PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

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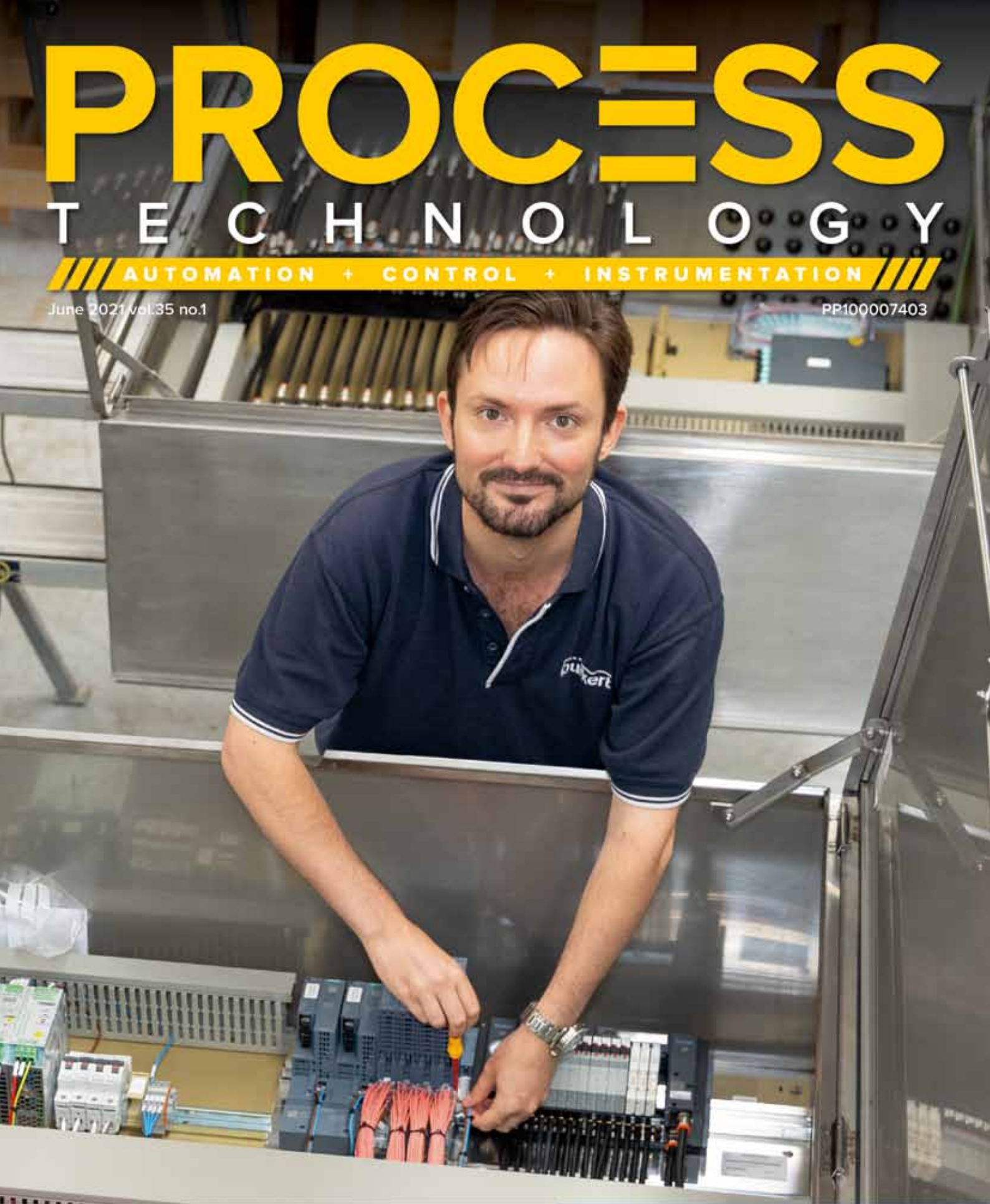

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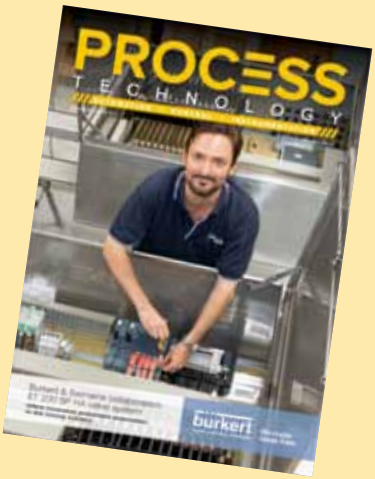
ON THE COVER



Recently Bürkert was commissioned to build six large IP66 control panel enclosures to be shipped overseas, for use on a mining site. The panels included the Bürkert AirLINE Type 8647, a Siemens SIMATIC ET 200SP HA compatible manifold. The panels will work in conjunction with optical fibre communication onsite via the Profinet protocol, with up to 40 valve functions in each panel.

The advantage of utilising the Type 8647 AirLINE SP valve island is its compatibility with Siemens peripheral systems, so that the valve island can be set up very easily. It performs identically to Siemens modules, while boasting numerous functions.

"The integration of the Type 8647 also provides the valve island with access to all of the Siemens SIMATIC ET 200SP HA's Profinet functions," said Tobias Zipf, Product Manager Pneumatics. "This allows the customer to benefit through greater process reliability and increased plant availability."

Integrated check valves in the exhaust air ducts also help to prevent unwanted valve switching caused by uncontrolled pressure peaks. In addition, the valve island has a hot-swap function, allowing valves to be changed during operation. Central monitoring of the number of switching cycles of the valves enables wear-optimised maintenance (predictive maintenance) and improves the process reliability of the plant.

The AirLINE SP Type 8647 offers direct connection to the ET 200SP HA I/O system while avoiding unwanted valve switching. Valve replacement is possible during operation thanks to its hot-swap function, with wear-optimised maintenance enabled. Each valve island offers control of up to 64 valve functions in a small, space-saving design.

Learn more by visiting https://www.burkert.com.au/en/type/8647.

Burkert Fluid Control Systems
www.burkert.com.au

bürkert FLUID CONTROL SYSTEMS

CHOOSING AN ICS CYBERSECURITY MONITORING SYSTEM

EVALUATION CRITERIA

The changing cyber-threat landscape is having a large effect on how industrial systems are managed.

A rapidly changing threat landscape, combined with convergence between traditional IT and industrial control networks, is having a dramatic impact on the risk to industrial systems. Industrial control systems (ICS) include national critical infrastructure ranging from energy production and distribution to transportation, manufacturing and building control systems that are all important underpinnings to global business and everyday life. Risks to these systems range from disruption to destruction of critical assets with the potential for collateral impact to the safety of employees and citizens.

Historically, ICS threats emanated from well-equipped nation states that steered clear of destructive attacks, which were viewed as 'red lines' that couldn't be crossed without a retaliatory response. With Stuxnet and attacks on the Ukrainian power grid, to name just a few, the proverbial red lines have clearly been crossed. But new threats, beyond nation states, are also emerging.

Cybercriminals are exploring ways to extend ransomware campaigns, from grandma's photos, which may command a few hundred dollars, to holding a production line hostage, which can be much more lucrative. Meanwhile, terrorist organisations can now engage a burgeoning underground market to buy or rent the skills, tools and infrastructure necessary to launch a campaign focused on destroying infrastructure or harming people.

One clear effect has a been a dramatic uptick in the attention corporate boards and C-level executives are now paying to the cyber risks associated with the industrial assets they are responsible for. This attention has spurred many organisations to review governance plans — with a clear trend towards accountability for protecting ICS networks being assigned to a chief information security officer (CISO). These events have spawned keen interest in tools that can provide CISOs and security teams with the same level of visibility into ICS networks that they are accustomed to with traditional IT networks.

Key requirements — an outcomes perspective

As with any technology selection, there are layers of requirements that teams need to wade through before choosing an ideal solution. Selecting a monitoring system to protect some of the most critical assets the organisation owns is no different. It is, however, important to focus on the most important criteria first so the team can narrow the field and choose a solution that addresses the essential objectives. Otherwise it is easy to get lost in a plethora of low-level requirements and miss the proverbial "forest for the trees".

A particularly useful exercise in refining the list of requirements is to flip the discussion from a 'requirements view' to an 'outcomes perspective'. That is, express the key outcomes you want to ensure that the system can deliver. This view will help the team cut through the clutter and focus in on the important goals.

The top five most important outcomes for ICS monitoring systems include:

1. Do no harm and require no downtime.
2. Give complete visibility.
3. Provide early warning.
4. Detect malicious and accidental threats.
5. Enable rapid response (reduce mean time to resolution).

Do no harm and require no downtime

Mixing metaphors, if the proverbial "pill is worse than the ill, then we have a problem Houston". Many industrial networks are 15, 20 or even 30 years old. The industrial assets and the underlying networks in many of these environments are quite brittle compared with today's standards. And while newer plants — with modern network equipment and contemporary industrial assets — are often more robust and resilient to network traffic delays or other unexpected interruptions, even modern ICS networks can be finicky.

Therefore, ICS monitoring systems need to be designed to ensure they don't harm industrial networks or adversely impact the industrial process. Many traditional IT vendors and security teams learned hard lessons when they tried to run, for example, vulnerability scanning systems that queried control assets that were simply not designed to be interrogated and added traffic to the network. ICS devices sometimes failed, and not gracefully, occasionally taking plants offline in the process.

Systems that actively poll (or query) endpoints such as controllers can harm the process. This can be a somewhat less severe risk in modern networks or at the upper layers of the Purdue Model where the workstations or servers are more resilient to interrogation.

Another important consideration is whether the solution requires plant downtime for installation or maintenance. Systems that need to be installed on endpoints or systems that need to be placed 'in line' on the ICS network require downtime to set up or must be installed, configured and modified only during plant maintenance windows. This can cause significant implementation project delays or emergency downtime to fix issues.

Give complete visibility

First the solution must be able to monitor both TCP/IP and non-IP nodes — for example, serial connections such as Profibus or Modbus — that are a critical part of many industrial environments. Further, the system needs to be able to understand network topology and provide visibility into 'the other side' of gateway devices. For example, this could be a PLC with a network card that is a gateway to a potentially expansive segment of the network on the other side of the device. IT teams will often assume that they have a secure network perimeter, but fail to understand that assets on the other side of the gateway may be connected to a network that is connected directly to the internet or DMZ. In a nutshell, blind spots are bad because they limit the team's visibility into potential attack vectors and make good hiding places for adversaries seeking persistence.

Secondly, the system must cover the full range of ICS protocols that are present in the specific environment. This does not mean cursory coverage where the system can simply identify the presence of a specific ICS protocol, or systems that only understand the network address of the nodes involved in the conversation. This means a deep understanding of the open and proprietary protocols, so the tool can discern types of devices that are communicating and understand the actual conversations. Otherwise the system will not be able to provide important insights, detect anomalies or provide rich alerts and the contextual information you will need to meet other very important objectives noted below.

Many IT security vendors have tried to repurpose traditional security tools for use in ICS networks (eg, IDS/IPS, next-gen firewalls, etc). For these limited protocol devices, being implemented in an ICS network is like being dropped into a United Nations session without the special translation headphones. You know there are many conversations going on but can only really understand one or maybe two. A tool that is ICS protocol blind means it cannot understand the important industrial control conversations that need to be monitored for anomalous behaviour or other important activities that may pose a risk. The degree to which the system can provide insights into network configuration issues or build a fine-grained anomaly detection model is directly proportional to the depth of understanding that the given system has into the protocols being used in the network. Without significant protocol inspection depth, the monitoring system's detection and alerting capability will be conspicuously limited.

Provide early warning

An attack on a system requires the adversary to successfully execute multiple steps in a process. The steps an adversary takes to execute a cyber attack were well documented by a team at Lockheed Martin, using the established kill chain model employed by the military. A key premise of the Lockheed Martin Cyber Kill Chain is that if you can detect a threat early in the chain, you can disrupt (kill) it before it has its intended impact.

With this as a premise, it is very important for the ICS monitoring technology to be able to identify an attack as early as possible in the kill chain — for example, when the attacker is trying to establish a foothold on the industrial network or is working to enumerate the network to identify key targets such as controllers. Because early detection is not ensured and response times often vary, it is also important for a monitoring tool to be able to detect adversary activity all along the kill chain — up to and including attempts to manipulate settings to impact the underlying process (such as changing a controller's settings).

Detect malicious and accidental threats

Industrial systems and the processes they control face many different types of issues. As any well-schooled ICS security practitioner (unfortunately there are not enough of them) or plant floor operator can tell you, human error and accidents are far more common (at least today) than actual cyber attacks trying to inflict harm. Thus, ICS monitoring solutions must be capable of alerting security and shop floor teams about both malicious activity and other actions that could potentially harm assets, process or people.

On the malicious side of the equation there are two main categories — external and insider threats. External threats must gain a footprint on the network or co-opt an insider to have an adverse impact. In the former case, we discussed detection throughout the kill chain steps. The insider

is the most difficult case: where an external actor co-opts an insider, or where a disgruntled employee is acting on their own. In this situation, the insider would typically have legitimate credentials and be authorised to make changes to the network environment or controllers that could harm the process. Thus, the monitoring tool must be able to detect obviously malicious activity as well as high-risk changes that may be perfectly legitimate but could also be initiated by an insider attempting to do harm.

Enable rapid response (reduce mean time to resolution)

This is an easily stated, but often very hard-to-deliver outcome for many systems. To achieve this outcome there are a few underlying requirements that need to be addressed.

First, the system needs to provide security operations centre (SOC) analysts — typically the primary user — immediate 'situational awareness'. To achieve this requirement the system must provide concise, well-crafted, human-understandable alerts that shorten the time and effort needed to investigate and resolve alerts.

> PROVIDING VISIBILITY ACROSS THE LENGTH, WIDTH AND DEPTH OF AN ICS NETWORK IS A FOUNDATIONAL OUTCOME AND IMPORTANT PREREQUISITE FOR OTHER KEY REQUIREMENTS.

Rather than a single, consolidated alert that indicates exactly what is going on, far too many systems provide SOC analysts with a long stream of anomalous events — often requiring significant effort just to understand what is happening and whether it is important. Assembling a stream of alerts for an ICS network that SOC analysts are often unfamiliar with, into something meaningful, is beyond the skill set of most analysts. Even if the team has the skills, the extra cycles are something that these teams certainly don't have and the lost time can prove critical during an attack.

Secondly, in addition to immediate situational awareness, advanced systems will provide the contextual security data required for SOC teams leading the investigation of alerts in the early part of the kill chain. SOC teams understand security events associated with adversaries gaining a foothold, enumerating the network and attempting to move laterally. This activity is directly in their 'wheel house' and the more contextual information the analyst has regarding the attack the more quickly and efficiently they can investigate and resolve the issue.

The same applies for alerts associated with the latter stages of the kill chain; for example, where an adversary may be trying to change controller settings to impact the underlying industrial process. In these cases, the SOC team will most likely need to interact with their counterparts at the plant. For this conversation to be efficient and productive, the SOC analyst will need to provide shop floor personnel contextual information associated with the process itself.

For example, instead of relaying network addresses of the assets involved, which plant personnel may or may not be able to quickly associate, the SOC analyst can improve the situation by providing asset names. Further, to ensure that plant personnel can efficiently investigate issues, SOC teams can provide information such as the set points being manipulated and other contextual information the operations and engineering teams need. Armed with actual process-related context, plant personnel can readily query SCADA and DCS systems, understand the potential impact and take steps to mitigate the attack.

To help SOC and shop-floor teams collaboratively investigate and solve these later-stage, process-affecting alerts, the system must provide detailed process context. In all scenarios the ability to rapidly understand the situation that caused the alarm and the ability to quickly and efficiently investigate the issue is crucial.

Summary

With the list of the top five outcomes ICS monitoring systems need to deliver, teams can focus on the most important requirements — those that deliver true risk management ROI.

Claroty
www.claroty.com

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

STAINLESS STEEL PANEL PC

This panel PC fully complies with IP69K water and dust resistance to survive splashing conditions during washdown processes.

Backplane Systems Technology Pty Ltd

https://bit.ly/3aXm0qD

EDGE AUTOMATION CONTROLLER

The DA50A automation controller provides secure networking, protocol conversion, cloud connectivity and IEC61131 automation capabilities in a modular design.

Control Logic Pty Ltd

https://bit.ly/3eUxJaO

ULTRASONIC SENSOR

The UC18GS ultrasonic sensor offers features that meet a broad range of application needs, including adjustable beam width and built-in interference target suppression.

Pepperl+Fuchs (Aust) Pty Ltd

https://bit.ly/3eM9OKt

ENERGY-EFFICIENT MOTORS

The DR, DRN and DR2 series energy-efficient motors offer designs supporting efficiency classes IE1 to IE4.

SEW-Eurodrive Pty Ltd

https://bit.ly/2ReOBAK

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NEW PRODUCTS

DIFFERENTIAL PRESSURE TRANSMITTER

The Furness Controls FCO432 differential pressure transmitter offers a wide measuring range from low pressure of ±50 Pa to +10 bar. It also has an accuracy of ±0.25% of reading.

This pressure transmitter is available with two display options: a low-power LCD display or a high-brightness, illuminated OLED display. This offers flexibility for integration into different industrial applications. Alternatively, users can opt to use the transmitter without a display.

The FCO432 can be configured with multiple functions such as setting up an alarm system using independent relays, or zeroing the device externally or automatically. Its output is fully scalable as linear to differential pressure or as a square-root function. It can also be configured with standard 2-wire 4–20 mA and 4-wire isolated 4–20 mA current output, as well as voltage options.

The FCO432 is suitable for cleanroom applications such as in pharmaceutical manufacturing or for industrial flow measurements such as combustion pressure, air pressure and air flow in industrial furnaces, dryers, ovens, cleanrooms, wind-tunnels, orifice plates, pitot static tubes and others.

Bestech Australia Pty Ltd
www.bestech.com.au

DISTRIBUTION BLOCKS WITH INTEGRATED DISCONNECT

The PTFIX distribution blocks with push-in connection from Phoenix Contact are individually configurable. They can be used to separate signals quickly and easily as well as to implement fuses and components.

Three different versions are available: TG, for various isolating plugs, fuse plugs and component connectors; MT, featuring integrated knife disconnection; and MTL, featuring integrated lever knife disconnection. The function distribution blocks have test points for all common test probes.

The compact size saves space, and various mounting adapters for DIN rail and direct mounting provide flexible mounting options. All PTFIX blocks can be aligned without any loss of pitch. For custom creation, Phoenix Contact offers the web-based PTFIX configurator in which the user is guided to enter desired properties and the resultant configuration can be ordered.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

KNIFE GATE VALVES

Emerson has announced the Clarkson KS1 knife gate valve, designed to help mine, oil sands, and pulp and paper operators achieve increased availability for challenging slurry processes.

The knife gate valve features a gate edge seal design that creates a continuous seal around the gate, together with a precision-moulded elastomer seat. The heavy-duty seat is said to increase the contact area and resilient sealing ability of the valve compared to standard O-ring designs, resulting in improved isolation performance over an extended life cycle.

The valve design has been optimised for heavy slurry conditions with a full round port that eliminates protrusions into the flow, which minimises turbulence across the valve and reduces wear on valve components and downstream equipment. Reversible, rotatable wear rings on both sides of the valve protect the seat and extend maintenance intervals.

The valve is repairable with standard tools and readily available spare parts. Adjustments can be made to the packing system that dynamically self-adjust pressure to the gate edge seal system. The product is designed to standard MSS SP-135 face-to-face dimensions for simple change-out and upgrade of underperforming installed valves.

The product comes in sizes from 2″ through to 30″ with a variety of available flange patterns; an ASME Class 150 pressure rating of 290 psi at ambient temperature; and a temperature rating up to 150°C. Alternate materials are available to combat extraordinary abrasive and corrosive process conditions and a variety of automation options can be configured to suit.

Emerson Automation Solutions
www.emerson.com/au/automation

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Beamex MC6-T

New revolutionary temperature calibrator

AMS

The Beamex MC6-T is an extremely versatile portable automated temperature calibration system. It combines a state-of-the-art temperature dry-block with Beamex MC6 multifunction process calibrator and communicator technology.

With the ability to generate temperature as well as measure and simulate temperature and electrical signals, it offers a really unique combination of functionality. In addition to temperature calibration abilities, the MC6-T also offers electrical and pressure calibration capability, all in one device.

It offers versatility, that no other temperature calibrator can match.

AMS INSTRUMENTATION & CALIBRATION PTY LTD
Unit 20, 51 Kalman drive
Boronia VIC 3155
AUSTRALIA

Phone: +61-3-9017 8225
Fax: +61-3-9729 9604
E-mail: sales@ams-ic.com.au
Internet: www.ams-ic.com.au

DIFFERENTIAL PRESSURE SWITCH

The Dwyer Series AT-ADPS ATEX/IECEx approved differential pressure switch incorporates a flameproof aluminium enclosure that protects the device for use in hazardous areas commonly found in process or industrial applications.

The differential pressure switch is designed for monitoring pressure, vacuum and differential pressure. The set point can be easily set and verified without the need of a separate pressure gauge due to the unit's dual-scale adjustment knob. Additionally, six different pressure ranges are available, allowing the product to be installed in varying process or HVAC applications.

The switch incorporates a cast aluminium enclosure with texture epoxy coating suitable for industrial applications. An optional windowed enclosure allows users to visually verify the pressure set point on the pressure switch while the device is energised.

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

GAS CYLINDER ADAPTERS

Ralston Instruments has introduced a range of compressed gas cylinder adapters, adding to its existing line of pressure calibration products. Made of stainless steel with a knurled knob for easy grip, the compressed gas cylinder adapters make it easy to connect and disconnect a hose or regulator to inert gas cylinder valves without a wrench or thread tape.

The compressed gas cylinder valve adapters are said to be a practical and functional option for pressure calibration applications in the oil and gas, health care, pharmaceutical, aerospace and plastic industries, along with processes involving the use of inert gas cylinders. The five available models connect to AS 2473.2 Type 50 (Australia), CGA 580 (US and Canada), BS 341 Type 3 (UK), NF E29-650 Type C (France) and DIN 477 Type 10 (Germany).

Ralston Instruments LLC
www.ralstoninst.com

PARTICLE IMAGE VELOCIMETRY CAMERA

The pco.panda 26 DS sCMOS camera from PCO offers double shutter capabilities, a resolution of 5120 x 5120 pixels and 26 MP images with an inter-framing gap of 1 μs making it suitable for double imaging — a prerequisite to perform particle image velocimetry (PIV) measurements. These include non-intrusive laser optical measurement techniques for research, diagnostics into flow analysis, turbulence, aerodynamics, microfluidics, chemical processing plants, spray atomisation, spray dryers, rotary kilns and combustion processes such as gas turbine combustors used for aero and marine applications.

In PIV, light-scattering particles are added to the flow under test. A laser beam is formed into a light sheet, illuminating the scattering particles twice with a short pulse at a time interval Δt. The lower limit for this time interval is defined by the double image inter-framing time of the camera. The scattered light is recorded onto two consecutive frames of a high-resolution digital camera. The shorter the double image inter-framing time, the higher the flow speeds that can be analysed.

Exposure times for the pco.panda 26 DS range from 6 μs to 350 ms and the frame rate is 7.1 fps at 26 MP resolution. The dynamic range is 66 dB and parasitic light sensitivity 1:10,000 so users can achieve a low readout noise and dark current.

The compact housing design of the camera and interface provide easy integration. No external power supply is required and power and fast data transfer are through a single USB 3.1 cable.

SciTech Pty Ltd
www.scitech.com.au

Clean waterways with artificial intelligence and IoT

In cities all over the world — and particularly in older cities — stormwater runoff and household sewage are transported to water treatment plants in the same piping network. An advantage of these so-called combined sewage systems (CSS) is that runoff water, which could be polluted with oil, pesticides, fertiliser and more, is purified before it is released into nature. That's good news for the environment.

There is a downside, however: during heavy rainfall or snowmelt, a CSS piping network can be stretched to the limits and untreated water may escape into waterways via the combined sewer outlet (CSO). But the chances of this happening are greatly diminished when blockages in the CSO are removed in time.

British water company Yorkshire Water operates 55,000 km of sewers. In times of intense rainfall, CSOs are designed to release excess water and sewage into rivers to prevent flooding in public areas. Of course, these incidents need to be kept to an absolute minimum. In the framework of Yorkshire Water's Pollution Incident Reduction Plan 2020 – 2025, the goal is to cut pollution incidents by 50%. Key to attaining this objective is to remove CSO blockages and thereby minimise the probability of a release.

For some time now, around 2000 sensors on CSOs have been monitoring sewage levels and issuing alerts when an overspill has happened. But wouldn't it be better to know where blockages are most likely to occur so that debris can be removed before an overspill has a chance of developing? Until now, experts at Yorkshire Water have been trying to make predictions by evaluating data from the sensors with statistical methods, but that often led to false alarms and late detections.

Each CSO responds differently to rainfall, so it is difficult to know if the observed changes in level are normal or not. A number of factors come to play here — such as the design of the upstream and downstream network, or whether the area is hilly or flat, urban or rural.

The company therefore took the step of replacing statistical methods and partnered with Siemens and the University of Sheffield to develop a system that employs AI and the IoT to locate blockages before overspills can occur. The approach has now been tested at 70 sites across the region.

"The results of the innovative trial across the region have been very positive," said Heather Sheffield, Manager of Operational Planning and Technology at Yorkshire Water. "The data has allowed us to identify problems with our network quickly, giving our teams the opportunity to attend to them before pollution occurs."

The data from the sensors on the CSOs, along with real-time information on rainfall, is delivered to SIWA Blockage Predictor. This application — which runs on MindSphere, Siemens' cloud-based IoT operating system — identifies anomalies in sewer system behaviour.

Initially, an AI system was trained with sensor data to learn the normal behaviour for a CSO when it rains. Now, a new AI model has been trained for each site to learn its unique pattern of behaviour in response to rainfall. Fuzzy logic technology is then employed to automatically interpret the data to detect any significant differences in behaviour. When an issue is found, a response team at Yorkshire Water receives a notification to visit the asset and remove the blockage or forming blockage. Because SIWA Blockage Predictor is embedded within a web application, users can access it on mobile devices and PCs.

In the trial involving a variety of assets across 70 sites, SIWA Blockage Predictor gave up to two weeks' advance notice of blockages — blockages that could have potentially led to undiluted effluent being released into the environment. Further, the predictor found nine in 10 potential issues, which makes it three times more successful than the prediction processes that relied on statistical methods. Another boon to operations teams is an extremely low false alarm rate of just 3%. That's half the rate of the current statistics-method-based approach.

The journey from idea to solution began with a series of research projects between Yorkshire Water and the University of Sheffield. Over a number of years, the core analytics concept was proven on a sample of Yorkshire Water assets.

While the analytics worked, as an academic project it was not designed to be scalable nor secure, and it wasn't optimised for easy daily use. When Siemens joined the project team, the data science knowledge was transferred and the university team took on a second important role — validating the effectiveness of how Siemens had developed the analytics and how this compared to the existing Yorkshire Water solution. After analysing 21,300 days of data, this independent analysis by the university further boosted Yorkshire Water's confidence in this new tool.

For a longer and more detailed version of this article go to https://bit.ly/2QpfiCE

Siemens Ltd

www.siemens.com.au

UPS SERIES WITH ONE CABLE TECHNOLOGY

The UPS units from Beckhoff's CU81xx series have been designed for rear panel and DIN rail mounting. One capacitive and two battery-assisted versions are available: the CU8110-0120 capacitive UPS (0.9 Wh) with a maximum power output of 120 W; the CU8130-0120 battery-backed UPS (15 Wh) with a maximum power output of 120 W; and the CU8130-0240 battery-backed UPS (30 Wh) with a maximum power output of 240 W.

In the battery-assisted versions, the NiMH battery cells are accessible from the front should they need to be replaced. It is only necessary to release two screws in the cover to replace the battery module.

A feature of the UPS series is its flexible communication capability, which allows the retrieval of status values for diagnostic purposes or the configuration of the UPS. All industrial PCs with an appropriate interface and Windows 7 or 10 operating system can thus be connected in the conventional way via USB 2.0. In the simplest case, eg, when using a classic PLC, digital I/Os are also available so that the controller can read a power fail signal and respond accordingly.

The UPS connection can also be implemented with the Beckhoff One Cable Technology (UPS-OCT) solution, which is currently supported by Beckhoff's C6030 IPC, the CX52xx embedded PC series and the CX2100-0024 embedded PC power supply unit. This solution combines the IPC power supply with the UPS communication in a single 24 VDC cable.

Beckhoff Automation Pty Ltd
www.beckhoff.com

COMPACT MAGNETIC ENCODER

The TWK TRW38 is an ultra-compact single-turn magnetic encoder developed with safety-oriented applications in mind. With a diameter and length of 38 mm the sensor is suitable for mounting in confined installation spaces. The safety encoder detects both position and speed and fulfils the requirements of SIL 2 (IEC 61508) and PL d (EN 13849). The safety-related signals are transmitted via a certified EtherCAT FSoE interface.

The position resolution is 16 bits/revolution. The certified EtherCAT FSoE interface is designed to ensure reliable transmission of the safety-related signals to the higher-level controller or to a safety relay, as well as programming of the sensor.

The aluminium housing and overall design is intended to enable long service life under unfavourable conditions such as vibration and shock loads.

Veederline Pty Ltd
www.veederline.com.au

EMBEDDED COMPUTER

The ARK-3531 is powered by a 9th Gen. Intel Core i3/i5/i7/i9 35W desktop processor and provides a rugged, compact design suitable for limited-space environments. It delivers desktop-comparable computing power, supports 9–36 VDC power input and provides an IP40-rated vibration/shock-resistant design capable of functioning in broad temperature ranges of -20 to 60°C.

This embedded computer supports dual DDR4 2666 MHz SO-DIMM memory with a 64 GB maximum capacity. It features a range of I/Os including two USB 3.1, six USB 3.0, eight COM ports and 16 bit GPIO. It also provides a mini PCIe slot and an M.2 2230 E key slot for device integration. Using Intel RAID 0/1 software, the ARK-3531 accommodates two 2.5″ SATA III hard drive bays, enabling adaptability in diverse applications.

When using Advantech's VEGA-320 and VEGA-330 edge AI modules, the ARK-3531 functions as an AI inference system for applications in robotics, smart manufacturing and transportation. When paired with Advantech's edge AI VEGA modules, the ARK-3531 can function as an AI inference system in AI image recognition applications.

Remote monitoring and management via a centralised platform enables predictive maintenance and efficient troubleshooting while minimising IoT device downtime. Advantech's WISE-DeviceOn software platform features a suite of programmable APIs including a multi-level watchdog, hardware monitor, system restore mechanism and other user-friendly interfaces. With the inclusion of WISE-DeviceOn, the ARK-3531 can be used for remotely managing, monitoring, configuring and controlling numerous terminals for easier maintenance and recovery.

Advantech Australia Pty Ltd
www.advantech.net.au

USB INTRINSIC SAFETY BARRIER

The Pepperl+Fuchs USB intrinsic safety barrier supplies EXTA2 keyboards or similar devices in Zone 1/21. The barrier connects a host device, such as an industrial PC that is installed in Zone 2 or in non-hazardous areas, to a USB device such as a Pepperl+Fuchs EXTA2 keyboard or a similar device in a Zone 1/21 environment. To transmit USB signals from hazardous areas, it converts the two USB channels into intrinsically safe circuits.

The barrier is certified to lead intrinsically safe circuits into Zone 1/21 hazardous areas and is a one-to-one data connector — data is passed through without buffering. The barrier is powered via the USB host, so no extra power is required.

A suitable enclosure that corresponds to at least IP54 in accordance with IEC/EN 60079-0 allows the barrier to be used in Zone 2/22, while the connected EXTA2 keyboard can be installed in Zone 2/22 or 1/21.

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

BARCODE READER

The BCL 200i is a 1D barcode reader with integrated industrial interfaces and simple Profinet configuration. The device can be configured directly in the control system via the GSDML file. Compact in size, it offers a cable outlet on the side of the device as well as a dovetail connection, making it suitable for applications such as on or between conveyor lines.

The product is particularly suited to the detection of 1D codes in guided container reading regardless of whether the barcode is printed vertically or horizontally on the label. The device features integrated Ethernet TCP/IP and Profinet interfaces. The web-based configuration tool enables remote diagnostics worldwide.

The integrated code reconstruction technology (CRT) enables the device to read barcodes with small line heights, damaged/smudged labels or a large twist angle. Due to automatic reflector activation (autoReflAct), the barcode reader can be activated without any additional sensor. This is achieved by placing the barcode reader directly facing a reflector mounted on the other side of the conveyor. As long as the scanner is the target at the reflector, the reading gate remains closed. If the reflector is covered by an object with a barcode label, the scanner activates the read procedure.

Leuze electronic Pty Ltd
www.leuze.com.au

NEW PRODUCTS

IoT SURGE PROTECTION DEVICES

The VARITECTOR PU AC IoT surge protection devices were specifically developed by Weidmüller for stable 230/400 V networks, and are designed to provide top-level protection for industrial energy networks. The product features a real-time status monitoring function, which allows for live monitoring of the arrester. This function is useful when there are deviations from the standard, which are then automatically displayed to the user.

The VARITECTOR PU AC IoT records surge pulses and monitors the status of the protective conductor connection or the history of the temporary surge voltages. This makes it possible to draw conclusions on the service life of the arrester and to plan service work efficiently. In this case, the user will receive operating data to review, for example, or will be shown a message explaining that the arrester has come to the end of its service life and needs to be replaced at the next maintenance interval.

The IoT function can withstand the lightning current, meaning that the data for real-time monitoring is available even following a surge voltage. The intuitive integration into the Industrial IoT can also be carried out via web server. Using the MQTT protocol provides the user with the data in the form of standardised protocols that can be easily integrated into the user's existing engineering systems.

Weidmuller Pty Ltd

www.weidmuller.com.au

MULTIVARIABLE VORTEX FLOWMETER

The VorTek Instruments Pro-V M24 multivariable vortex flowmeter incorporates a velocity sensor, a precision platinum RTD temperature sensor and a solid-state pressure transducer. The M24 can deliver volumetric flow, mass flow, temperature, pressure, density and energy (BTU) measurements from a single installed device, which should reduce complexity, equipment costs and installation costs in comparison to installing multiple standalone instruments.

The device includes a reduced bore option. The meter's process connections match the line size, but by using integrated reducing flanges the meter body is reduced in diameter. This increases the fluid velocity through the meter, extending the meter's measuring range to capture lower flow rates that might otherwise be missed in a full line size meter. This reduced bore option also shares the same face-to-face dimension as a standard M24 meter for pressure classes up to ANSI 600. So if process conditions change, the meter body size can be changed without any piping modifications.

In addition to providing traditional communication methods such as analog output signals, the flowmeter offers serial communication options such as BACnet/IP and Modbus TCP/IP. It also provides Power over Ethernet (PoE) capabilities, delivering power and data through a single Ethernet cable.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au

FANLESS EMBEDDED SYSTEM

The iEi TANK-880-Q370 is a ruggedised fanless embedded system with an Intel i7-9700TE 1.8 GHz processor, 8 GB DDR4 pre-installed memory, one PCIe x16, two PCIe x4 and one PCIe x1 expansion slots, HDMI/DP video and a 9–36 VDC power supply.

The product contains multiple expansion slots for add-on cards and four accessible 2.5″ HDD/SSD SATA 6 Gbps bays (with RAID 0/1/5/10 support), which allows for analysing large amounts of data. It also has multiple LAN ports that are easy to install and maintain. To allow the hardware and additional software to run effectively, the device has an operating temperature range of -20 to 60°C.

It also supports dual independent displays with high-resolution support.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au

RJ45 INDUSTRIAL ETHERNET CONNECTORS

The HARTING RJ Industrial is a complete, matched Ethernet cabling system for building automation and industry. The company says it is a solution that can be used for all applications with equal success, with RJ45 connectors for demanding tasks — from printed circuit boards to patch panels, whether IP20 or IP65/67, in HARTING Han 3 A hoods and housings.

The RJ45 plug is at the heart of HARTING's RJ Industrial product line. It can be assembled in the field without any special tools. Nowadays, the product line covers all Ethernet communication technology: ranging from PCB sockets for device integration to industrial data sockets. Hybrid interfaces are also available, combining data transmission and power supply in one connector and cable. This requires 50% less space, uses less cabling room and reduces costs.

HARTING Pty Ltd
www.harting.com.au

MACHINE VISION CAMERAS

Pixelink's PL-X machine vision camera series with 10 GigE interface is designed to provide speed, accuracy and reliability with a quick and easy set-up. Four camera models are available and include 7, 12, 20 and 24 MP versions and incorporate Sony's Pregius Sensor line including the latest 4th generation sensors.

Additional features including Power-over-Ethernet (PoE), Trigger-over-Ethernet (ToE), IEEE 1588 clock synchronisation (PTP) and high-speed data transfer, making the cameras suitable for applications such as automated inspection, VR and AR applications, broadcasting, 3D mapping, research and multi-camera application requiring synchronisation.

Sensor features such as back-illumination and global shutter are designed to support the capture of accurate, distortion-free images of large moving objects with high bandwidth for high-speed imaging. Enclosed or board-level versions are available.

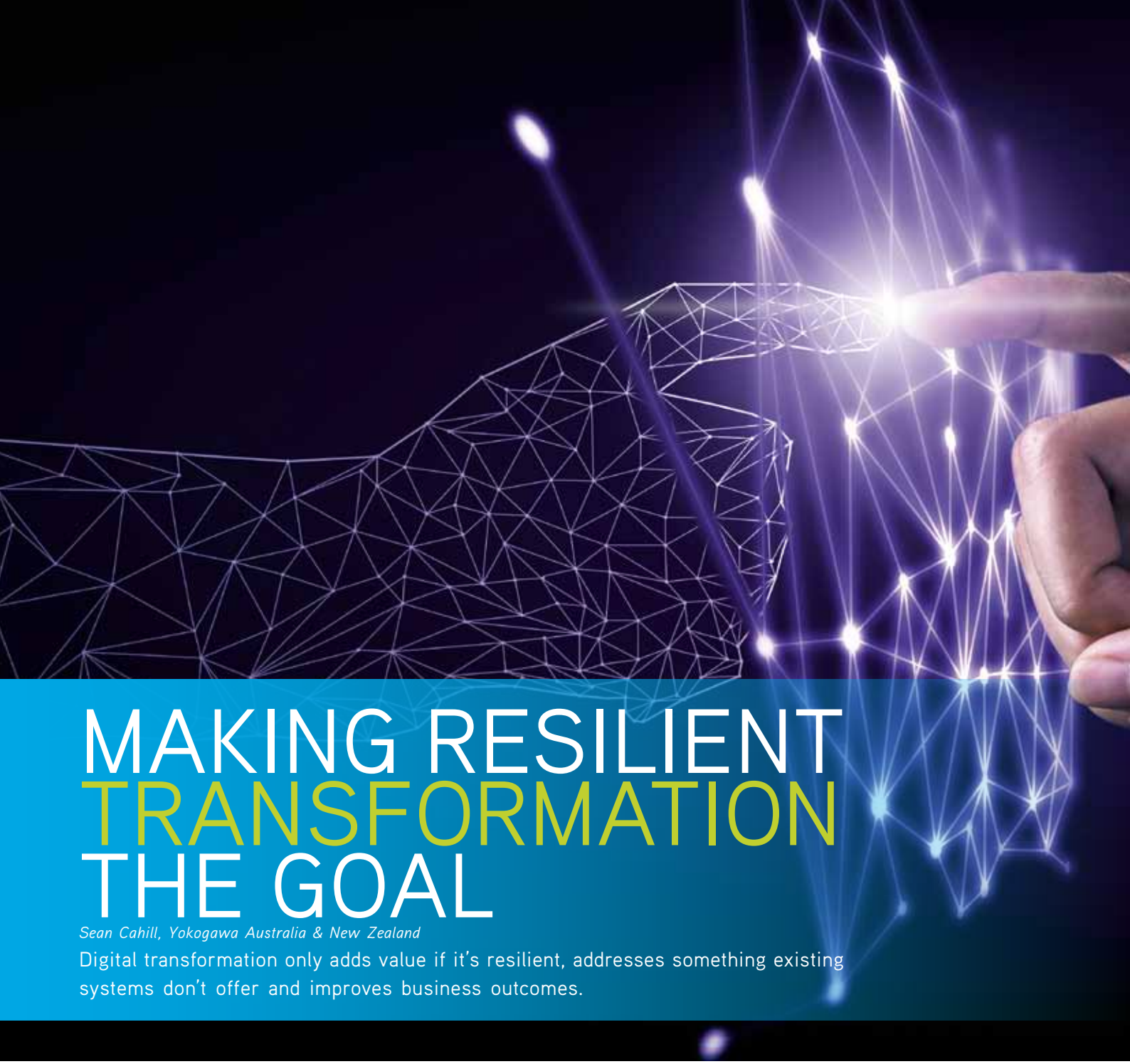
SciTech Pty Ltd
www.scitech.com.au

SAFETY RADAR SYSTEM

The LBK radar system responds to movements and generates a switching signal as soon as a person enters or exits the monitored area. Leuze says the radar technology can differentiate between people and static objects, and detects even stationary persons located in the protected area. Static objects, such as pallets or material containers, can be left in the protected area with no problem, as they do not result in a system interruption.

The safety radar system is used primarily in restart protection and for monitoring hidden areas. Users can adapt it to their individual requirements due to the number and position of the sensors, the adjustable operating range as well as the selectable opening angle. The system also uses its FMCW technology to monitor areas on steps or pedestals and behind non-metallic shadowing. To safeguard larger areas, up to six radar sensors can be connected together via a controller. In this way, the system offers a maximum monitoring area of 15 x 4 m. The individual sensors can be connected to form groups and if necessary these groups can be switched off, thereby allowing the system to adapt to dynamic processes. Users can use the easy-to-operate configuration software to define the system parameters.

Leuze electronic Pty Ltd
www.leuze.com.au



MAKING RESILIENT TRANSFORMATION THE GOAL

Sean Cahill, Yokogawa Australia & New Zealand

Digital transformation only adds value if it's resilient, addresses something existing systems don't offer and improves business outcomes.

There are many definitions of digital transformation, and although there may be variances and differing opinions, there does seem to be a consensus on the base premise.

"Digital transformation is the use of digital technology to accelerate business strategy. It is about the careful selection and effective application of digital technologies to empower people, optimise processes and automate systems of the organisation to achieve a step-change in business performance."

Where issues of understanding and interpretation of digital transformation arise are usually around the selection and application of technologies. This is often further confused by the plethora of new entrants supplying to the manufacturing and process industries, where process understanding and experience can be a significant issue. Well-intentioned, or merely seeking to take advantage of a potentially lucrative new business opportunity, technologies that are designed for non-industrial applications find their way into the mix, often with unpredictable results. The greater damage caused by this is from a loss of confidence by the end user and a growing sense of digital fatigue. This can lead to considerable delays in their ability to take advantage of this valuable process improvement opportunity, at a time when it's needed the most.

The collection and analysis of significant volumes of process data is the crux of digital transformation. It is a key step as industry looks to the future, and the predicted move towards 'industrial autonomy'. Data capture and data mining have been around for decades, but until recently we lacked a cost-effective means of doing so at the scale we are now contemplating. Capturing the huge volume of data at the desired sample rates or having the storage, processing power and analytical tools to effectively take advantage of this virtual goldmine is now a reality. Yet in the excitement of being presented with this new opportunity, many have forgotten a core tenet of the process and manufacturing gospel: is my data reliable?

Conservatism is not a dirty word

As engineers it is only natural to get enthused at new and exciting technologies. This is despite the instinctive conservatism that has been a natural element — and more importantly, a balancing ele-

ment — keeping our industry reliable and most importantly, safe.

Enthusiasm also emanates from other sources within the business. Once omnipresent market pressures have increased further due to the unexpected consequences of COVID-19. Cost, productivity, environment, staffing and safety (CPESS) have all been dragged more centrally into the spotlight. Business continuity plans (BCPs) have been challenged in unimaginable ways due to the black swan event that is COVID-19, challenging even the most robust contingency management practices. Despite many continuing to operate in a sense of relative 'normality', what has occurred led many business leaders to consider whether they were well enough prepared or whether they had spent time since the global financial crisis blindly shuffling towards an uncertain future.

Being cast unceremoniously into the spotlight has not only focused leaders on their BCPs, but has drawn a degree of clarity on what image of the future they should look to create. This is where digital transformation has entered the fray for many — some at an accelerated pace. Suddenly the goal is not only to build further resilience into their operations, but to construct a platform

> INDUSTRY IN GENERAL HAS FOR MANY YEARS BEEN UNDERSERVED IN THE DATA ANALYTICS SPACE.

upon which they can address CPESS challenges and create an evolutionary future of industrial autonomy. Increasing clarity on the advantages of doing so has been revealed not only to leaders in the process and manufacturing industries, but also to those who covet the business opportunities it creates.

Industry in general has for many years been underserved in the data analytics space. As the commercial sectors became flooded with service providers, attention suddenly locked onto the enormous potential of industry, once IIoT became a 'thing'.

Some of the blame for this lag resides with the process and manufacturing sectors themselves. This was due to their conservative nature and need to limit downtime, while ensuring stability and safety — such factors that other sectors might accommodate to a degree, but without the potential for serious ramifications as is faced by many industry segments. Reliability is critical, stability is crucial and safety should be without compromise. Yet as the buzz around digital transformation became a roar, so people's guards began to slip, often driven by an executive need to improve business performance — the once impenetrable drawbridge of expectation around supplier capability, process understanding and fit-for-purpose products slipping a few gears. The resultant flood of hungry new entrants clutching at any opportunity they could create was growing in voracity.

Don't get me wrong: there is a place for new, innovative and alternative technologies in any space, the process and manufacturing industries being no different. The real issue has been the overwhelming and often confusing array of products, services and 'guidance'. All have drawn the attention of end users away from basic principles due to the clamour for a 'quick win', yet delivering questionable outcomes at a significant cost. With little discernible return on investment and compromises to one or more elements of CPESS, some manufacturers have retracted their support for digital transformation. In circumstances where they still decide to engage, the responsibility is often removed from operational technology (OT) teams and passed to the IT department, often without a cohesive integration plan. This leaves many gaps: be they source data reliability, or simply a lack of understanding of the systems already in place and their capabilities.

When it's not digital transformation

A recent case in the mining industry highlights this issue perfectly. A time-consuming and expensive digital transformation solution had been sold to the miner to resolve process challenges encountered with one of their crushing circuits. Heralded as a unique artificial intelligence (AI) solution, it was designed to predict the level of crushed ore in the bins and keep them at optimal levels. On further analysis by the OT team, this proved nothing more than a simple mass balance calculation that could have been achieved

> WHERE ISSUES OF UNDERSTANDING AND INTERPRETATION OF DIGITAL TRANSFORMATION ARISE ARE USUALLY AROUND THE SELECTION AND APPLICATION OF TECHNOLOGIES.

within their existing process control system and at a fraction of the cost. Essentially, no AI required, just process understanding and capitalising on existing investments.

The end user can be absolved of much of the blame here because many of the promises made seemed quite compelling. In this instance they were subjected to the sales and marketing might of a global software house, while hampered by limited communication between IT and OT departments. However, it does serve as an indicator of potential frailties within industry in general as we chart a path towards a future of industrial autonomy.

Much has been written about the challenge of aligning IT and OT departments and the risks in not doing so. Progress is being made, but there is still room for improvement, especially when it comes to digital transformation. IT departments generally have greater experience in the data analytics side, but they need to consult with OT departments more before committing to solutions that impact process operations.

Devices in the field should also be evaluated to ensure they are fit for the environment in which they will operate, and not be repurposed products designed for commercial environments. Resilience matters, otherwise the data you have gone to great lengths to access could be intermittent in nature, misleading or downright wrong. That is assuming the device is still operational after a couple of seasonal weather and operational cycles!

Lessons learned fuel best practice

NASA is a prime example of an organisation that has used decades of experience to understand and improve its methods through the implementation of a 'lessons learned' system. Their publicly accessible database holds contributions from NASA and other organisations from various programs and projects across an array of disciplines. It is essentially the collated learnings from decades of activity, which it uses to improve future performance in a safe and sustainable way, while still allowing NASA to push technology to its limits for greater advancement. Sound familiar?

There are many positive and successful examples of digital transformation in the process and manufacturing industries. The most effective being cases where the service provider not only possesses significant experience in the sector but worked closely with both the IT and OT departments. Their goal from the start was to bring that experience to bear while understanding requirements, evaluating existing capabilities and developing a robust roadmap to successful implementation. Devices designed for the environment they would operate in, and a surety on required levels of reliability and resilience, encapsulate all that is important in improving CPESS goals on the industrial autonomy journey.

The process and manufacturing industries have decades of experience behind them, many having learned lessons the hard way. Service providers who have supported and administered solutions to their processes over this time have learned with them, striving to ensure quality, reliability, accuracy and resilience, keeping end users one step ahead of the curve. Now working across the IT/OT divide, further resilience is being built into their systems while extracting all the valuable insights from their plant and turning them into actionable outcomes: the latest technology applied in the right way, to achieve sought after outcomes.

As with all technology advancements, the field of players will thin out over time, leaving a knowledgeable, reliable and dedicated ensemble who have the means to drive expected growth. Once revealed, they will convert your digital transformation vision and turn it into a resilient transformation future of industrial autonomy.

Yokogawa Australia Pty Ltd
www.yokogawa.com/au

OPINION

SYSTEMS ENGINEERING: BRIDGING THE GAP

In a top-down design process, there is often a missing link between systems engineering and design implementation.

Performing large-scale system design and upgrades is a complex task. Traceability and synchronisation across all design levels is key to streamlining large-scale development programs. However, there is often a missing link between systems engineering and design implementation in a top-down design process.

Systems are ever-increasing in size and complexity. There are requirements that must be engineered, maintained, derived, allocated and adhered to; and constraints on performance, costs, time to market, power consumption, weight, etc. Systems engineering is a challenge that needs to address these factors throughout the design of system architectures. The outcome of this process is typically a set of starting points for the design of the sub-components, with interface descriptions, sub-constraints and derived requirements.

The main challenge is to have a focus on each component without losing the overview. Crucial system context information, requirements traceability for the system and (derived) component level, and the use of filtered views for handling system complexity are key. An easy transition to development of the system and guaranteed consistency are also necessary for success.

Decomposition of requirements and allocation to an architecture model

A systems engineering project typically begins with high-level requirements and optionally a legacy system that could be reused to some extent. The main task is to create an architecture with sub-components, each allocated to derived requirements to fulfil their share of the overall functionality, with as many hierarchy levels involved as appropriate. This structural decomposition is accompanied by a similar decomposition of the requirements, so that the constraints of each sub-component are sufficiently defined.

Non-functional requirements

Many requirements are referring to lifecycle issues or other non-functional constraints. Possible solutions have properties such as weight, cost, reliability, development effort and other data that need to fit these non-functional requirements — as well as their compositions — on each hierarchy level. Accordingly, a hierarchy of stereotypes has to be defined, representing each type of sub-component and capturing properties as needed, including the non-functional requirements mentioned above.

Functional requirements

Temporal performance constraints aside, functional requirements are typically not addressed specifically on the architectural level, other than getting decomposed into derived requirements in parallel with the system decomposition. Performing a complete analysis at this early stage is possible with formalised requirements, but due to the difficulty of getting a complete set of requirements and assumptions, this assume-guarantee reasoning is applied very rarely in practice and is not covered by this methodology approach. Instead, simulation is proposed on the component and architecture levels to validate requirements consistency locally as well as overall system behaviour.

Therefore, the ability to simulate the very same overall architecture model that was used to define components with their interfaces and interconnections is needed to avoid any mistakes caused by a rupture of systems engineering and design flow.

Handling complexity

By definition, systems are more complex than just the software or just the hardware, or any other segmentation of the system. Focusing just on parts of the system during any design activity is mandatory to not get lost or tangled in complexity issues. However, if important context information about the role of a component is missing, specification or design flaws become inevitable.

So, a suitable subset (view) of the system needs to be set up to understand a specific design or analysis concern, with only the minimum required context information — everything not relevant for the task at hand needs to be hidden.

While finding an appropriate view meeting the criteria mentioned above is demanding, it is typically not sufficient to have just one view for a sub-part of the system. Different perspectives of looking at the system require different views that are all overlapping: functional dependencies, organisational dependencies, bottleneck views, power consumption considerations, supplier dependencies, maturity levels, failure probability views, safety integrity level sections and so on. A complete understanding of a specific design or analysis concern requires quick switching among the huge number of different groupings and filters needed on the sub-systems.

Since all such different views on a system always need to be consistent, tool support is crucial to define and use such views.

The right tools

Due to the size and complexity of systems, classical approaches with drawing tools and spreadsheets to account for custom properties and corresponding analysis are no longer appropriate. The probability of consistency issues and problems caused by out-of-date data is just too high if there is no dedicated tool support to keep data together and consistent. This is even truer for any manual approach to creating something like a view of the system, focusing only on specific aspects and leaving out all the rest.

Thus, systems engineering tools or development environments for software and for hardware that provide solutions for the challenges and tasks outlined above are highly recommended.

Jean-Baptiste Lanfrey has over fifteen years of experience in application engineering and control design engineering roles. He joined MathWorks in France in 2008 and worked with customers in the control design, physical modelling, automatic code generation, and verification and validation domains before moving to MathWorks Australia in 2013.

VISION SOFTWARE UPDATE

Wenglor's uniVision software for two- and three-dimensional image processing has been updated to version 2.3 and now supports EtherNet/IP controls via the EtherNet/IP interface. Overlays in the web-based visualisation of results have also been updated.

EtherNet/IP is now integrated as an interface in Wenglor's smart cameras and control units. Together with the Profinet interface, which can also be used in combination with these devices, it is the most commonly used industrial protocol in the world.

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

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

Treotham Automation Pty Ltd
www.treotham.com.au

HUMIDITY CALIBRATION SOLUTION

Michell Instruments has released a solution for in-house calibration of humidity probes. The benefits of performing calibrations in-house include less process downtime as well as reduced costs since fewer probes will be sent to external calibration laboratories. However, the capital outlay required for traditional systems is prohibitive for all but the largest companies. Michell has combined its HygroCal 100 humidity validator with the Optidew 401 chilled mirror hygrometer to place in-house calibrations in the reach of more companies.

Michell's Optidew 401 chilled mirror hygrometer is traceable to national standards to provide a reference for humidity calibrations. It is accurate to ±0.15°C dew point and ±0.15°C temperature, and connects easily to the HygroCal 100. Both instruments are light and compact, allowing users to easily move the system to where it is needed most or to be packed away if not required.

The HygroCal 100 is a lightweight, portable humidity verifier, which uses its internal polymer reference to provide automatic verifications of the accuracy of RH probes. The HygroCal 100 interface enables users to assign a hygrometer with an analog output as a reference device. This allows the unit to be used to perform full calibrations of humidity probes, which are traceable to the reference used.

Michell has also partnered with fellow a process sensing technologies company, Rotronic, to provide commercial calibration services in ISO17025 accredited laboratories and fully functional dew-point calibration systems with climatic chambers, as well as transportable humidity generators for field calibrations.

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

POWER SUPPLY FOR STATIC ELIMINATORS

EXAIR's Gen4 four-outlet selectable-voltage power supply allows users to choose input voltages of 115 or 230 VAC. Four 5 kV stainless steel output connectors can energise four static eliminators at the same time. Applications using up to four Gen4 Super Ion air knives, Ion air guns, Ion air cannons, ionising bars or any other EXAIR Gen4 static eliminator device can be connected to one power supply.

The power supply features an electromagnetically shielded modular power supply cable that eases routing and connections. An integrated fuse on the primary protects against voltage spikes. The illuminated power switch indicates operation and is field replaceable. The four-outlet power supply is housed in a durable metal enclosure (152 x 102 x 112 mm) that is suitable for rugged industrial environments. Gen4 static eliminators with a bayonet-style connector can be inserted into the power supply where the electrical connection is made deep inside to prevent a shock hazard.

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

SOLENOID INTERLOCK

Characterised by its slimline design and 1500 N interlocking force, the Schmersal AZM150 range of solenoid interlocks features a total of eight different actuator approach options and three different actuator types (straight, angled and flexible), allowing for versatile installation. The rotating actuator head is user changeable and utilises a boltless locking design.

The interlock comes with a low coding level but is also available with an optional high coding level. The benefit for users is that, in accordance with ISO 14119, a higher coding level requires fewer measures to prevent the bypassing of locking mechanisms, such as fitting out of range or in a concealed position.

The slimline polyamide thermoplastic enclosure is impact resistant and comes with an IP rating of 65/67, and its space-saving design makes the product suited to small machines. The interlock can also be installed onto 40 mm groove profiles using a mounting plate. In addition, there is an option to fit an emergency exit release or emergency unlock. The solenoid interlock is available in power-to-lock and power-to-unlock variants. There is also an optional lockout tag for up to six padlocks.

Control Logic Pty Ltd
www.controllogic.com.au

POWER SUPPLY BUFFER AND REDUNDANCY MODULES

The PS9xxx supplementary modules for the PS power supply series from Beckhoff include buffer modules and redundancy modules.

The buffer modules prevent disturbances caused by voltage dips and fluctuations in the electrical grid or by peak loads, so that the power supply units and connected loads can operate without failure. They store energy via maintenance-free electrolytic capacitors and release it as required.

The buffer modules require no control wiring; they can be added in parallel to the load circuit at any point. In addition, multiple modules can be connected in parallel to provide more power or further increase the power failure bridging time.

The redundancy modules create a redundant fail-safe supply network. In such a system, two or more power supply units are connected in parallel and decoupled by one or more redundancy modules. This prevents an output-side short circuit in one of the power supplies from short-circuiting the output voltage.

The redundancy modules use efficient MOSFET technology for decoupling, which reduces voltage drops and thus power dissipation. Accordingly, the devices should have lower power loss compared to conventional diode modules.

Beckhoff Automation Pty Ltd
www.beckhoff.com

MULTI-TUBE HEAT EXCHANGERS

HRS Heat Exchangers has introduced the C Series of industrial multi-tube heat exchangers with a smaller tube diameter to improve heat transfer in certain situations and create a more compact unit.

The HRS C Series is suitable for applications with low to medium viscosities, as well as heating CIP fluids and general industrial applications. Based on the company's K Series of industrial multi-tube heat exchangers, the C Series also features HRS's corrugated tube technology, which is said to increase heat transfer and thermal efficiency while also minimising the effects of fouling. The standard option is expected to be popular for use with industrial hot water and steam applications.

The smaller tube diameter means that more tubes can be fitted into each unit, making heat transfer more efficient. This results in a more compact unit as the overall length of the heat exchanger can be reduced for a given capacity, meaning that C Series units with smaller tubes can be produced for areas where the available space for installation is restricted and a larger K Series may be unsuitable.

The C Series has 12 mm tubes as standard option, while the K series has 18 mm tubes. As standard the C Series is manufactured from stainless steel, with all standard connection types available.

HRS Heat Exchangers Australia New Zealand
www.hrs-heatexchangers.com/au/

LOW-PROFILE BULK BAG/DRUM FILLER

Flexicon has released a low-profile, combination bulk bag/drum filler that allows filling of bulk bags and drums in low headroom areas.

When filling bulk bags, full-length forklifting tubes integral to the rear-post fill head allow incremental height adjustments secured with hitch pins to accommodate bags of sizes from 1000 to 1500 mm tall, and widths to 1150 mm. The filler is equipped with an inflatable bag spout seal, a feed chute dust vent and a low-profile densification deck that de-aerates material in bags weighing up to two tonnes as they are being filled.

A remote console or wall-mounted panel houses controls to automatically inflate the bag to remove creases, open a flow control valve or start a feed device, and stop the flow of material once a preset fill weight has been gained. The vibratory deck de-aerates and densifies material in the bag at preset setpoints to create a solid, stable bag, ready for shipment.

The unit can be switched to drum-filling mode by positioning the swing arm-mounted drum-filling chute under the fill head discharge port. The attachment has an adaptable seal to handle drums measuring up to 570 mm in diameter and 900 mm in height. When filling one drum, initiating a filling cycle delivers a programmed weight of material to the drum. When filling two, three or four drums, the feed chute automatically indexes after each drum is filled, reducing operator involvement to initiating the cycle and removing the palletised drums.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au

COMMON ERRORS IN INFRARED TEMPERATURE MEASUREMENT

While modern non-contact sensor technologies offer advantages over contact-type measurements, there are occasions when an IR sensor may mislead the user.

Infrared temperature sensors determine the surface temperature of an object based on the infrared radiation emitted by the object at any temperature above absolute zero (-273°C). Some types of infrared temperature sensors include thermal imaging cameras, infrared sensors and handheld pyrometers. These modern non-contact sensor technologies offer advantages over contact-type measurement in terms of reliability, accuracy, maintenance and response rate. However there are several occasions when the IR sensor may mislead the user leading to erroneous results. This article aims to clarify these issues to avoid such events from happening and assist the user in obtaining correct and reliable data.

Material emissivity

Emissivity is defined as the ability of a real object to emit thermal radiation in comparison to a theoretical black body at a given temperature, T. Its value lies between zero and one. As IR sensors calculate the object's temperature based on the emitted energy, failure to specify the correct value of material emissivity will definitely produce errors in the measured value.

Specifying the true material emissivity is a challenge. While the emissivity of the material is known at a certain temperature range, the emissivity is also a dynamically changing property that largely depends on the surrounding ambient temperature and the wavelength of the measuring instrument. Understanding all parameters applied in the measuring instrument is crucial to make the correct temperature measurement. Currently, there are several infrared sensors specifically designed to measure at a particular wavelength to suit a specific industry, such as 7.9 μm for glass and 1.1 μm for hot glowing metals.

Measurement spot size

The accuracy of infrared sensors is also greatly influenced by the measurement spot size, especially when measuring the temperature of small objects. This is often referred to as 'distance-to-spot ratio', which specifies the diameter of the area being measured relative to the distance of the sensor from the target. For example, for a sensor with a distance-to-spot ratio of 5:1, it will measure an area of approximately 1 cm diameter when the sensor is located 5 cm away from the target.

It should be noted that the measurement spot size should be adjusted to the size of the measured object. Using the above-mentioned sensor to measure a 10 cm area from 1 m away will produce erroneous results as it will measure the temperature of the area outside of the object. Some models are designed with a laser sighting to point at the target object, however, the size of the laser beam does not always specify the true measurement spot size and users are always encouraged to check the correct specifications of their purchased model before making the measurement.

Reflective and shiny objects

Most infrared temperature sensors produce unreliable data when measuring shiny and reflective objects. In general, shiny and reflective materials emit less infrared energy than normal objects, meaning they have lower emissivity. Although using a non-reflective tape to bypass this issue may work occasionally, this is not feasible for measuring the temperature of hot objects commonly found in most of the manufacturing industry. Some IR sensors designed for measuring at very short wavelength have been developed to reduce measurement errors due to the emissivity change.

Bestech Australia Pty Ltd
www.bestech.com.au

BESTECH
Sensors & Teaching Equipment

19″ STAINLESS STEEL MULTI-TOUCH DISPLAY

Winmate has released a 19″ stainless steel multi-touch projective capacitive display with a 1280 x 1024 resolution, 250 nits brightness, VGA and HDMI inputs, and USB for touch screen control.

The 19″ display has a smooth, completely sealed housing made from stainless steel suitable for integrating into corrosive environments. The smooth surface and edge-to-edge design will resist bacteria growth. The highly-sensitive touch screen and PCAP multi-touch make it easy for users to key in data, rotate images, drag and drop files and zoom in with two or more fingers. Likewise, the display is designed for low power consumption and effective heat dissipation, making it durable for long-term usage in production facilities.

It has several mounting options such as rear and VESA mounting, allowing the user to choose the most suitable mounting solution for their application.

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

DECENTRALISED INVERTER

The NORDAC ON is a compact and smart inverter for decentralised use. It is directly mounted on the drive housing and covers lower power ranges of up to 1 kW. The plans in place include two versions with three sizes each: NORDAC ON was designed for use with asynchronous motors, whereas NORDAC ON+ is intended for combination with synchronous motors and supplements the NORD high-efficiency range of IE5+ motors. Both inverter versions have an integrated Ethernet interface and thus are equipped for integration into modern automation systems. Whether for ProfiNet, EtherNet/IP or EtherCAT, the required protocol can be easily set via parameters.

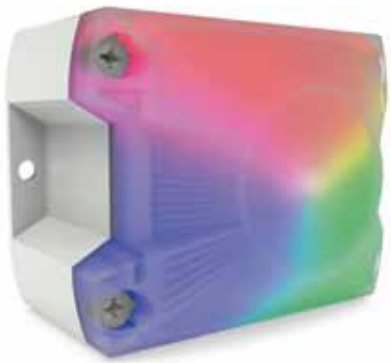
The inverter has been matched to the target application of horizontal conveyor technology. The standardisation covers all industry-specific requirements. All connections are pluggable and should ensure quick, easy and error-minimising commissioning and maintenance onsite. The equipment comprises a diagnostic interface, four digital inputs and, with the NORDAC ON+, an additional protocol-based encoder interface.

In case the inverter cannot not be mounted on the motor, it can alternatively be mounted on the wall close to the drive.

The NORDAC range is equipped with a PLC for functions close to the drive. They can process the data from connected sensors and actuators; autonomously initiate control sequences; and communicate drive and application data to the control centre, networked components or cloud storage.

NORD Drivesystems (Aust) Pty Ltd
www.nord.com

LED INDICATOR LIGHTING



Pfannenberg's PYRA lighting series has been expanded to include LED technology. The PYRA LED series is available as RGB, single and traffic lights to offer flexible and versatile signalling options and operating modes for industrial applications in the field of information and warning.

The RGB version offers a wide range of RGB colours and can be used to visualise the desired status with one device. The range is available with or without sounder and can be set for brightness and time sequences for various combinations. In addition, the PYRA LED lights can be flush-mounted, which can be easily integrated into existing machine and plant design, while providing full 360° visibility.

The traffic light version can be ordered fully assembled or combined as desired and is available either with 2- or 3-stage LED modules.

They are suitable for a wide range of applications including machine and plant operation, in intralogistics and material handling, for status information of machines, rooms and areas for access control.

Control Logic Pty Ltd
www.controllogic.com.au

CLICK PLUS

Simple PLC Control on STEROIDS!!

Wi-Fi

Bluetooth (provisioning only)

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Ethernet

Serial (RS-232/ RS-485)

Antenna sold separately

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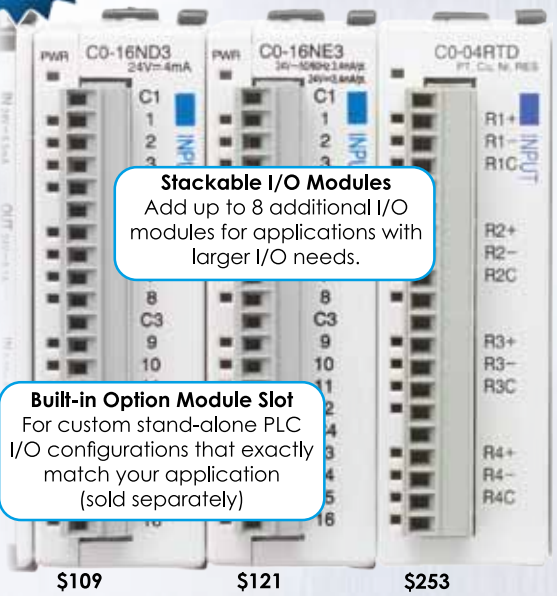

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Add up to 8 additional I/O modules for applications with larger I/O needs.

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For custom stand-alone PLC I/O configurations that exactly match your application (sold separately)

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Three CPU options. Free Software.

The CLICK PLUS PLC Series combines the simplicity of the original CLICK with advanced features you wouldn't expect from a simple low-cost controller. Data logging, Wi-Fi connectability, MQTT communication and increased security measures are just a few of the impressive features offered with the CLICK PLUS PLC series.

CLICK PLUS PLC Overview Video

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www.directautomation.com.au 1800 633 040

RUGGED TABLET

Getac has announced the launch of its next-generation K120 rugged tablet, for mobile field professionals working in industries including public safety, manufacturing, utilities, defence, transportation, natural resources, and oil and gas.

The next generation of the K120 tablet features upgrades and enhancements to further optimise productivity in remote or adverse environments. They include enhanced connectivity, with in-built Wi-Fi 6, wireless wide area network (WWAN) with integrated GPS/GLONASS and Bluetooth 5.2, enabling users to utilise a wide selection of over-air interfaces, while Thunderbolt 4 technology makes data collection in the field quick and easy. Additional key features include PCIe NVMe user-replaceable SSD storage and 16 GB of memory as standard.

The K120 also includes a 12.5″, 1200 nits LumiBond 2.0 display with Getac sunlight-readable technology for easy operation in bright outdoor environments. Multiple touch modes (regular touch, glove and pen modes, plus an optional digitiser mode) enhance performance in a range of situations, while a dual hot-swappable battery design offers uninterrupted full-shift functionality. To keep sensitive data fully protected, the K120 features a range of security features and multifactor authentication management including Intel vPro Technology, TPM 2.0, high frequency (HF) radio-frequency identification (RFID) reader, smart card reader, fingerprint reader and Windows Hello.

MIL-STD-810H, MIL-STD-461G and IP66 certification, 6′ (1.8 m) drop resistance and an operating temperature range of -29 to 63°C mean there is reduced risk of data loss, damage or failure.

Getac Technology Corp
www.getac.com/apac/

ANALYTICS SOFTWARE

Seeq Corporation has announced an updated packaging of Seeq features and applications as Seeq Team and Seeq Enterprise editions.

Seeq Cortex, a renaming of Seeq Server, is included in both editions and is the execution engine that delivers key features, including multi-source and type data connectivity, security, calculation scalability and other features.

Benefits of Cortex include abstraction of data sources with high-speed connectivity to multiple and diverse time series and contextual data sources, including historians and SQL-based data sources; high calculation speed with a highly parallelised, time-series specific engine to enable fast execution of analytics including data interpolation, filtering, cleansing and modelling; and data security and user access control through integration with OSIsoft PI for tag-level access control.

Seeq Team is optimised for new deployments in a single-site facility such as a water utility or power generation plant with a limited number of time series and contextual data sources, or for the first usage of Seeq by a workgroup within a larger organisation.

Seeq Enterprise is designed for complex single-plant, multi-site or enterprise deployments with hundreds or thousands of users. It includes support for more complex data sources such as data lakes and ERP systems, along with features for integrating OT and IT data science teams driving digital transformation initiatives.

Seeq Corporation
www.seeq.com

MODULAR-ENABLED AUTOMATION

OPENING UP NEW OPPORTUNITIES

Ralf Jeske, Global Product Manager, ABB

Many process businesses are starting to adopt modular automation to realise the productivity, efficiency and reliability benefits the technology can deliver.

Large-scale automation systems have been at the heart of production line control for decades. Now, driven by changes in consumer demands, an alternative plug-and-produce modular automation approach is emerging.

The pharmaceutical, fine chemicals, and food and beverage sectors are facing uncertain times and unprecedented challenges. The need to maintain uptime and reliability, synchronise supply with customer demand, maximise available capacity and deliver smaller batches in shorter lead times has resulted in the need for new technologies to keep pace. Energy and raw material prices are increasing, eroding profit margins for end products. Changes in regulatory requirements, such as in energy and water, are also impacting on production plants.

Meanwhile, customers and wholesalers are demanding higher quality, faster delivery and lower prices. This is squeezing margins and forcing industries to find new areas in which efficiency gains, however marginal, can be achieved. Furthermore, these industries are facing harsh global competition and changing market requirements such as more customised products, smaller batch sizes down to a batch size of one, and quick and simple integration of pre-packaged modular solutions.

In emerging markets, the production capacity of fine and specialty chemicals and the pharmaceutical industry is also growing, requiring the establishment of new plant and the associated automated systems to control them.

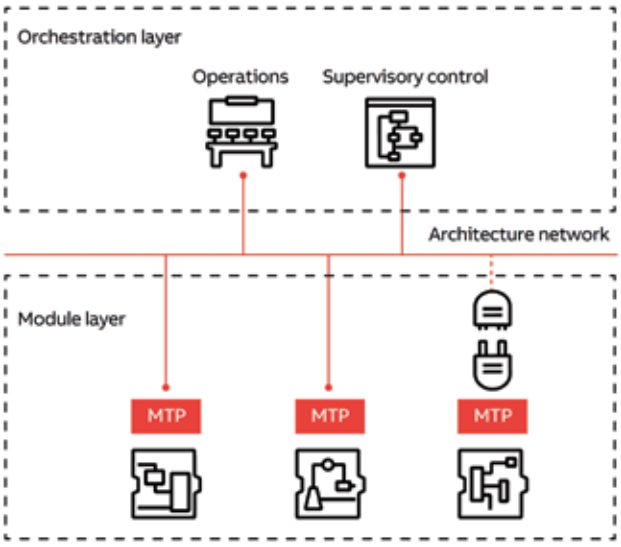

Figure 1: Modularisation of process automation systems simplifies plant level engineering, making production more flexible.

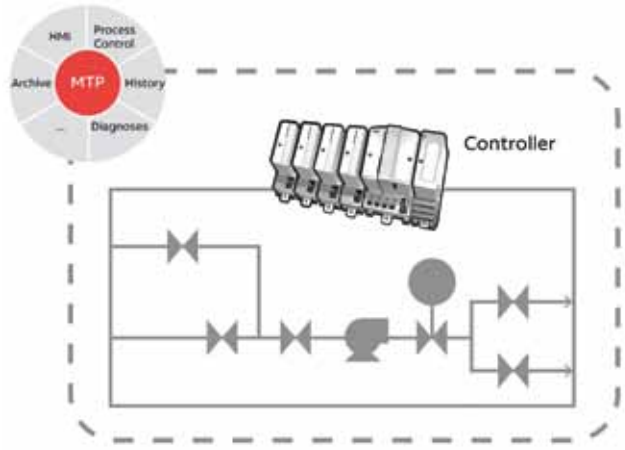

Figure 2: MTP is a new way of defining the description for process technology system modules in which information is stored that is necessary for integration into the automation system.

Current production line control

Today we have large-scale plants and, particularly in batch, there are multipurpose plants. Large-scale plants tend to produce single products and, while they are efficient, they tend to be inflexible. With multipurpose plants, products can be routed through different vessels: such plants have flexibility but are often inefficient. However, large-scale production remains a good solution for mass-produced products.

The automation systems controlling large-scale production are custom made with line-by-line source code executed by a master controller that governs sequencing, motion and I/O from the start to the end of the production line. These large automation systems have advantages, particularly for continuous production with highly predictable or constant demand cycles.

Decades of refinement and standardisation mean that these systems are typically optimised at the design stage for a particular plant layout, specific product types and a defined level of throughput. Monitoring and optimisation become easier as most setpoints typically remain the same, and engineers who are familiar with the process can more easily spot and rectify any processes operating outside of normal parameters. However, meeting the modern-day challenges described above requires a new approach.

Challenges impacting on distributed automation

Production needs to be faster and more agile to meet changing market demands. The pharmaceutical industry for example needs to focus on the individual needs of a patient, and this brings challenges in creating personalised medicines. As such, end products can no longer be commodities with thousands of tonnes being produced at a time, but rather batches of individualised products specific to the customer.

Meeting this demand for added flexibility calls for processes that are reliable, repeatable and error free, with the ability to adapt on the fly and quickly ramp production up or down to match sudden changes in demand. The market is moving faster than ever, and manufacturers must move with it, combining the agility of batch production with the speed of flow production, all while keeping efficiency high and costs low.

To develop customer-specific products and small batch series, there is a demand to develop flexible modular concepts that bring:

- reduced time to market
- standardisation of processing modules
- increased automation efficiency through quick and efficient module upgrade or exchange
- higher flexibility.

Modular automation brings an agility and flexibility to production never before seen. By acting like building blocks, the modules can be replicated and used to scale up or down in order meet rapidly changing capacity demands. By simply changing a few modules, a completely new product can be produced.

Benefits of modular-enabled automation

There are several benefits in process-encapsulated, reusable modules for both brownfield sites and flexible production plants.

For brownfield sites these include:

- up to 50% less downtime
- up to 50% less capital expenditure for automation engineering
- up to 20% lower life cycle management[1].

For flexible production plants, typical improvements can include:

- up to 40% faster time to market
- up to 80% faster rearrangement of production equipment
- almost zero automation engineering to copy and adapt a production line
- up to 50% less capital expenditure[1].

In addition, customer-specific product adaptations can be rapidly and flexibly carried out by exchanging individual modules, bringing the cost of producing a batch size of one in line with that of mass-produced products. Overall, modular automation offers a more flexible and service-oriented plug-and-produce solution, as well as:

- simplifying engineering, making production more flexible
- speeding up time to market because of reduced effort required to build plants
- increasing plant efficiency
- enabling scaling capacity by numbering up and down the production according to the market
- increasing productivity through the ability to create recipes and equipment logic in parallel
- improving the capability and speed of product changes
- improving overall competitiveness
- lowering total cost of ownership for automation.

Modular automation in practice

There are many parts that make up a typical modular automation system. Figure 1 shows the overall layout and is a guide as we build a typical modular-enabled automation system, describing t

The starting point is the intelligent module that contains services orchestrated by the plant operator in the distributed control system (DCS) to reach the optimal production process. Supervisory control helps each module anticipate the actions

of other modules. Modules are precisely defined with clear functionality that is easy to exchange or extend, equipped with specific application software and manufactured in small quantities and fully tested before delivery. The modules feature localised automation and can in some cases run fully autonomously.

Next is the module layer which houses several intelligent modules, often described as a process equipment assembly (PEA) — see Figure 2. A PEA is described by a vendor-neutral MTP file. Information is stored that is necessary for integration into the automation system and comprises an archive, HMI, process control, safety and security, alarm management and maintenance diagnosis.

Contained within the PEAs are controllers. Through a simple import of the MTP into the production plant's DCS, these pre-automated PEAs can be easily added, arranged and adjusted according to production needs. Adhering to this standard should allow any module to plug into any automation system. Numbering up is easier, as entire pre-tested control subsystem programs can be connected with other controllers. This is much quicker than writing new code from scratch.

The MTP is generated using a module designer, which also defines the piping and instrumentation as well as module services. The final configuration can generate a target destination for automation systems as well as an MTP file for the integration into a process orchestration system. This module engineering needs only be done once and is reusable.

The MTP is the key to modular automation and creates the framework of interoperability between the module layer and the process orchestration layer. The process orchestration layer is a process control system that triggers the production process, collects all feedback from the services, handles the information and returns the commands for each process module. At orchestration level, the modules are monitored, controlled and managed, and all the information on the current state of the plant is available on the HMI of the DCS. The DCS evolves into a process orchestration system that manages the operation of the pre-automated intelligent modules. The DCS imports the MTPs from its built-in library of process objects.

The orchestration designer helps maintain this library of MTPs, which can then be configured using a drag-and-drop approach and connecting the necessary pipes between each of the modules. The orchestration designer is configuring how the user sees the modules and defines how the services within the modules are then orchestrated.

A promising future for modular-enabled automation

Due to challenges facing the pharmaceutical, fine chemical and food processing sectors, coupled with the impact of COVID-19 on production operations, modular automation is set to grow in the short to medium term. While high initial outlay may prove a challenge for some, many process businesses are starting to adopt modular automation to realise the productivity, efficiency and reliability benefits the technology can deliver.

Reference

1. ZVEI 2105, White paper: Module-Based Production in the Process Industry – Effects on Automation in the "Industrie 4.0" Environment: Recommendations of the Modular Automation Working Group Following Namur Recommendation NE 148, ZVEI.

ABB Australia Pty Ltd
www.abbaustralia.com.au

LONG-RANGE LASER DISTANCE SENSORS

Wenglor has released its latest generation of wintec long-range laser distance sensors. The transit time sensors, available in plastic or stainless steel 316L housings, have been given an increase in performance through integrated Dynamic Sensitivity (DS) technology.

The sensors offer a working range up to 10 m, maximum reproducibility of 3 mm and insensitivity to ambient light up to 100,000 lux. Supporting the IO-Link 1.1 standard with COM3, process data can be written, numerous status messages such as temperature or ambient light warnings can be called up, and impact and shock loads can be recorded.

The sensor emits very short light pulses in the nanosecond range, with signals that are statistically evaluated and thus produce the distance to the object. Even with very weak signals, the sensor is said to generate precise measurements.

Long-range laser distance sensors with wintec (Wenglor interference-free technology) detect objects based on the principle of transit time measurement, regardless of their colour, gloss, surface structure and inclination angle. The sensors can be installed next to each other or even opposite each other without influencing each other.

The sensors work from temperatures of -40°C, have a short warm-up time and have LEDs on the front for simple installation. Simple operation and low power consumption should enable time and cost savings for users.

The version in corrosion-resistant stainless steel 316L housing (1.4404) is suitable for use in the food industry, with resistance to high-pressure cleaning up to 100 bar and water temperatures up to 80°C.

Treotham Automation Pty Ltd

www.treotham.com.au

Autonomous decision-making for materials handling

Materials handling comes with inherent challenges all mining companies must deal with in order to ship the right product at the right time. Unscheduled equipment relocation, a lack of process standardisation and operator variability can lead to consequential costs through the supply chain.

Essential for the movement, storage, blending and delivery of materials across the mine, materials handling equipment serves as the link between the mine and the market. While it sounds simple on paper, when it comes to materials handling in mining, there are numerous challenges that mining companies face.

Materials handling in mining is inherently difficult. Mines are working with large machines that transport large quantities of materials over long distances, meaning a problem upstream will cascade across the site and down the supply chain. When a problem occurs, then the mine is soon dealing with backlogs, downtime, spillage and major delays. No mining company is immune to these challenges, but for many, taking variability out of the scenario is key.

Materials transfer is traditionally a complex process. Without a fully automated system in place, operators are overwhelmed with trying to perform several tasks while managing multiple interfaces. With this constant handoff occurring at all stages of the chain, many companies are susceptible to unscheduled process delays, spillage and a lack of standardisation due to operator variability and miscommunication.

At the train load system (TLO) the load controller is the focal point for plant operations, which means that during the busiest parts of their day, they will need to resolve multiple challenges simultaneously. The TLO operator can quickly become overwhelmed from all the sources of information that they need to consult. This is where mistakes and delays start piling up.

One of the most common consequences of being overwhelmed is that equipment is not in the right place at the right time to load a train. This results in delays for the train and the negative impacts are amplified down the supply chain. Operating in such a reactive state offers no ability for predictive indicators to address where an issue may occur before it happens.

A major mining company set out to overcome the challenges that exist for the TLO operation. The solution was to implement decision automation (execution management) for materials handling based on Rockwell Automation's FactoryTalk ProductionCentre and Logix Controllers.

Once implemented, the solution coordinates the resources in the mine and execution management (EM) automates the orchestration of the equipment decision-making process. EM does this by integrating with SAP or the site's job management system to automatically convert a job into a list of all the tasks and equipment needed to correctly execute the job.

EM integrates with existing control systems to align the pieces of equipment needed to complete the job. Once the existing control system permissives for the route and equipment are enabled, the stacking/reclaiming job will automatically begin. EM will continuously update the stockpile inventory management system as well as the SAP system on the job progress. Once the job has been completed, EM will automatically relocate the equipment to the correct position for the next job.

The solution consists of two main components. First, the production manager defines the job number, job quantity and type of material. Second is the real-time execution management (REM), which directs the production manager, coordinating the start or completion of a job, measuring material consumption and production. The role of REM is to command and orchestrate the automation system from each area, ensuring that all the operations will successfully complete the job.

Implementation was easy — execution management (EM) integrates with the existing control system, so all the existing control and safety systems remain in place. Once installed, the benefits of the implementation exceeded the company's expectations. Improvements to conformance scheduling were immediately seen based on a standardisation of the most efficient operational processes for the site. The mine also saw a reduction in the workload and dependency on the operators and reduced unscheduled process delays. This solution resulted in an annual saving of $200 million for the company.

Rockwell Automation Australia
www.rockwellautomation.com/en-au/industries/mining-automation/

TOUCH MONITORS

The IDP-3100 series touch monitors (available in 15″ and 21.5″) are suitable for many automation and industrial applications. They deliver a backlight lifetime of 50,000 h and high display performance within a compact, contemporary design without a bezel.

To address issues caused by direct sunlight, such as screen cracking, hazing and yellowing, the IDP-3100 series monitors are equipped with a UV-resistant touch solution that improves reliability in outdoor applications. The base unit supports the integration of customised brightness enhancements, optical bonding and surface treatments such as anti-glare, reflective, fingerprint and microbial treatments.

The IDP-3100 monitors leverage DeviceOn/Display software to enable remote monitoring, status visualisation and real-time management. This software supports brightness and colour adjustments, screen on/off timer functions and group management. The backlight lifespan monitoring and warning reminders are designed to help ease maintenance and optimise display performance remotely.

Featuring an industrial-grade design and IP65-rated front panel to protect against water and dust ingress, the IDP-3100 monitors are suitable for a range of industrial applications. The touchscreen supports easy cleaning and maintenance in high usage applications where hygiene is important. The monitors leverage a HDMI signal interface for integration within embedded boards and systems and can support both panel and VESA mounting to ease deployment in diverse applications and environments.

Advantech Australia Pty Ltd
www.advantech.net.au

EDGE AI GPU COMPUTING PLATFORM

The Neousys Nuvo-8108GC-XL is an edge AI GPU computing platform supporting NVIDIA RTX 30 Series GPU cards up to RTX 3080 and Intel Xeon E, 9th/8th-Gen Core processors.

Featuring thermal operation up to 60°C, support for shock and vibration up to 3grms and a wide range 8-48 VDC power input design, it is an advanced industrial-grade edge AI GPU computing platform designed for autonomous driving, vision inspection and intelligent video analytics.

To accommodate the latest RTX 30 Series GPU cards into the system and maximise its performance, the Nuvo-8108GC-XL comes with a mechanical design focused on heat dissipation. The thermal design supports the latest RTX 30 Series GPU cards and its heterogeneous parallel computing architecture.

Nuvo-8108GC-XL has an additional x8 PCIe slot (4 lanes) and one x16 PCIe slot (8 lanes) for developers to add expansion cards to extend functionality, such as for video analytics and deep learning vision inspection or 4G/5G communications.

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

SMART GRID GATEWAYS

HMS Networks has expanded its Ixxat SG-gateway series for the networking of energy components. Two multi-I/O versions allow traditional I/O-sensors as well as sensors or devices in Wi-Fi networks to be connected to energy systems using IEC 61850 and IEC 60870.

Digitalisation of energy technology is important for mastering the future challenges of sustainable energy supply. With Ixxat SG-gateways, device manufacturers, system integrators, energy suppliers and network operators get instant status information into the control room through direct access to plant data from various sources. The compact Ixxat SG-gateways are suitable for retrofitting plants and the digitalisation of substations.

Due to a wide range of supported interfaces and protocols, Ixxat SG-gateways remove the need for installing several separate gateways, such as fieldbus gateways, sensor gateways, IoT gateways and firewalls. Adding to the existing support for IEC 61850, IEC 60870, EtherNet/IP, Profinet, MQTT and 4G, the two additional SG-gateways feature multi-I/O and Wi-Fi capabilities (IEEE 802.11 a/b/g/n). With this, traditional as well as wireless sensors can be connected to control rooms and cloud systems. Besides RS232/485 and Ethernet, eight digital I/Os (24 VDC) and eight analog inputs (0–20 mA or 0–10 V) are available for direct sensor connection, all switchable via software.

Example applications are temperature monitoring of high-voltage lines via Wi-Fi using Modbus TCP, pressure and density measurement of cooling liquids using Modbus RTU, and room temperature or humidity measurement in buildings using analog or digital I/O.

Global M2M

www.globalm2m.com.au

HYDAC FOCUSED ON ACTIVELY SOLVING COMPLEX MACHINERY SKILLS DEFICIT

HYDAC is committed to providing fluid engineering equipment training in various formats to balance out the lack of know-how that plagues many industries and end users.

The operation, maintenance and repair of complex fluid power equipment skills shortage relevant to just about every Australian industry is well known.

What is required is more student and technician training on advanced — ever more complicated — and potentially dangerous fluid engineering equipment. This training must generate "competent and qualified people" who are "grounded in basic knowledge and skills as well as being multi-skilled and adaptable" to evolving work requirements, said HYDAC Australia Managing Director Mark Keen.

"This is both urgent and important, because the technology is changing very quickly in every industry, with the fluid power industry embracing a lot of electrohydraulic integration," he said.

Dearth of educational training facilities and courses

Keen highlights that in HYDAC's experience there is a dearth of educational facilities and trainers to meet this skills deficit, including Victoria's top five universities.

"And yes, these institutions do offer mechatronic courses in a basic way; however a student of mechatronics that I take out of university is a blank sheet of paper most of the time — there is little or no exposure to hydraulic systems in university training," he said. "Surely it is not possible for them to cover every industry, but hydraulics is important and needs to be taught."

As to TAFE colleges, he points out that the few he has visited often feature equipment dating back 20 to 30 years.

"It's not their fault it hasn't been modernised but it doesn't change the fact it's mostly irrelevant," he said. "So this is where we're really stepping up: we're challenging the current education systems as to why hydraulics is not taught — why it has been deleted from the educational system — when the construction industry, power generation, mining and almost all other industries from food processing to defence are highly reliant on hydraulic equipment."

QR codes a quick and easy solution

HYDAC, said Keen, offers education and training "to give something back and create some balance".

In this regard the fluid power company is spending tens of thousands of hours developing and modelling courses by dedicated personnel.

"Surely, bespoke training on specific machinery is the highest level and most attractive," he said. "The limitation here is affordability, and to overcome this we're going to a new level of integration for customers that want the features and benefits without the huge costs."

This comes in the form of scanning a finished system with a high resolution ($75,000) scanner that creates a master training module and then embeds easy-to-create QR codes into the model defining HYDAC's equipment. These codes enable an operator to easily access pre-programmed, pop-up information from a filter or an electrical control box, as an example, via a smartphone, tablet or HYDAC Tools app.

Usage of QR codes has not been taken up as much as they could be in manufacturing even though the technology can optimise project management and supply chain processes as well as print marketing.

"This is an innovative way of bringing in information," said Keen. "I've already designed many pieces of the jigsaw puzzle, which I can bring together very cost effectively in a package by doing the smart scanning and QR code integration.

"And I think this is really interesting for Australian industry and, of course, it has nothing to do with hydraulics — it can be applied to any application in the sector and that's the exciting part of using this emerging technology that I appreciate.

"And we can be a good partner to others who have an interest in the sector as well."

HYDAC's training options

HYDAC, as a certified regional training centre for Asia/Pacific, has a comprehensive range of standard training options selectable from its training calendars for courses running on standing programs through to fully customised programs.

Nationally recognised courses on a variety of topics span the basics of hydraulics to thermal optimisation, filtration, electronics and predictive maintenance/Industry 4.0. This has grown to a complete portfolio of training courses and systems integration, with the service side a focus point.

Students learn not only in the classroom but also have the opportunity to handle company equipment such as electrohydraulic training and cooling systems rigs, according to HYDAC Technical Training Manager Paul Marley.

Technicians and trainers can also make use of HYDAC's VR training and soon-to-be-released augmented reality (AR) training, with options for direct field service support.

HYDAC International
www.hydac.com.au

HYDAC

AS I SEE IT

CYBERSECURITY IN INDUSTRIAL APPLICATIONS

Cybersecurity is a critical issue, not only for IT infrastructure but also for operational technology (OT). Traditionally, OT was an 'air-gapped' environment, meaning that it was not connected to external networks or other IT infrastructure. With the growth of the IIoT or Industry 4.0 the gap has been closed, and OT networks are widely connected to IT systems and the cloud.

IT incidents often cause loss of data, information or value, unfortunately involving increasing amounts and consequences for victims, but they are recoverable. A security breach in an industrial or infrastructure system can lead to so much more than just financial loss since a more physical picture comes into play. The demand for better security in industrial applications is surging and cybersecurity needs your attention. It is worthwhile to share some key facts I have learned, and I hope this will be helpful for you to develop your own roadmap for cybersecurity in industrial communication networks.

A system is highly protected from external threats if there is absolutely no connection to the internet. However, security needs to be considered on different levels to prevent human errors. For example, an external contractor may connect their laptop to your machine network, which could expose your machines to risks and threats, or an employee may make unintentional configuration changes, or the incorrect firmware can be downloaded to a machine.

The responsibility for the security of an installation falls on everyone as there are many security aspects to consider, especially when accommodating co-existence with older products or installations using older networks. To make the implementation easier and more efficient, I would recommend the use of communication solutions that include built-in security features that meet the installation's security requirements. If you are a system integrator, you have no control over the specific security policies within your customer's installation environment. Therefore, strengthening a device to handle any situation helps to provide more reliable security performance regardless of the installation conditions.

The best way to achieve security is to commit to international standards. The standardisation aspect of cybersecurity is a bit more advanced, with some established standards like ISO27001 and IEC 62443. ISO27001 is a mature standard focusing on protecting the IT management systems, and it is driven and accepted by IT people. It is proven in use with highly available technology like TLS encryption, VPN connectivity, X.509 certificates and so on. In industrial applications, this standard is mainly relevant for those systems connected to IT environments, such as remote access, IIoT and cloud-based communications. IEC 62443 is an emerging standard for industrial control applications — focusing on the robustness and security of industrial communication. The emphasis is on the total application, according to the defence-in-depth philosophy. Being in accordance with IEC 62443 also means confidential information on the device is protected from any possible extraction. Additionally, the device should have sufficient resources to withstand attacks, as well as the additional processing capacity required by the security mechanism. All possible but unused interfaces must be closed, such as ports, JTAG interfaces and so on.

In summary, by closing the gap between IT and OT, OT is increasingly becoming part of a system chain that can be hacked. Industrial environments will have to be fully secured for this. This security includes all people, processes, systems and components involved.

Tom Hu is the Technical Services Manager at Global M2M, helping clients all over the manufacturing, irrigation, water treatment, waste management and building management industries. He has diverse experience in secured remote access and IIoT solutions involving AWS, Azure, ThingWorx, OSIsoft, MindSphere, Ignition, VPN, MQTT and HTTPS.

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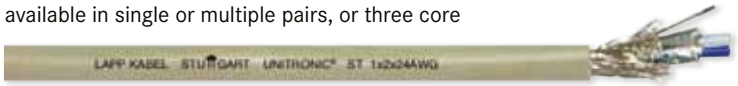

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