasks get more complicated, more solutions are becoming available. Choosing the right one is crucial.

Traditional safety control solutions

Safety relays

These devices have been used to control plants and machinery since the early days of industrial control technology, and continue to be widely used today. In the event of a hazardous situation, the actuator is simply isolated from the energy supply. Simplicity is their strong point.

Long-time car mechanics fondly speak of the days when engines were so simple that much routine maintenance could be performed with only a simple set of tools. Plant maintenance team members also appreciate the straightforward simplicity of safety relays and contactors.

Not surprisingly, simplicity is also their primary shortcoming. To return to the car analogy, those earlier engines truly were easier to work on, but they required far more work to keep them running well. They also lacked many performance and reliability benefits that are now standard in every new car or truck. In the same way, relays don't always have the flexibility to meet all requirements of the modern factory.

The nature of how safety relay-based systems are wired means modifications to the system are challenging, requiring significant engineering and wiring time. There are far more motors, switches and other control devices that must be accommodated. Each device may require a safety relay that must be individually hardwired, creating serious troubleshooting issues as technicians attempt to identify and repair faults or issues armed only with their multimeters.

One more similarity with older cars is there were a number of mechanical parts — spark plugs, rotors, belts and others — that were the victim of routine wear and required maintenance at relatively short intervals. Safety relays also suffer from mechanical wear, requiring maintenance and increased downtime due to faults.

The nature of how safety relay-based systems are wired also means modifications to the system are challenging, requiring significant engineering and wiring time.

It's also important to note these types of protection systems can simply be bypassed in the event of a malfunction, disabling the protective function.

Single-function safety relays

Single-function safety relays ensure proper working of the safety function, keeping both people and equipment well protected.

When you look only at the cost of safety relays, they can be a low-cost solution in limited applications, typically controlling three or fewer safety functions or devices. They are simple to operate and have a clear, predefined structure with fixed functionality. Safety relays can achieve up to PL e as per ISO 13849-1 or SIL 3 as per IEC 61508.

Typical applications for single-function safety relays include:
• stopping movement in a controlled and safe manner
• monitoring the position of movable guards
• interrupting a closing movement during access
• providing an emergency off/stop.

However, as the safety systems become more complex, the shortcomings of a safety relay solution add up, including:
• complex wiring, with direct hardware connections between each device;
• difficult, and therefore time-consuming, troubleshooting — because faults must be manually traced through sometimes complex wiring layouts;
• a logistical nightmare with significant engineering for system modifications or upgrades;
• tedious functionality changes because of each relay's defined purpose or function;
• inability to operate in mixed modes (safety and standard);
• exponential growth of required number of safety relays if zone control, muting or additional safety functionality is required.

Despite their limitations, safety relays are widely used, are commonly built into new equipment and could be the right choice in simple applications.

Multifunction safety relays

This solution represents a configurable device with a few more inputs and outputs. As a rule of thumb, a programmable safety relay can control between two or three safety functions, representing an incremental flexibility improvement over a single-function safety relay. Additionally, they have a smaller footprint that enables more compact control panels or cabinets and will reduce and simplify wiring. That simplicity, though, is dependent on the safety functionality required. If zoning or muting is required, based on the application risk assessment, the simplicity benefit greatly diminishes.

Multifunction safety relays are available in several styles and configurations, including, but not limited to, dual-channel monitoring with or without time delay, two-hand control, light-curtain monitoring, speed monitoring, motor-standstill monitoring and relay extension to increase the number of output contacts.

Such relays offer many I/O configurations. A simple base unit can handle a variety of inputs, and expandable input and output modules can be added as needed. Some multifunction safety relays can be programmed, providing some flexibility. Most, however, require no software for configuration or operation. That makes typical set-up and maintenance very straightforward and simple but offers no flexibility.

Multifunction safety relays are often a choice when single-function relays can't meet the safety functionality required for the application. Other situations include systems with more complex requirements than single-function relays can handle but that are too limited for applications such as machine tools or robots with many I/O points or a high number of safety-related tasks.

Multifunction safety relays are a good choice for common applications with up to three safety functions such as emergency stop, safety door or light-curtain monitoring using just one device. However, multifunction safety relays still share some of its most significant shortcomings with the single-function safety relay.

Today's safety PLCs

As machine tools, automation systems and process facilities have grown increasingly complex, so have the demands on safety control systems. The safety PLC, sometimes also called a safety controller or failsafe PLC, is the most capable and cost-efficient device for today's more complex control and safety systems. These PLCs meet the required safety standards, able to achieve up to PL e as per ISO 13849-1 or SIL 3 as per IEC 61508.

Safety PLCs are available that offer a distinct advantage in comparison to safety relays; they provide both standard and safety functionality in a single controller. The fact that both standard and safety-related programs can be executed via a single controller simplifies the system, decreases design time and considerably reduces the panel size. In particular:
• changes can be easily done via programming;
• TÜV-certified safety function libraries are available, significantly reducing the design time and increasing flexibility;
• PLCs meet the required safety standards, able to achieve up to PL e as per ISO 13849-1 or SIL 3 as per IEC 61508.

Using safe ladder logic as one means of safety programming, safety functionality changes can be easily done via programming rather than device replacement and related rewiring. Modifying an application is as easy as entering the safety password for access to the safety program, updating the program and then loading the updated program into the safety controller. OEMs can create custom safety libraries for safety functionalities that are commonly used in their solutions. These programs can be password protected to prevent users from circumventing safety functionality. This ensures the integrity of the safety systems and the personal safety of the operators. TÜV-certified, safety function libraries are available, significantly reducing the design time and increasing flexibility.

Safety PLCs from some suppliers also provide scalability, due to the ability to easily add PLCs to a system when upgrading to a

End users also benefit greatly from this advantage of flexibility when modifying or expanding their existing system, or when combining multiple machines.

When designing your safety system you should consider:
• number of safety functions
• system design time
• potential for system modification or expansion
• downtime tolerance
• overall cost: initial and ongoing.

Downtime tolerance

Operators of some production or process operations can tolerate downtime better than others. Taking a machine offline for several hours to troubleshoot or modify the control system in these applications doesn't present a critical issue.

In most cases, though, downtime must be avoided at all costs. In these situations, the built-in, advanced diagnostics provided by safety PLCs can be incredibly valuable. Maintenance personnel and operators are instantly guided to the exact location of the fault, enabling rapid restoration and return to productive operations. And the programmability enables much shorter downtimes for system maintenance or modification.

System modification or expansion

Some safety-control systems are relatively static. Once designed and installed, it's highly unlikely they will be touched aside from routine maintenance. Other systems, though, are likely to be modified or expanded to incorporate process changes or increased production demands. In these more dynamic applications, the ability to modify functionality solely via reprogramming the device software makes the case for safety PLCs very strong.

Cost considerations

When comparing technologies, cost is always a consideration. The ability of a safety PLC to perform the task of multiple, single-function safety relays creates a straightforward cost-benefit analysis. In a basic application incorporating two to three safety relays with the standard PLC, the cost of the safety PLC can be initially about 30% less. Additional savings are realised over time because of the increased flexibility and simplicity of the safety PLC. As the number of I/Os increases, both the initial and ongoing savings multiply.

The case for safety PLCs

Many OEMs, panel builders and end users continue to appropriately use older safety relay technology because it provides all the needed functions in a simple, affordable and proven device. It's likely that many more safety relay users, however, continue to use this technology simply because they are comfortable with it or are unaware of the reliability and cost benefits of safety PLCs.

In applications where more than three safety functions are required, the safety PLC almost always represents a smarter choice. The ability to rely on a single controller that combines control and safety functions can be part of a standard or failsafe network. Safety PLCs can replace multiple separate relays performing various functions, which reduces component costs. Built-in diagnostic tools reduce the time required to troubleshoot, repair, modify or upgrade safety PLC-based systems, providing additional ongoing savings and benefits. And safety PLCs can enable wireless device communications.

OEMs and panel builders interested in providing their customers with more-flexible, lower-cost products would benefit by including safety PLCs in their automation solutions.

Siemens Ltd
www.siemens.com.au

> MANY OEMS, PANEL BUILDERS AND END USERS CONTINUE TO APPROPRIATELY USE OLDER SAFETY RELAY TECHNOLOGY BECAUSE IT PROVIDES ALL THE NEEDED FUNCTIONS IN A SIMPLE, AFFORDABLE AND PROVEN DEVICE.

larger-capacity device. The existing program is easily transferable to the new safety PLC, where it can be modified as necessary for the expanded application.

The embedded diagnostics provide instant identification of faults in the safety and standard circuits. Technicians can rely on the indicator lights or information provided via the HMI or web server to immediately be directed to the location of the fault, enabling fast repair and rapid return to production.

Make an informed decision regarding the right safety solution

The cost and productivity advantage in many, and probably most, applications of safety PLCs over older technology is clear and measurable. OEMs and panel builders should consider a number of factors when exploring the potential benefits in their applications.

One of the first things to consider is the number of I/O points required. In applications with more than three safety functions, the safety PLC is almost always the right choice. This number might be smaller or larger depending on the application but remains a good rule of thumb. The simple economy of a single, multifunction device rather than a device for each I/O makes the PLC a clear choice in these applications.

While less quantifiable, there are several other device traits supporting a transition to safety PLCs.

Design freedom

Panel builders and OEMs facing pressures to bring products to market more quickly, or to deliver products to customers within a tight time frame, can benefit from shortened system design times. Product engineers are less constrained by selection of parameters because of the flexibility of the safety PLC. This technology offers numerous possibilities to meet safety functionality requirements across a multitude of applications. Rather than sizing components based on specific parameters, they can specify that a safety PLC be able to operate within a wide range of application parameters.

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

PROFIBUS TESTER

The Softing Profibus Tester 5 is an all-in-one tool for testing bus physics, bus communication and cabling.

TechRentals

https://bit.ly/2YzWd2A

SONIC IMAGER

The Fluke ii900 Sonic Industrial Imager is designed to quickly and accurately locate air, gas and vacuum leaks in compressed air systems.

Fluke Australia Pty Ltd

https://bit.ly/2KahKpu

EDGE AI AND MACHINE VISION PC

The AAEON BOXER-6841M Series has been built for both edge AI and machine vision applications.

Interworld Electronics and Computer Industries

https://bit.ly/2GCuPah

SIGNALLING DEVICES

Pepperl+Fuchs offers a comprehensive range of high-performance signalling products suitable for a wide range of industries and applications.

Pepperl+Fuchs (Aust) Pty Ltd

https://bit.ly/2GB1DjT

Getting smart with water quality monitoring

Located 350 km north of Sydney, Kempsey Shire Council uses monitoring stations to ensure water quality standards are being maintained. One such legacy system was equipped with sensors for measuring pH and chlorine. The sensors used reagents to establish measurements; however, it was becoming unreliable and required time-consuming upkeep.

Chlorine sensors are traditionally a high-maintenance monitoring solution, generally requiring a constant routine of replacing parts (membrane caps), upkeep of electrolytes, increased labour and equipment costs. Additionally, the presence of chloramines, either intentional or unintentional, can also have a strong influence on readings, creating errors in free chlorine analysis.

Of greatest concern for the council was the fall-off in accuracy and the need for frequent recalibration.

As a result, the council decided to update its time-consuming water quality monitoring with a smarter 'plug-and-play' solution for its water and wastewater services.

The council compared a number of alternative systems and decided on the Bürkert Online Analysis System. The compact modular design has an integrated HMI display; I/O modules; a range of available sensor cubes including pH, chlorine (Cl_2) or chlorine dioxide (ClO_2), conductivity, oxidation reduction potential (ORP/redox) and turbidity; as well as a cleaning system. All of which can be wall or panel mounted, or built into an existing cabinet, which is the solution the council used.

The solution reduced the maintenance requirement, diminishing drift and the need to recalibrate — which were all regarded by the council as essential advantages for its application. The zero effects from chloramines was an added bonus.

Bürkert's Cl_2 and ClO_2 sensor cubes contain a high-precision membrane-covered amperometric sensor, but the difference is they are based on MEMS (microelectromechanical systems) technology. This microchip allows for precision measurements, with little to no drift as its readings are not influenced by chloramines. These cubes only require small samples for measurements and have a fast response time (t90) of less than 30 s.

Once installed, the individual sensor modules or 'cubes' are essentially plug-and-play. It's a simple process to create alarm parameters for each sensor cube, ensuring that any anomaly in the process is identified quickly.

"We are very pleased with the new system," said Greg Morrow, Instrument Technician at the Kempsey Shire Council's South West Rocks plant. "Since it was installed, there has been no need to recalibrate the chlorine or the pH sensor cubes. Their performance has been verified using portable laboratory equipment (a DPD1 photometer reference test) for free chlorine. Furthermore, the sensors' response time has been virtually instant, far exceeding the performance of the alternatives we looked at."

Bürkert's Online Analysis System communicates with existing control protocols and with personnel, both on and off site. Any deviation from the set criteria is notified immediately. This integration helps reduce time between a deviation from process parameters and remedial action required to correct the situation.

"After 10 months in operation, the accuracy has been excellent; there's no drift in either the chlorine or the pH measurements," said Tristan Nowland, Instrument Technician. "Additionally, the amperometric chlorine MEMS sensor chip isn't affected by chloramines, providing true chlorine analysis. Another major benefit is the cubes are not reagent-based, and so the maintenance requirement for this system is greatly reduced."

The performance and ease of installation of these systems has prompted the council to install the Bürkert Online Analysis System at several other reservoirs and water treatment plants.

These systems are designed to provide all the analysis data required for most applications — as well as acting as a data logger to provide necessary evidence for maintaining water quality standards.

Burkert Fluid Control Systems
www.burkert.com.au

Driving paper production at Visy's pulp and paper mill

Visy is a global leader in the packaging, paper and resource recovery industries, providing high-quality, innovative and sustainable packaging products and solutions. The company has more than 120 sites across Australia, New Zealand, Thailand and Vietnam, and trading offices across Asia, Europe and the USA.

Visy's Pulp and Paper mill in Tumut, New South Wales, is the largest integrated pulp and paper mill in Australia and produces high-quality kraft paper for both domestic and international markets. Two million tonnes of plantation-sourced wood is processed at Tumut each year — the site is one of Australia's largest exporters of containerised manufactured goods and hosts a renewable energy generation facility, producing half of the plant's own energy needs. The plant also operates a closed loop water system, where all mill wastewater is re-used for farm irrigation.

In financial year 2017–18, paper machines 9 (PM9) and 10 (PM10) at VISY Tumut produced over 681,000 tonnes of unbleached kraft paper.

As a company that is always looking towards the future, Visy took a proactive approach in upgrading legacy drive control equipment on the PM9 winder downstream of the paper machine to avoid any potential for downtime while also futureproofing the Tumut plant.

Visy contracted Rockwell Automation to conduct the planning and design stage of the project.

"The first step of the project was to perform a FEED study," said Matthew Barrett, Senior Project Engineer at Rockwell Automation. "As part of this process we worked closely with Visy to gain a detailed understanding of the engineering requirements for the winder upgrade." Upon completion of the FEED, a detailed proposal was prepared and the upgrade commenced.

Paper Machine 9 produces a 'jumbo roll' that is 3.2 m in diameter by approximately 5.5 m wide. This jumbo roll then moves into the winder, which cuts the paper into smaller rolls to suit customer requirements and allows for easy shipping. Each roll coming off the winder is wound with a specific tension profile, to avoid collapse or telescoping. The operational requirements of the drive system are very demanding — it must be able to rapidly accelerate and decelerate the heavy rolls and maintain web tension and production speed of up to 2500 metres/minute while the diameters of the rolls are changing.

To achieve consistent roll quality, it is essential to keep the whole winder system stable. Settings on the drives and control system must be finely tuned to ensure that tension fluctuations do not affect the roll structure. To achieve this, coordination of the drives on the winder was crucial. "If all the drives are not coordinated, the winder is unable to work effectively," Barrett explained.

The Allen-Bradley PowerFlex 755TM drive system was decided on as the best choice for this application. The coordinated drive systems reduce energy consumption as they are able to share energy on the bus — some drives are motoring while others are regenerating. With a smaller footprint than the legacy system, the drives were also able to reduce the space required to house the system.

Control requirements were provided by Allen-Bradley GuardLogix controllers and all safety devices were upgraded to Cat3, Pld. Further safety upgrades are easily achievable due to the GuardLogix system being installed. EtherNet/IP provided secure communications between the controller and drives.

HMI requirements for the winder were delivered by FactoryTalk View software. The WindPro solution was engineered by Rockwell Automation to help paper manufacturers monitor and control paper roll density and help prevent quality defects, such as wrinkles and tears. It provides real-time winder control and monitoring including recipe management, roll data, general operator interface to the winder, faults, alarms and trending.

"This was one of the first applications in the world that used the new PowerFlex 755TM drives, so we worked closely with the product specialists in the US regarding some of the technical aspects of the drives," Barrett explained. "As there was a limited time available for commissioning the new system, we conducted a factory acceptance test (FAT) to provide a complete simulation of the machine. This allowed Visy to see the drive system in operation and we were able to go through all of the functions to make sure it met Visy's requirements."

The installation and commissioning of the system was conducted during the plant's annual shutdown, with no significant issues. In fact, the first roll produced by the winder was sellable quality. "The new winder drive system is working well and there has been no downtime due to drive system issues. We have remote access to the system, which helps with troubleshooting as required," Barrett said.

"The technical support from Rockwell Automation has been great," said Santiago Vargas, Visy Tumut Project Engineer. "The new control and drive system for the winder is performing really well and by having remote access to the system, Rockwell Automation is able to continue to provide support as required. The project has been a success for Visy and we are very confident in the Rockwell Automation team."

Rockwell Automation Australia
www.rockwellautomation.com/en_au

CABLE AND HOSE SPOOL

The igus e-spool is a compact, spring-driven cable drum system that can safely guide energy, media or fibre-optic data cables, and can extend cables and hoses up to 21 metres without the need of a motor.

A standard e-chain, which is guided by a guide roller, is designed to always ensure, with an integrated retaining spring, the correct length and tension of the e-chain system. An igus twisterband is responsible for the rotational movements. This structure makes movements in every direction possible.

The e-spool has evolved from customer requirements and covers the gap between the spring-driven standard e-spool for up to 14 m extension length and the motorised e-spool for large projects, eg, in the offshore sector. The system has been equipped with a larger twisterband for a higher filling. To compensate for the payload and extension length, the structure of the e-spool provides more bracing, a more stable all-enclosing body and a reinforced floor plate as a retraction safeguard. In order to withstand the higher forces, the developers also opted for an optimised mechanism for adjusting the spring force. The 21 m e-spool is available either as a spring-driven version with 2 HD springs or as a motor-driven version with a built-in stationary motor.

Treotham Automation Pty Ltd
*www.treotham.com.au*

FACTOR 1 INDUCTIVE SENSORS

Pepperl+Fuchs' broad portfolio of reduction factor 1 sensors is designed to enable maximum flexibility in automation machinery design. This is made possible by industry-friendly cylindrical and cube-style designs, cabled versions, as well as IO-Link, weld-resistant and chemical-resistant versions for especially harsh applications. The range offers identical switching distances for all metals, weld-immune versions in different styles and IO-Link in every model. Reduction factor 1 sensors simplify installation and optimise automotive process line production.

Stainless steel versions are also available as durable sensors for the food industry. Reduction factor 1 sensors with V4A stainless steel housings made of FDA-certified LCP withstand extreme conditions when detecting metal food containers. They are rust-free and resistant to cleaning agents used to clean and disinfect the outside of machines in the food industry. With IP68/IP69K protection, these inductive sensors fulfil the challenging requirements of use in washdown areas.

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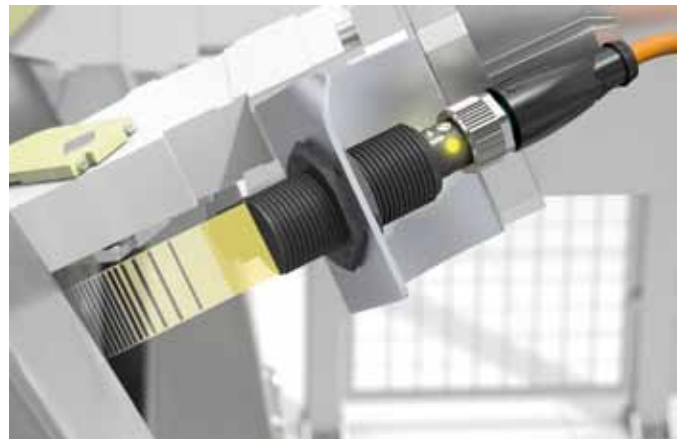
FANLESS EMBEDDED PC

The ARK-1220L is a compact DIN-rail fanless embedded box PC that is suitable for industrial and outdoor environments. Featuring Intel Atom E3940 QC processors with front accessible I/O ports on a single bezel, this device is suitable for applications such as machine automation, intelligent factories, in-cabinet equipment integration and IoT gateways.

To enable effective device management, the ARK-1220L comes pre-loaded with Advantech's IoT device management application, WISE-PaaS DeviceOn. DeviceOn includes hardware security certification and parameter settings required by the relevant application domain to help simplify the initial deployment phase and subsequent management. McAfee and Acronis are also integrated into WISE-PaaS DeviceOn for antivirus protection and data recovery and backup. For system security, the ARK-1220L utilises the Trusted Platform Module (TPM) 2.0 function and supports BitLocker under Windows 10 IoT.

Designed for rugged environments, the ARK-1220L supports a -30 to 70°C operating temperature range with 0.7 m/s air flow. Its wide-ranging power input of 12–28 VDC is suitable for use in environments with fluctuating or unstable power supply. The ARK-1220L supports an array of functional I/O ports including four USB 3.0, two LAN and two COM ports placed on its front panel. With compact dimensions, the ARK-1220L is suitable for limited space applications that require I/O flexibility and enhanced performance.

Advantech Australia Pty Ltd
www.advantech.net.au

AUSTRALIA'S MINING FUTURE TO BE UNLEASHED AT
AIMEX CONFERENCE

Technological advancements, workforce changes, community collaborations and environmental challenges are just some of the concepts that will be grappled with when the future of Australia's mining industry is unleashed at Australia's largest and longest running mining exhibition and conference in August.

More than 6000 mining industry professionals and over 500 exhibitors are set to take over Sydney Showground across three days, from 27–29 August. Speakers and key topics for the free-to-attend conference have been announced for Asia-Pacific's International Mining Exhibition (AIMEX) 2019 edition, and the line-up for the three-day event will provide visitors with an opportunity to hear from mining innovators and disruptors at the same venue where the technology is on show.

Sponsored by Davey Bickford Enaex, the AIMEX conference has been developed with direct input and consultation from key mining personnel and industry associations, as well as key mining companies.

On the opening day, a panel of speakers from across the mining spectrum will dissect the industry's image and discuss ways that the mining sector and the community can work more collaboratively together in the future. Mach Energy's Ngaire Baker, Mark Jacobs from Yancoal, Dr Kieren Moffat from CSIRO and Anna Littleboy from The University of Queensland will lead the discussion.

Baker, External Relations Manager for MACH Energy, said it is crucial that the mining sector demonstrate the value it can offer communities, especially in regional and rural areas.

"I've worked and lived in some of Australia's most remote mines and mining towns, and towns such as Orange, Parkes and Singleton in NSW, and I have experienced first-hand just how vital it is for the mining industry to look after these communities and to do our jobs to the best of our ability so that both parties reap the benefits," Baker said.

"The mining industry can bring so many benefits to regional areas, and to have the opportunity to discuss these very important issues with experts from all sides of the spectrum at the AIMEX conference is invaluable.

"I have been attending AIMEX since the mid-90s and I make every effort to connect with suppliers and learn about new technologies that will benefit the operation I am working in. To be able to attend the conference as part of AIMEX is invaluable; we are all time poor and this conference is a key part of the three days of AIMEX — it provides me with a rare opportunity to hear from visionaries, engage with my peers and challenge the current mindset."

A highlight of Day Two will be the panel discussion on how the mining community can reinvent its approach to talent acquisition and retention for today's agile, digital, mobile, analytical and technologically driven workforce.

Mining Leaders Group founder Brett Cunningham, Weld Australia CEO Geoff Crittenden and Jamie Frankcombe, Whitehaven Coal's Chief Operating Officer, will lead the thought-provoking discussion that will exchange ideas and share current thinking to prepare for tomorrow's demands in areas such as recruiting, educating schools, upskilling and diversity.

Other highlights of the conference include Dr John Cronin's presentation on using telepresence technologies for the safe deployment of wireless mesh networks and underground inspection robots in mines, as well as cross-industry learnings from the oil and gas industry that define and mitigate HMI risk with technology and analytics. The final day's panel will look at adapting to climate change, emissions and what this looks like for the mining sector.

Embedded within the exhibition and conference, five of Australia's biggest mining companies — Centennial Coal, Glencore, Mach Energy, Whitehaven Coal and Yancoal — will for the first time come together to create the AIMEX Mining Pavilion.

AIMEX Exhibition Director Brandon Ward said no other mining event gives access to this volume of suppliers and this calibre of speakers for free.

"AIMEX is about pushing boundaries and challenging operations and business to innovate — not just through technology but through workforce practices, social engagement and policy reform," said Ward.

"This year's AIMEX conference is our most extensive yet, which means mining professionals have a forum for open and transparent dialogue that will drive the sector forward."

Attendance to AIMEX is free for both the exhibition and conference, with registrations now open. For a full overview of the AIMEX conference, including session topics and speakers plus a complete list of exhibitors, please visit the event website: aimex.com.au.

SIDE-ENTRY MIXER FOR OIL STORAGE

Storage of crude oil results in the settlement of bottom sludge and water, which needs to be removed regularly to prevent accumulations that can cause corrosion or seriously reduce operational efficiency.

Plenty TMH side entry mixers prevent harmful sludge from settling by ensuring that heavy solids, water and corrosive salts are maintained in suspension. TMH mixers are equipped with a toothed belt and high-efficiency impellers for optimum mixing and energy efficiency. Downtime is reduced through a tank shut-off device to allow the shaft seal and bearings to be changed under full tank conditions, while the maintenance-free bearings have an L10 life in excess of 65,000 h.

The mixers offer 316 stainless steel wetted parts construction; maintenance-free, long life bearings; and a power range from 1.1 to 5.5 kW.

SPX Flow Inc
www.spxflow.com/au

POCKET THERMAL IMAGER

The Fluke PTi120 pocket thermal camera is small enough to carry every day, stands up to dirt and water, and can survive a 1 m drop. Enhanced infrared inspections are now in the user's pocket for quick temperature scans of electrical equipment, machinery and other assets.

With Fluke Connect Asset Tagging, users can eliminate the need for sorting and organising infrared images. By scanning their asset's QR code or barcode, the infrared image and all date- and time-stamped information will be stored to predefined folders. Images can be sent via Wi-Fi or automatically upload once connected to the network or computer via USB.

The 3.5″ LCD touch screen offers Fluke's IR-Fusion to blend a visible light image with an infrared image to easily locate problems. Users can simply slide a finger across the screen to adjust the setting.

Fluke Australia Pty Ltd
www.fluke.com.au

PORTABLE PROCESS CALIBRATOR

The WIKA CPH7000 portable process calibrator provides flexible on-site calibration for process transmitters and pressure gauges, and has ATEX approval.

The portable, multifunction instrument integrates an electronics module, a hand pump for generating test pressures from -0.85 to 25 bar and a high-performance data logger. Accuracy is to 0.0–25% FS.

The product can also be used to fulfil test tasks for the measurement parameters of temperature, voltage and current (0–24 mA).

The calibrator offers the possibility to set calibration routines quickly and easily, as well as to run preconfigured calibration routines and automatically save the measured values. The completed calibration processes can be wirelessly transmitted to a PC. This data can subsequently be evaluated and archived using WIKA-CAL software.

A high-pressure version is also available that tests measuring ranges up to 10,000 bar.

WIKA Australia
www.wika.com.au

VALUE
BEYOND
MEASURE

ST80 SERIES
AIR/GAS FLOW METERS

NEW!

With Adaptive Sensor Technology™
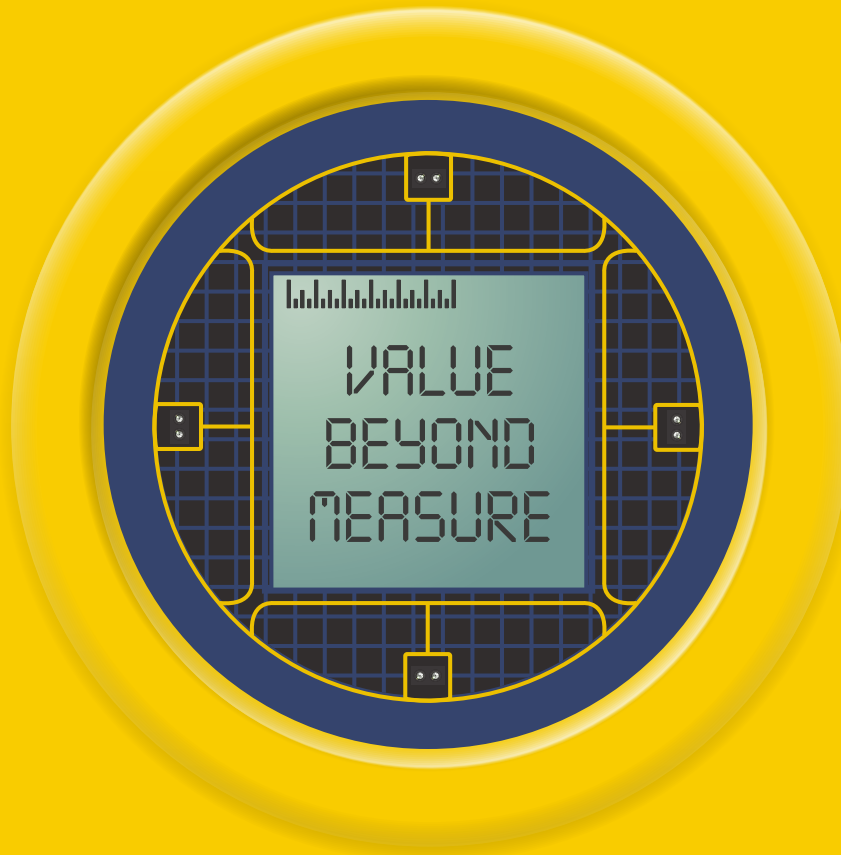
The face of accuracy, repeatability and reliability in thermal flow technology.

ST100 ST75 FS10A FLT93

For more than 50 years, FCI has been the gold standard for thermal mass flow meters, flow switches, and level switches. FCI delivers the virtually zero-maintenance performance plants rely on year-in, year-out—from small dosing lines to the largest stacks worldwide. Dependable, cost-effective, and extensively certified, FCI provides the thermal dispersion technology instruments by which all others are measured.

AMS

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

FCI FLUID COMPONENTS INTERNATIONAL LLC

www.FluidComponents.com

HOT TAP DIGITAL FLOWMETERS

EXAIR's hot tap digital flowmeters allow installation when compressed air piping is under pressure. By eliminating the need to isolate and remove pressure from the pipe, these compressed air flowmeters are designed to reduce installation time while maintaining safety.

Hot tap digital flowmeters incorporate two valves that the measuring probes pass through. A sound muffler that also collects chips from the drilling process eliminates installation debris from entering the airstream and minimises noise exposure. Measuring compressed air is the first step towards identifying high compressed air use areas and compressed air leaks, and optimising air use.

Each meter ships with the necessary hardware and tools for installation including drill bit, drill guide, chip capturing muffler and hex wrenches. The hot tap feature is available on 51 mm through 203 mm flowmeters. They are available in standard units which display airflow values on a bright LED screen, with optional data logger to capture and manipulate the data, or with wireless capability to transmit the data securely over a wireless network. Airflow values are expressed in SCF per minute or m³/h.

Hot tap digital flowmeters for schedule 40 iron pipe and Type L copper are now available in sizes 51, 64, 76, 102, 152 and 203 mm. They are CE and RoHS compliant and can also be ordered for schedule 80 or 10S pipe.

Compressed Air Australia Pty Ltd
www.caasafety.com.au

UPS FOR EDGE SYSTEMS

Schneider Electric has introduced the Galaxy VS — a modular, easy-to-deploy, 10–100 kW, three-phase UPS designed to meet the critical power requirements of IT, commercial and industrial facilities.

With its compact and flexible design, the product is intended to addresses the requirements of edge computing and small data centres where space and access are at a premium. Up to 99% efficient and with optional lithium-ion batteries, doubling battery life, the device claims a low TCO. Critical system components are built as modules with a fault-tolerant design. This provides internal redundancy at reduced load levels and a short mean time to repair.

The unit has a wide power range from 20–100 kW (400 and 480 V) and 10–50 kW (208 V) with one platform. It is also EcoStruxure Ready. Site managers or technical personnel can remotely monitor their Galaxy VS system status with a smartphone app.

Schneider Electric
www.schneider-electric.com.au

MINIATURE TRIAXIAL ACCELEROMETER

The Dytran series 3133 is a miniature, hermetically sealed, IEPE triaxial accelerometer, weighing 0.8 g. The series of accelerometers is designed to mount in spaces inaccessible to other types of accelerometers. TEDS models are available.

Packaged in a robust, lightweight, welded titanium cube, the accelerometers are available with sensitivities ranging from 0.25–10 mV/g. The design incorporates ceramic shear sensing elements with integral electronics and a metre-long integral cable terminating to a 4-pin ¼ –28 connector. With adhesive mounting capabilities, the cable is designed to mate with several different types of Dytran extension cables.

Suitable applications include environmental stress screening (ESS), HALT/HASS screening, modal and structural analysis, product response testing and general-purpose triaxial vibration measurements.

Metromatics Pty Ltd
www.metromatics.com.au

OPEN FOR THE DIGITAL FUTURE

Digitalization offers companies the great opportunity to shape their future dynamically and successfully. However, the digital transformation also entails many challenges. Networking, analytics, increased productivity and new business models are all challenges that have to be faced on a daily basis. There are no hard and fast rules for handling the digital transformation successfully. Therefore, forward-thinking companies need solutions tailored to meet their specific system requirements.

Let our open automation platforms inspire you to meet the demands of the ever-changing IIoT age. We offer you the freedom of adaptable customer solutions instead of rigid, preconfigured options. For example, leverage the flexibility of Sparkplug to decouple system applications from your field devices to increase operation performance while reducing network complexity and costs.

AUTOMATION meets IT

Connect the Worlds of Modern Engineering

Experience the possibilities of our open automation platform. Whether you feel most at home in the world of PLC programming or embedded programming (Linux, etc.), you are free to choose with WAGO as our software tools offer the best of both worlds. Combining that with the utmost in system modularity and flexibility, as well as network independence, allows for modern engineering – automation and IT in one platform.

OPEN and SECURE

Keep Important Data Secure

One of the major challenges that comes with digitalization is figuring out how to securely collect data from your manufacturing site's plant floors.

With the PFC200 Controllers, you'll always be on the safe side. Our controllers encrypt information directly and then transmit it securely to the Cloud via IPSec or OpenVPN. These cybersecurity tools help users transfer data in a secure manner with TLS security and built-in Firewalls and VPNs.

HTTPS

OPENVPN

FIREWALL

FTPS

SSH

IPSEC

TLS

PFC200 Gen 2 Controllers For Sparkplug Edge of Network Applications

The PFC200 Gen 2 controllers are the industry's first PLC supporting the Sparkplug B[1] standard with gateway functionality for all popular fieldbus networks, as well as a built-in VPN and Firewall for security. Utilizing the latest version of our e!COCKPIT programming software and the WAGO Sparkplug license enables these controllers to become Edge of Network (EoN) devices for monitoring and controlling your plant floor machines and exchanging information with an Ignition-based SCADA system or third party historians.

The WAGO Advantage:

- Proven industrial hardware with the utmost flexibility and modularity
- Choose from over 500 digital, analog and special function I/O modules
- Gateway functionality for multiple fieldbus networks: CANopen, Profibus, Modbus TCP/UDP, Ethernet/IP, Modbus RTU and EtherCAT
- Sparkplug support for reduced network traffic, processor overhead and engineering time

Compatible Controllers	
PFC200 G2; 2 ETH RS	750-8212
PFC200 G2; 2 ETH CAN	750-8213
PFC200 G2; 2 ETH RS CAN	750-8214
PFC200 G2; 4 ETH CAN USB	750-8215
PFC200 G2; 2 ETH RS CAN DPS	750-8216

Modbus CANopen OPC UA EtherCAT OPENVPN SAP Certified Built on SAP Cloud Platform

IPSec HTML5 docker EtherNet/IP Sparkplug MQTT e!COCKPIT Microsoft Azure Certified Linux

WAGO

DIGITAL TRANSFORMATION IN MANUFACTURING

A STRATEGIC GUIDE — PART 2

*Matt Newton**

Improve profitability and maximise return on capital across the operations and asset lifecyles to enhance competitiveness and cut the hype.

n Part 1 of this article, the business benefits of digital transformation beyond the IIoT hype were highlighted, describing the need to find innovative ways to fuse digital technology with your existing people, processes and assets.

Undergoing a digital transformation can enable companies to optimise their planning and operations, asset performance, monitoring and control, as well as provide greater workforce empowerment.

Digital planning and operations

With digital transformation directly impacting the enterprise value chain, business units that were historically in silos are beginning to connect in real time, accelerating towards a unified supply chain model. Planning and operations are fused together resulting in a 360-degree view of the digital value chain for you to visualise, analyse and optimise all aspects of the enterprise.

Feedstock and raw materials data can be analysed, live, against planning, operations, scheduling and distribution. Full plant models can be managed simultaneously within a supply and distribution network. Fast optimisation, combined with user-configurable visualisations and reporting, allows the impact of uncertainties and data changes to be evaluated and understood in real time. Reconciliation and historical trend analysis shows you how and why deviations from plans occurred, enabling increased planning efficiency and making it easier to generate feasible, robust schedules that shrink the gap between planned and actual operations.

The amount and accuracy of production information increases substantially, equipping users with tools and insights to go beyond basic data, OEE and lean manufacturing principles to discover the real metrics that are driving performance, availability and quality throughout all levels of supply chain management, planning and operations. Metrics generated by newly tapped digital data sources enable your team to gain immediate insight into economic decisions across a range of scenarios. Direct integration of operational data and reconciliation environments enables rapid and continual updating of production schedules.

Powerful modelling and analytical tools help your team to pinpoint bottlenecks, and understand how to design more efficient operational workflows. Digital model-driven deployment allows flexible rollout across multiple sites and reduces total cost of ownership (TCO). A consistent and holistic view of the business at each site with KPIs and key scorecard indicators can also be shared across all functions of the enterprise.

A study of common failure patterns by ARC Advisory Group found that 82% of failure types are random. Only 18% are predictable and can be prevented using traditional maintenance methods. Machine learning helps identify inefficiencies and abnormalities in equipment operation long before regular inspection. Engineers can reference operational models and digital twins for recent abnormalities in design versus operational performance.

Digital monitoring and control

As new intelligence is driven into industrial process control and manufacturing, the control of assets shifts from the logic run on traditional local programmable logic controllers, HMIs and historians to a more efficient production strategy driven by intelligence found in cloud-based applications. New data, from real-time operations and IoT sensors, feed cloud-based applications to create insight into how process and production efficiency can be improved. Using digital control strategies, these new efficiencies are driven back into operations in real time.

While data has become a priceless asset to the enterprise, the ability to make sense of data and use it to drive new insight can unlock the greatest value. The specifications of HMI and SCADA solutions vary widely — from simple and straightforward to complex and demanding. Similarly, user requirements vary based on the scale and size of the underlying production or operations processes. New tools can help deliver user experiences with real-time contextualised, visualised operations and improved situational awareness. These capabilities offer enhanced benefits over traditional HMI and SCADA solutions including:

- **A unified interface:** Universal context of real-time processes, alarms, events and historical data across disparate business systems and units through a unified data model with cross-platform support for different client interfaces including mobile, augmented and virtual reality.
- **Digital twins:** Design and operational performance are quickly compared for operational anomalies, with control tag data overlaid on physical assets through AR/ VR technology.
- **Safety:** Mobile, augmented and virtual reality technology provide real-time, easy-to-follow, visual, step-by-step operating procedures and key messages to operations personnel, reducing human error and guiding operators to appropriate equipment for performing specific tasks. Operators are also supplied with information about the location of existing hazards by superimposing them over the operator's location.
- **Accelerated training:** Operator training is accelerated by allowing operators to perform new tasks and maintain products using the technology's visual instructions. This enables compliance standardisation across processes, functional teams and sites.
- **Modelling and configuration:** 3D CAD/CAM drawings of asset and components are virtually displayed for operators to reference during design, maintenance and operations tasks.
- **Knowledge capture:** Information management technology enables real-time data capture and transmission to a central repository for additional analysis and sharing between business units and digital assets.
- **Decreased capital expenditures:** Cloud technology and software-as-a-service (SaaS) approaches lower capital expenditure costs and provide flexible software licensing models.

As comprehensive operations efficiency models are deployed, your team can instantly see which equipment, processes, groups or sites are underperforming. This provides part of the foundation for developing an asset performance management strategy.

Digital asset performance management

Creating digital twins of assets allows users to optimise performance, reliability and maintenance. Low-cost sensing technology has enabled increased fidelity of your assets' operational behaviour. Sensor networks become another data source, contributing to the digital twin. This is particularly important for legacy assets that were not 'born digital'. As digital tools such as predictive analytics and machine learning software begin to peer into the physical world through sensor networks and other data sources, a variety of cloud, on-premise and hybrid tools are available to predict equipment failures before they occur. Moreover, maintenance can be scheduled around optimum economic and production conditions.

A complete digital asset performance management (APM) solution combines enterprise data capture with asset management, advanced workflow, mobility, predictive analytics and risk-based management. Work orders are automatically generated to relieve maintenance issues. Analytic capabilities continue to evolve from predictive to prescriptive — from what will happen to what should be done. This integration with advanced workflow facilitates continuous process improvement while ensuring assets are not overly maintained, and MRO inventory costs are reduced.

Digitalisation

The digitally empowered workforce

Digital technology is changing how you can train and operate your people throughout the asset and operations life cycles. New tools are also improving knowledge transfer and increasing situational awareness throughout your global team. Augmented and virtual reality (AR/VR) technology is quickly gaining traction in industrial applications. Operators can now learn how to safely and effectively operate a plant or facility or perform maintenance on an asset through immersive virtual reality experiences. Another important trend is the move towards mobile technology in industrial applications. When these technologies are coupled with digital twin approaches, operators and plant personnel can visualise processes and assets in real time, live from the floor of the plant.

Operator training simulators (OTSs), powered by advanced augmented and virtual reality technology, bring digital twins of assets, control rooms and even entire plants to life in a safe and controlled learning environment. Immersive technology such as head-mounted virtual reality displays and 3D projection allows your teams to experience training in a simulated, identical control room or plant. This provides a realistic virtual learning environment, which prepares your teams to act appropriately in any given situation.

As operators leave the classroom and enter their day-to-day working environment, augmented reality empowers them with new streams of information and insight on enterprise operations. It uses similar technology to that found in virtual reality, but applies it in an operational context allowing operators to perform their tasks more efficiently. For example, remote support can be provided to operators in the form of maps and diagrams that help guide a plant worker to the physical location of an asset or process failure. Augmented digital procedures also shorten the time required to train new technicians on how to perform standard operating procedures.

Mobile technology can unite teams in virtual settings no matter where they are physically located. Diverse experts can perform their duties from wherever they are, accessing, monitoring and managing the plant or factory live, from handheld devices. Workers are no longer as tied to the physical plant location but instead can carry a digital twin of the plant or factory in their pocket at all times. Mobile technology also enables workers to capture data, collecting it from digitally stranded assets deployed before internet connectivity was common in industrial devices. This, in turn, boosts operational visibility and helps to build situational awareness across global portfolios. In addition, mobile operator rounds digitalise operational processes to ensure best practices are always followed by operators. Digitalising operational processes and maintenance workflows also enables real-time team collaboration during problem resolution.

Mobilising the operator workforce also helps your team to ensure they are following the latest rules and regulations. Stacks of paper maintenance reports, audit logs and repair procedures become digital versions of themselves. Information is stored in a central location and backed up to the cloud. Regulatory audit trails can be automatically generated. New maintenance technicians can be trained more quickly, through maintenance procedures and decision support workflows delivered directly to their mobile devices.

Key technology investment pillars

Choosing the right technology investment requires analysis and can be challenging. You may find it helpful to think in terms of four key technology pillars that can ensure successful digital transformation and optimum return on investment for your business.

Comprehensive value chain

Modern digital platforms need to deliver returns across the comprehensive value chain of your enterprise. Technology investments must enable the digital integration of engineering, planning and operations, control, visualisation, information and asset performance management solutions to create a 360° view, from the shop floor to the top floor.

Open and system-agnostic

Interoperability and cross-platform support accelerate a path towards continual process improvement. Rapidly sharing big data and insights across multiple platforms including cloud, mobile, augmented and virtual reality requires system-agnostic technology that augments rather than replaces your existing asset investments. An open, system-agnostic approach to digital transformation drives long-term value and lower TCO.

Digital ecosystems

Technology investments should be backed by a multidisciplinary ecosystem of technology partners. Ecosystems should include design, development, delivery, maintenance and support of industry-specific solutions, on a global scale. Your ecosystem partners in this enterprise may include software developers, technical distributors, system integrators, OEM providers and technology partners, all focused on extending value and driving innovation across your business.

Flexible and agile implementation

Adapting to unforeseen events becomes automatic when you use flexible technology implementation. True digital transformation platforms help your teams to choose the right mix of deployment options including on-premise, cloud and hybrid rollouts. Agility in procurement allows your team to try out several options, through perpetual licensing or subscription-based approaches. Solutions for implementing technology on an as-needed, staged approach help your organisation reduce upfront costs and decrease time-to-value of modern technology investments, thereby accelerating your progress towards increased profitability.

How to get started

Ultimately, your decision to pursue digital transformation comes down to one fundamental question: how does digital transformation benefit

your business? The answer lies beyond investing in new technologies or gathering even more data. Digital transformation is about innovating the business strategy, improving operations and uncovering unprecedented new opportunities for both efficiency and productivity.

According to McKinsey & Company, when technologies like intelligent engineering data management, cloud, advanced analytics, and digital twins are pursued as part of an organisational digital strategy, they can play a role in improving operating margins by as much as 20%. Modern digital tools that support data-driven processes across the entire asset and operations life cycle not only enable new greenfield industrial applications to be delivered more effectively and with full data-centric digital information, but also enable brownfield applications with improved operations and increased efficiency.

Digital transformation is part of an ongoing journey towards continuous process improvement involving the collaboration of people, processes and assets through technology. It doesn't happen all at once, but instead builds momentum over time as people, processes and assets are digitally fused together to bridge the operations technology and information technology gap. Start small in your strategy and adoption. But start now to maintain or improve your competitive level and market position.

Major investments upfront are not required to begin a digital transformation journey. Consulting services can help your team to assess your current asset inventory and business operations and chart your best overall digital transformation strategy. Pilot projects of digital technology such as predictive analytics and virtual reality can help the enterprise understand where to make the best technology investments to improve profitability and maximise return on capital.

Matt Newton is Senior Technical Marketing Manager for AVEVA's Asset Performance Management portfolio. With over 15 years' experience planning, developing and implementing diverse batch and process automation applications, he has extensive experience designing and implementing IIoT and machine-to-machine applications from the network edge to the enterprise cloud.

AVEVA
www.aveva.com
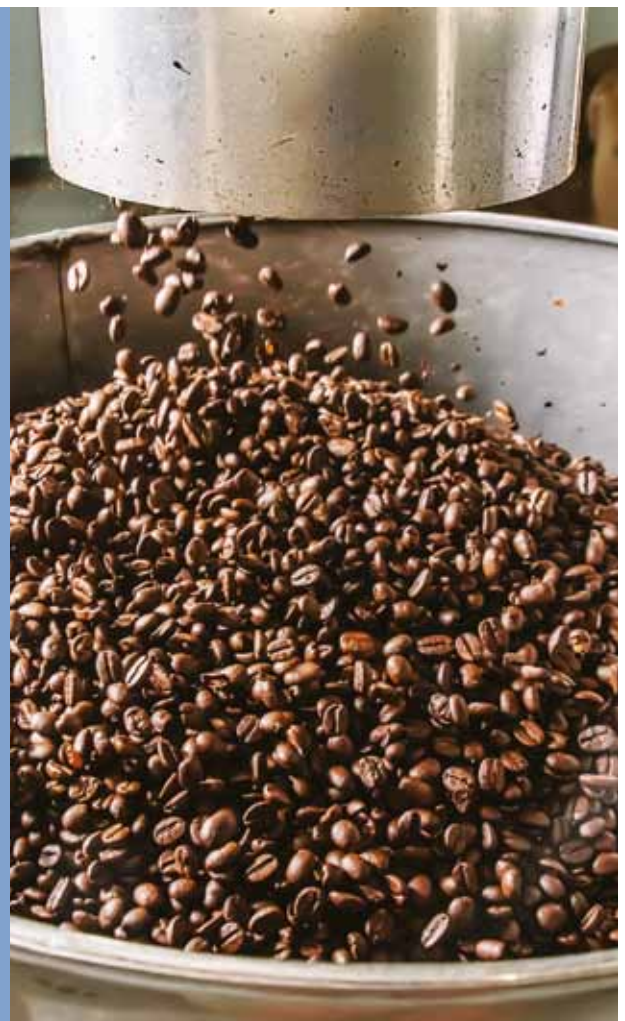
MULTICODE READER

The ifm multicode reader detects 1D and 2D codes. It is claimed to ensure reliable identification even under difficult conditions, such as in the case of changing extraneous light or shiny surfaces. Several different codes in one or more images can be evaluated in just a few milliseconds.

Simple applications with one code per image can be set quickly via the teach button. The preset device configuration can be changed by means of a user-friendly smartphone app. For complex identification tasks, the multicode reader can be configured using ifm's Vision Assistant software.

After pressing the teach button, the user aligns the multicode reader to the code by means of a laser marker. Focus, exposure setting and detection of the code type are automatically carried out by the sensor.

A smartphone app (iOS, Android) is also available for basic configuration of the device. The user can use it to define the trigger or IP address. Based on these settings, a Data Matrix code is generated on the smart phone's display. When this code is held into the multicode reader's field of view, the configuration is automatically adopted.

The device has an exchangeable ifm memory stick. It can be used to save or load complete configurations, simplifying device replacement and the set-up of several units for the same application.

ifm efector pty ltd
www.ifm.com/au

SLAB GATE VALVE

SPX Flow offers a range of flow control solutions that are suited to liquid terminals and tank storage applications. For precise fluid control, SPX Flow is offering the M&J model M-303 slab gate valve, which is manufactured and tested to API-6D.

The floating slab gate uses the natural force of line pressure to obtain a dynamically tight downstream seal in high-pressure differential applications. Low-pressure sealing is accomplished with coil springs that energise the seat, pushing it against the gate.

The two-piece stem/common yoke simplifies operator mounting and conversions. The two-piece stem design also allows different materials to be used in wetted areas while standard material is used for stem threads.

Combined with the bolted packing retainer, the two-piece stem allows quick operator and extension changes in the field with the valve under pressure. For valves with ribs, a rib system has been developed to make painting and coating easy.

SPX Flow Inc
www.spxflow.com/au

STEEL CASTING CONTROL SYSTEM

Designed to bring real-time, automatic online control of mould fluid flow, the ABB Ability Optimold Control connects sensors and actuators in the continuous casting process.

The system works in real time, using feedback from a high-resolution sensor system (such as ABB Optimold Monitor) to actively control electromagnetic devices such as stirrers or brakes that can influence fluid flow, correcting casting problems in the mould and ensuring that casting takes place under optimal conditions.

Combining with ABB's existing product suite for steel manufacturers, ABB Ability Optimold Control adds optimal process control in the moulding process, resulting in higher product quality, improved productivity and enhanced efficiency in slab casting while helping avoid costly quality downgrades.

ABB has also developed a product version specifically for use with a new type of electromagnetic brake (EMBR) in the conventional or thin slab continuous steel casting process. Optimold Control for EMBR independently controls the EMBR's flexible left and right sides and takes advantage of its flexible front core configuration, which enables it to work with any submerged entry nozzle (SEN) shape. The resulting real-time, online control optimises melt flow speed, symmetry and stability control.

ABB Australia Pty Ltd
www.abbaustralia.com.au

POWER SUPPLIES

WAGO's Pro 2 power supply range includes six units ranging from 120–960 W, and provides an energy conversion efficiency of up to 96%. The units permit fieldbus connection via snap-on communication modules and feature WAGO's TopBoost and PowerBoost capabilities for maximum system uptime and lower hardware costs. Parameters such as output voltage and overload behaviour can be easily configured via software.

The units also offer monitoring functions that provide continuous power supply data information and signal errors for application monitoring. Users also have the option of choosing the fieldbus they want to connect with their Pro 2 units, including IO-Link, Modbus RTU and Modbus TCP.

The TopBoost feature delivers 600% extra output current, enabling protection for up to 15 ms compared to conventional circuit breakers. PowerBoost provides an additional 150% output current for 5 s, providing high reserve power and eliminating the need for oversized power supplies and their associated costs.

WAGO Pty Ltd
www.wago.com.au
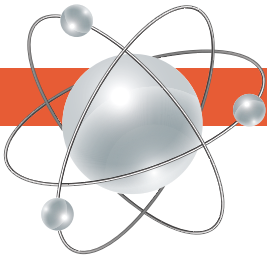
New technology for foundries cuts energy and emissions

The metalworking industry — and foundries in particular — consume extreme amounts of energy and thus produce large amounts of CO_2 as well. In the future, light metal foundries will be able to cut their energy costs related to production by as much as 60% and CO_2 emissions by as much as 80%. A new technology developed at the Fraunhofer Institute together with other partners will make this possible.

"We have developed a completely new design for a distributed, automatable melt supply system based on innovative, modularly upgradable burner technology," said Dr Stefan Scharf from the Fraunhofer IFF in Magdeburg. "We consider this a revolutionary design that will lead the industry into a more sustainable, digitally connected era."

Foundries in general, and nonferrous foundries in particular, currently have to repeatedly transfer and constantly heat melt charges in a gradual process. In addition to open-flame gas burners, electricity is also predominantly used to melt and heat the metal, despite its obvious economic and environmental drawbacks. Such conventional methods of process control and the related transfer processes detract from casting quality and necessitate complex actions to handle the melt. Established processes typically have correspondingly high energy and resource requirements.

With their new approach, the researchers are banking on an unconventional but highly efficient method instead. A newly developed burner system that uses the energy carrier gas for heating delivers control system performance and homogeneity previously only seen in electrically heated units. The waste heat produced can be recovered reliably, apparently for the first time ever. The new design based on this development envisions melting, transferring and holding the metal in fully movable transfer crucibles. This will make it possible to cut the multistage process steps currently necessary down to just one process step. The movable crucibles are supplied with the requisite thermal energy at so-called 'heat docks'

Molten metal being transferred. Melting and holding requires a great deal of energy.

operated with the new burner system. This eliminates the drawbacks of current alternative systems.

An equally new sensor system that monitors the process continuously establishes the basis for connected process control in the foundry industry, which will be automated in the future. This ultimately lightens workers' workloads, especially during particularly hazardous works steps, and enables companies to transform manufacturing digitally.

"This will enable light metal foundries for which the new system was developed to cut energy costs by 60% and related CO_2 emissions by as much as 80%," said Dr Scharf. "At the same time, this will increase manufacturing flexibility and product quality significantly.

"In principle, the design is transferable to any foundry and its component solutions are transferable to other industries as well."

According to the Bundesverband der Deutschen Giesserei-Industrie, nearly 340 companies in the light metal foundry sector in Germany (nonferrous metal foundries) produce around 1.7 million tons of nonferrous metal casts. Around one million tons of CO_2 are produced in the process. Energy costs presently add up to roughly 25% of their gross value added. Altogether, the foundry industry with around 80,000 employees generates around €13 billion a year.

The technology was developed in a research consortium consisting of the Fraunhofer IFF, Otto von Guericke University Magdeburg, promeos and Leichtmetallgiesserei Bad Langensalza. The project, named ETAL, is being funded by the German Federal Ministry for Economic Affairs and Energy.

The researchers presented the mass manufacturable prototypes of the new transfer crucibles together with the heat dock for the first time at the Hannover Messe this year. The manufacturable product should be on the market in early 2020.

Fraunhofer Institute for Factory Operation and Automation IFF
https://www.iff.fraunhofer.de/en.html
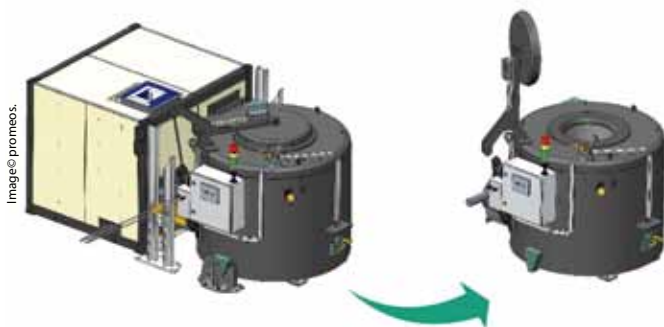
Movable transfer crucible with heat dock.

WORKSHOP CALIBRATION TEST BENCH

Beamex has introduced a workshop calibration test bench called Beamex CENTRiCAL. It is designed to combine ease of use, versatility and ergonomics for performing calibrations in a workshop.

CENTRiCAL is easy to configure to suit individual requirements, while the standard electrostatic discharge (ESD) protection offers electrical safety measures. Each unit is supplied with accredited calibration certificates to ensure quality and traceability. It is available with ergonomics via motorised height control or as a fixed height bench. A straight bench as well as corner modules are available to meet user needs. A trolley-based design is also available for mobile solutions.

Even though process instruments are often calibrated in the field with portable calibration equipment, there are situations when it is more effective and convenient to perform calibrations in a workshop. For example, during a commissioning phase, it is easier and faster to calibrate the process instruments in a workshop, before installing them into the process. It is also more efficient to calibrate spare devices and rotational spares in a workshop. Better accuracy can also be achieved when the calibration is performed in controlled conditions, using dedicated high-accuracy workshop calibration equipment. In the event of harsh or even dangerous field conditions, calibration in a well-designed workshop with equipment ready for use is ergonomic and practical. Workshop calibration can also complement field calibration.

Combining the Beamex CENTRiCAL together with software, hardware and calibration expertise forms an automated and paperless digital calibration solution.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

MINIATURE PIPE CLAMPS

Traditionally spray bars required pre-fabrication (such as welding) prior to installation. Once installed, adjusting the spray or adding additional nozzles was difficult.

Designed and made in Italy, the ZPN miniature pipe clamps are designed to enable any spray pipe to be assembled onsite without the need for special tools or welding equipment. The installer simply drills the spray holes where required, attaches the ZPN pipe clamps and screws in the spray nozzles.

The single spring ZPN Mini Pipe Clamps are quick and easy to connect to pipes from ½″ to 1″ in diameter. Made from plastic, the clamps are colour coded to indicate size, making it even easier to identify which one is required.

Tecpro Australia
www.tecpro.com.au

POWER SUPPLIES

The Omron S8VK-X series power supplies are compatible with EtherNet/IP and Modbus TCP fieldbus systems. Visualising and centrally controlling the condition of power supplies enables users to predict equipment maintenance requirements, eliminating unexpected response and unnecessary premature replacement.

Using Omron's Power Supply Monitoring Tool, it is possible to start monitoring by connecting the S8VK-X to a personal computer via an Ethernet cable. In addition to collectively displaying and saving data and displaying graphs, it is also possible to check the status in real time on a derating chart and to simulate of capacity changes.

The series has an operation temperature range -40 to +70°C and a compact, space-saving design. Coated PCBs and vibration resistance up to 5g provide a durable design.

A power boost function allows the units to supply 120% for the 120 W model and up to 150% for 240 and 480 W models.

Omron Electronics Pty Ltd
www.omron.com.au

SMART ULTRASONIC RELEASE OF VALVES

TRILITY recently launched SURV, a unique and innovative seized valve technology, in Australia. The service provides ultrasonic seized valve release, valve condition assessment and torque measurement. SURV is a safe and reliable alternative to seized valve replacement, and has already built a successful and proven track record within the Australia water utility sector.
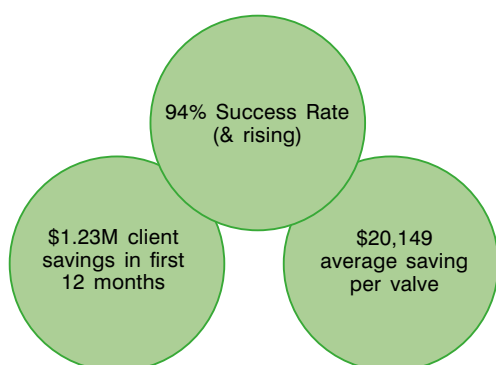
A seized valve can put your business at significant risk, often requiring lengthy emergency operations, or worse — disruption to your customers and loss of supply to thousands. Failure to act quickly will cost you time, money and reputation.

Through its patented technology, SURV can help you to realise the full asset life; it will restore a valve to its operational state. Without SURV's ultrasonic valve release technology, the same valve would otherwise require replacement.

Applications
- strategic and single supply pipelines
- strategic road, rail and river pipeline crossings
- reservoir and storage tank maintenance and cleaning projects
- pump station valve maintenance
- pipelines operating at high pressure
- pipelines that operate adjacent to, or supplying sensitive third parties
- pipelines in poor condition
- pre-assessment for main rehabilitation schemes
- testing and certification of fire hydrants
- risk mitigation in areas prone to flooding

Successful and proven track record within the Australia water utility sector

The technology is operated by experts who are able to monitor and respond to spindle movement in a controlled manner using a multi-action process.

It can further enhance your existing asset management data through its valve diagnostics service. SURV liaises with the asset operator to develop a program of works to operate valves, through a partial or complete cycle. Through this assessment, the full characteristics of a valve's operation performance will be diagnosed, often permitting the valve to be operated more efficiently in the future. This will enhance customer services as it minimises any potential for disruption to the network.

With safety in mind, SURV exclusively operates an intelligent ultrasonic valve release system, which is designed to reduce the risk of injury to your employees. Its mechanical valve actuation greatly reduces the risk of operator injuries, specifically around work-related musculoskeletal disorders associated with manual valve actuation.

Because safety and reputation are important and delivery to your customers is vital, you shouldn't leave your valve maintenance to chance. SURV will give you back control of your process, while maintaining safety and saving you time, resources and money — isn't it time you got SURVed by contracting our smart valve release services team. Take control; survey, assess and release your critical assets.

For more information, call 1300 522 170.

94% Success Rate
(& rising)

$1.23M client savings in first 12 months

$20,149 average saving per valve

Performance statistics

www.TRILITY.com.au
www.SURV.com.au

TRILITY

SURV®
Smart Ultrasonic Release of Valves

INGREDIENT WATER FILTRATION SYSTEM

Through its business unit Solys, Veolia Water Technologies has launched its NURION skid-mounted, reverse osmosis (RO) system designed to produce high-quality ingredient water.

The food and beverage industry requires water for various applications within its manufacturing facilities, notably as an ingredient, where it must be free from undesirable taste, odour, colour and impurities that could be harmful to consumers and to the product quality.

NURION has been developed as a reverse osmosis system that produces ingredient water for infant formula and soft drinks.

NURION ensures water quality consistency due to its permeate line design and certified components, which follow EHEDG hygienic design principles to optimise microbial control throughout the treatment process. The equipment pipes are made entirely of stainless steel, with a variable speed pump integrated with automatic control valves, aligned with the automation features ensuring stable operation and an autonomous reverse osmosis. In addition, all non-metallic materials (pressure vessels, membranes, seals and gaskets) are in accordance with at least one of the drinking water FDA/NSF-61/ACS regulations.

Within the NURION range (permeate flow-rate from 5 up to 25 m³/h), Solys is proposing a range of offerings, with flexibility through different options including: a full standard treatment line including pre-treatment; complementary products including CIP and chemical dosing sets; piping and installation kits; and consumables, spare parts and emergency service kits.

Veolia Water Technologies
www.veoliawatertechnologies.com.au

BRUSHLESS DC MOTOR

Outrunner motors offer many advantages, the biggest of them being the maximised distance from the shaft centre to the flux gap of the motor creating a larger lever arm effect from the torque production location to the axis. The larger diameter of outrunner motors therefore gives typically good torque characteristics.

There are also disadvantages of BLDC outrunner motors. The externally rotating rotor and static internal stator is a particular concern in any equipment that is operating near people or in harsh environments. This updated design offers an 'internal external rotor' that is contained in an aluminium or optional sealed stainless steel motor housing. The design also includes an internally mounted 4096 cpt incremental encoder and can be assembled with high torque ceramic planetary gearheads, producing a positioning drive system with a slow-motion, high-torque focus. Applications in process control, valve actuation and industrial machinery are particularly suitable for this motor.

maxon motor Australia Pty Ltd
www.maxonmotor.com.au

PROCESS CONTROLLER

The Witt Multi-Controller AM3 can be used as a standalone unit with a separate housing, but is also suitable for front-panel mounting due to its small size. Analog inputs and outputs enable communication with external systems.

The product is suitable as a display unit for virtually any application with electrical signals in the 4–20 mA range.

The console has built-in alarm functions and can manage up to eight alarms. In the event of an alarm, the alarm can be acknowledged directly via the touch display.

All received important values, such as alarms, can be stored via the integrated data logger. In addition to the alarm function, the unit can also be used as a device for monitoring external control systems.

The controller has an easy-to-read TFT display that activates automatically when approached. The device parameters, such as alarm limit values, can be easily set using capacitive keys.

Integrated into Witt gas mixers, the controller is used to monitor the inlet pressures and the vessel pressure and replaces the previous alarm module. Due to unchanged installation dimensions, the module can easily be retrofitted onto Witt gas mixers that previously used the Witt alarm module.

Niche Gas Products
www.nichegas.com.au

SUBMERSIBLE ACCELEROMETER

The Dytran series 3623 is an IEPE, case isolated, IP68 rated (submersed to 175 psi) triaxial accelerometer, weighing 18 g. This rugged, low-noise accelerometer was designed for vibration monitoring in submersible applications. Its small size makes it easy to mount in spaces inaccessible to other types of accelerometers.

The device features a hermetically sealed titanium case and a non-removable, water blocked moulded cable for zero water ingress, even at depth. TEDS models are available within the series. This function allows the user to query each sensor in a large array during field testing, and provides model number, serial number, sensitivity and other attributes using a TEDS compatible signal conditioner or data acquisition system.

Available with sensitivities ranging from 10–100 mV/g, the design of the Dytran series 3623 incorporates the latest in piezoceramic planar shear technology coupled with 2-wire internal IEPE electronics.

Metromatics Pty Ltd
www.metromatics.com.au

HMI UPGRADES

IDEC Corporation has released upgraded versions of its HG2G-V5 5.7″, HG3G-V8 8.4″, HG3G-VA 10.4″ and HG4G-VC 12.1″ HMI touch screens.

For retrofit applications, the HMIs are direct replacements for previous models, offering a seamless upgrade path and fitting into the same panel cut-outs. All HMI programming can be converted from existing models, so no additional programming is required.

All updated models use TFT-LCD screens displaying a wide range of colours, with the three larger-sized HMIs improving the resolution to 1024 x 768 pixels, while the 5.7″ model remains at 640 x 480 pixels. The entire range of HMIs offers high brightness, in this case ranging from 600 to 800 cd/m^2, to deliver greater visibility, even in high-glare locations such as direct sunlight.

An already wide operating temperature range has now been extended to cover -20 to +60°C. This, combined with IP66F, IP67F, Type 4X, 12, 13, Class I Division 2 hazardous location and UL 61010 approval ratings, allows operation in tough environments.

In addition to common and previously supported industrial protocols such as Modbus TCP and Modbus RTU, the HMIs now also support BACnet/IP. Support is included for over 100 other serial and networking industrial protocols, such as Modbus RTU Master/Slave and Modbus TCP/IP. Up to four protocols can be used simultaneously, allowing the HMIs to exchange data with many sources and systems.

USB, Ethernet and SD memory card ports are included and increased memory to 56 MB with a CPU that is 2.3 times faster, delivering improved performance.

IDEC Australia Pty Ltd
www.idec.com/australia

CMOS AREA SCAN CAMERAS

Teledyne DALSA has announced its Genie Nano-CXP series, a CoaXPress line of CMOS area scan cameras.

These CMOS sensors range from 16 to 67 MP resolution with CoaXPress 6.25 Gbps technology offering high speed, and a robust build quality for wide operating temperature ranges. Complemented by the Xtium-CXP frame grabber, they have been designed to work synergistically, minimising CPU usage and improving processing times for host applications by enabling maximum sustained throughput and ready-to-use image data.

Offering 25 million pixels at 80 fps in a small form factor, the Genie Nano-CXP cameras are engineered to deliver high-speed results for applications such as semiconductor wafer inspection, electronics manufacturing, solar panel inspection and machine vision.

Adept Turnkey Solutions
www.adept.net.au

DC UPS POWER SUPPLIES

The ADEL System range of DIN rail mount DC UPS power supplies incorporates a DIN rail mounting switchmode power supply and UPS controller into a single unit. Users can also buy a maintenance-free battery pack and holder to create a fully integrated UPS solution.

Some models can also be networked via the ADELBus network using the DPY351 controller.

The DPY351 is robust and equipped with a high-brightness and wide viewing angle 3.5″ TFT screen, providing optimum visibility in any operating condition. The user interface is clear, intuitive and allows for configuration and management of the connected devices in a quick and straightforward way.

Using the onboard Ethernet interface, it is possible to remotely manage the ADELBus network via the internet with a PC or a mobile device. The DPY351 can also act as a gateway using standard protocols such as Modbus TCP and SNMP.

ADEL System UPS power supplies are available with 12, 24 or 48 V outputs and optimise the loading and unloading times of the battery without a deep discharge, as well as the switch from the battery to the charger without any interruption. They also provide automatic protection without a fuse against reserve polarity, short circuit, overload and overvoltage.

The ADEL System power supplies are compact, allowing users to fit more devices onto a single DIN rail. They will operate in ambient temperatures ranging from -10 to 70°C.

ADM Instrument Engineering Group
www.admtech.com.au

CHANGE MANAGEMENT SOFTWARE

MDT AutoSave is a change management software package to safeguard industrial programmable equipment from loss of configuration for fast disaster recovery and configuration version archiving.

It can be configured to automatically inspect or analyse programs found in automation devices and provide detailed information of changes made between a master copy, prior version or a current version in the processor. With a complete history of changes and who made them all in one place, revisions can immediately be reviewed and audited to quickly resolve faulty or damaged programmable equipment in the production line.

The software acts as a universal industrial change platform or centralised system to coordinate all security, program versions and change-related activities to easily program logic for control programs and devices such as PLCs, CNCs, HMIs, PC control systems, robots, drives and general automation programs. This reduces time spent manually tracking changes, rewriting and commissioning programs.

Control Logic Pty Ltd
www.controllogic.com.au
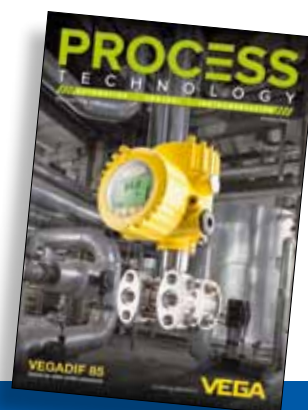
MACHINE CONDITION MONITORING SOLUTION

ADLINK Technology has announced an upgrade to its MCM machine condition monitoring solution with the launch of the DataConnect Pro Remote Facility Information Dashboard, integrating sensor management, data acquisition, edge platform and vibration analysis via dashboard-based operability. Users can simultaneously monitor multiple system devices, visualise real-time machine operation information and create effective dynamic preventive maintenance strategies, for reduced downtime and increased production capacity.

Based on the Microsoft Azure cloud platform and SaaS services, ADLINK DataConnect Pro provides a built-in equipment monitoring system utilising spectral features for precise notification. With no need for additional program development or architecture modification, it is easily deployed in multiple fields. As users grow and add more system equipment, their expansion is guided by dashboard-based existing facility information rather than redeployment or reconstruction of the whole system, thus reducing expansion costs. All users have separate accounts to ensure data security and retention of raw data for future analysis and AI application.

ADLINK Technology Inc
www.adlinktech.com

IICA

2019 TECHNOLOGY EXPOS
www.iica.org.au

Bunbury WA
20 August

Toowoomba QLD
3 September

Warrnambool VIC
18 September

Perth WA
17 October

Sydney NSW
30 October

AS I SEE IT

SMART WATER METERS: EVOLVING RAPIDLY

There are many parallels between the development of smart water meters and the development of electric vehicles, not only from a technological perspective but also from a social perspective.

Hybrid vehicles, which combine an internal combustion engine with a rechargeable battery and electric motor, were launched in the late 90s and have since become commonplace. Pure electric vehicles were launched in 2010 and their adoption in many countries is well advanced. In Australia, a mix of high price, long distances, range anxiety and lack of charging infrastructure has meant people have been reluctant to fully commit yet. But battery technology is rapidly increasing vehicle ranges and the charging infrastructure is growing, so there should be significant change in the next five years.

Similarly, over the past decade the water industry has moved into smart water metering by using the hybrid technology of attaching electronic data collection and transmission devices onto mechanical meters.

There have been numerous trials of different types of hybrid smart water meters over this period. Some of the challenges faced were the need to build proprietary communications networks and software solutions to transmit and process the data. With multiple different water meters, transmission devices, networks and software technologies to choose from, many water utilities and councils have taken a cautious wait-and-see approach.

We are now seeing the introduction of the next generation of smart ultrasonic water meters that bring a number of advantages. The ultrasonic technology has no moving parts and maintains accuracy over the life of the meter, unlike mechanical meters where the accuracy can drift. Improvements in power usage mean that battery life is now 16 years. These meters have fully integrated data collection and wireless communications, and inbuilt alarms for leaks, burst pipes and empty pipes, making the overall package very cost-effective.

We are also seeing the development of more open and standardised communications networks and these smart ultrasonic water meters are available in configurations that work with these open networks.

The benefits of adopting smart water meters include the elimination of manual meter reading costs and potential reading errors resulting in estimated bills. Also, the reduction in water consumption through customer visibility of consumption data can defer the need to build new infrastructure. There is also the potential reduction of liability for refunds under hidden leaks policies due to early customer notification of leaks.

There are also social drivers that are becoming more significant that support the business case for smart water meters.

With the universal adoption of smartphones and the internet, people expect instant access to information. Increasingly, this will be the case for individual water usage data. There is also a growing social desire to positively contribute to environmental issues. One top-of-mind issue is minimising water usage and wastage, particularly during drought. Smart water meters give people access to near real-time water usage information, allowing them to manage their water consumption in a meaningful and visible way. There is also a growing social expectation that organisations will provide increased customer service and improved transparency of their services.

All of these factors will see the rapid adoption of smart ultrasonic water meters over the next five years, much like the adoption of electric vehicles.

Andrew Riches has been in the flow meter industry for 14 years and is General Manager-Product Development for AMS Water Metering, importing smart ultrasonic water meters from Europe. He previously held senior management roles with two local manufacturers of flow meters.

This issue is sponsored by — Fluke — www.fluke.com.au