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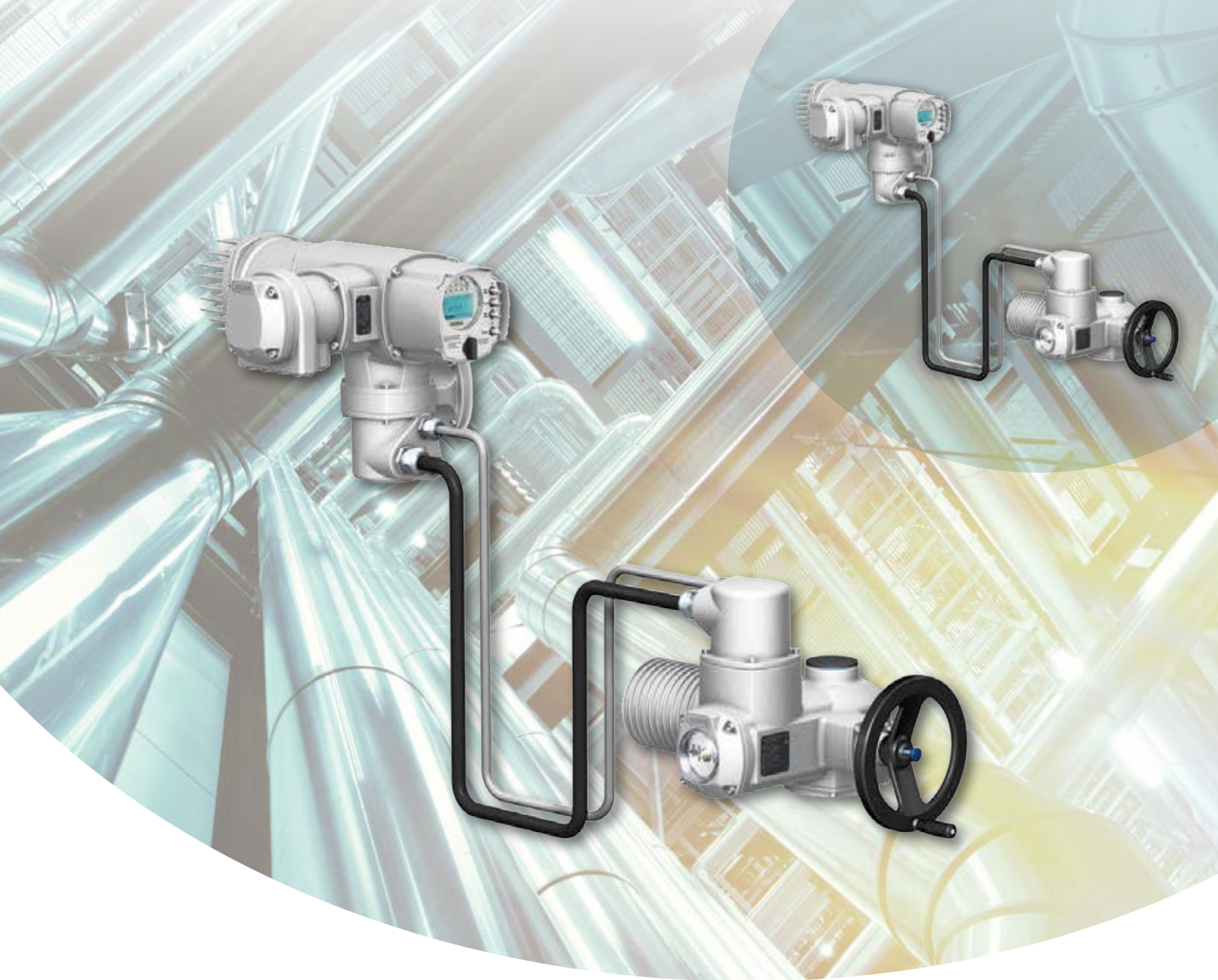


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COVER FOCUS

Every safety strategy comes down to a choice of route. Take the well-worn path of single-loop logic solvers, and you may find yourself boxed in by limited I/O and rigid functionality. Head down the road of a full-scale safety PLC, and you're facing a costly, complex journey loaded with programming overhead your application may not need. Moore Industries built a better road.

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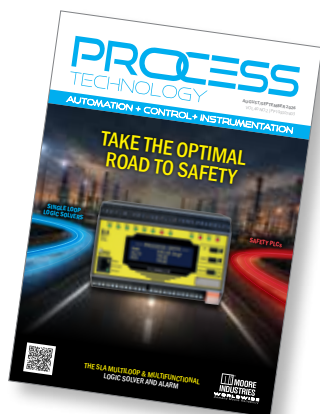
Rugged enough for the field and flexible enough for critical emergency shutdown strategies, simple alarm voting schemes and everything in between, the SLA gives plant engineers a logic solver that fits the job instead of forcing them to over-engineer or overspend.

Sometimes the best route to safety is the one that skips the extremes.

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welcome



Nowadays there is growing pressure on industrial operators to demonstrate cybersecurity compliance, and while traditional OT network design served its purpose well in the past, today it is fraught with pitfalls that need to be eliminated by restructuring into an architecture more supportive of cyberthreat mitigation. Our lead article discusses the way to do this by focusing on IEC 62443-3-3 — the standard defining system-level security requirements for industrial automation and control systems.

The main focus of this issue, however, is safety, first examining intrinsic safety, an important protection technique for electrical equipment operating in hazardous areas where flammable gases, vapours, or dusts may be present. Intrinsic safety remains the preferred approach for instrumentation and control devices in Zone 0 and Zone 1 classified locations.

In terms of factory worker safety, the use of light curtains to keep employees from inadvertently (or otherwise) accessing hazardous areas is an industry standard, but safety can be compromised by an incorrect application of muting. Production requirements sometimes demand that the protective function be temporarily suspended — for example, to allow materials to pass through — and common specification errors can inadvertently compromise the integrity of the safety function.

Finally, when I started as editor of this publication quite some years ago, discussions of the relative merits of various industrial fieldbus technologies were a common talking point, and industrial Ethernet was viewed with much suspicion. But now times have changed: fieldbus protocols served industry well for decades, but fragmentation, bandwidth limitations and integration complexity have since driven adoption of Ethernet-based alternatives that offer greater speed, interoperability and alignment with IT infrastructure — a transition that now appears irreversible: we look at some recent statistics on this front.

And of course more content can be found on processonline.com.au, and by subscribing to our bi-weekly email newsletter.

Glenn Johnson
Editor
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Transgrid to deploy synchronous condensers for NSW grid

Transgrid has announced that it has begun works to enable the installation of synchronous condensers on the NSW transmission network in order to support grid stability as the state energy grid transitions from coal to renewables.

The company will deploy a total of 10 synchronous condensers across five sites under the first phase of its System Strength Plan, following a NSW Government direction to accelerate procurement of this equipment as a Priority Network Infrastructure Project (PNIP).

Transgrid Executive General Manager of Network Jason Krstanoski said construction partners have now been engaged to carry out project-enabling works, which have already started at the first two priority sites in Newcastle and Kemps Creek.

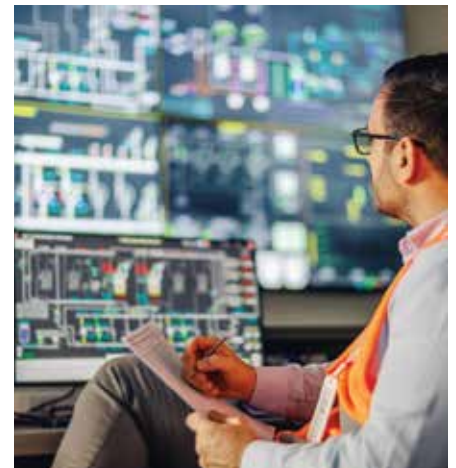
"We are pleased to announce that Consolidated Power Projects (CPP) and UGL have been awarded contracts for the civil and building works to enable installation of the synchronous condensers," he said. "By engaging two experienced delivery partners, we can progress works across multiple sites in parallel, helping ensure we meet the required timeframes to maintain system strength as the energy transition accelerates.

"Enabling works will be delivered by CPP at our Newcastle, Kemps Creek and Armidale substations and UGL at our Wellington and Darlington Point sites.

"This work is being carefully sequenced to ensure we will be ready for our supply partner GE Vernova to begin installing the synchronous condensers as soon as they start arriving in Australia, currently expected from mid-2027."



The rotor of a GE Vernova synchronous condenser.



istock.com/Organic Media

ASD issues guidance for OT network isolation

The Australian Signals Directorate (ASD) has released guidance for critical infrastructure operators to strengthen cyber resilience and prepare for cyber incidents, disruptions and other threats to essential services.

ASD says that as the cyberthreat environment continues to evolve, critical infrastructure organisations face increasing risks from cybercriminals, state-sponsored actors and emerging technologies. Building resilience is essential to protecting critical systems and maintaining the delivery of services that Australians rely on every day.

CI Fortify brings together practical guidance and recommendations to help organisations reduce cyber risk, strengthen security controls and improve preparedness for disruptive events. The resources support both technical and executive audiences, providing strategies to enhance security, support business continuity and improve organisational resilience.

The guide also explains how organisations can isolate critical operational technology (OT) and supporting systems from other networks for up to three months during cyber incidents or periods of increased cyberthreat. It provides practical guidance and strategic advice for OT owners, operators and cybersecurity teams. ASD says that by reviewing and applying this guidance, organisations can strengthen their ability to prepare for, respond to, and recover from cyber incidents.

ARENA backs aviation fuel from forestry byproducts

ARENA has announced \$32 million in conditional funding to support HAMR Energy to conduct a front-end engineering design (FEED) and other development activities for a proposed biomass-to-fuel supply chain across Victoria and South Australia. The project aims to convert forestry by-products into renewable methanol, which can then be used as sustainable aviation fuel (SAF), renewable diesel and other low-carbon fuel products.

SAF produced by the proposed facility could result in the displacement of 140 million litres of fossil jet fuel, abate approximately 330,000 tonnes of CO₂ per annum and support the commercialisation of SAF production.

ARENA CEO Darren Miller said this project could help accelerate Australia's emerging SAF industry.

"Aviation is one of the most challenging sectors to decarbonise, particularly for long-haul flights where alternatives to liquid fuels remain limited. SAF offers a practical near-term pathway to reduce emissions from aviation using existing aircraft and infrastructure," he said.



Credit: HAMR Energy

SAF Energy Park (artist's impression).

IEC 62443-3-3 COMPLIANCE

BUILDING A RESILIENT NETWORK SECURITY FOUNDATION

Theo Lai, Product Manager, Moxa

Adopting a systemic view of cybersecurity is the only way to ensure long-term operational resilience in the digital age.

The Industrial IoT (IIoT) has continued to expand in recent years, with more and closer integration of IT and OT assets. Inevitably, this trend has also fundamentally shifted the industrial cyberthreat landscape. The need for comprehensive network protection is more dire than ever. However, building comprehensive OT cybersecurity is more than just a matter of buying OT security-focused products. It's a complex and multifaceted endeavour that requires a systemic mindset for developing a comprehensive defence-in-depth strategy. Knowing where to start is half the journey.

A GUIDE TO ROBUST CYBERSECURITY — IEC 62443

The IEC 62443 framework is the world's most authoritative set of standards for OT cybersecurity. It covers security measures on multiple layers to create holistic protection against cyberthreats, including device-level components (IEC 62443-4-2) and secure product development lifecycle processes (IEC 62443-4-1). In this article, we will take a closer look at the IEC 62443-3-3 standard, which offers a guiding framework for integrating multiple system components into industrial automation and control systems (IACS).

IEC 62443-3-3 bridges the gap between the vendor's product capabilities and the implementation of those products, outlining the requirements necessary to meet a set of predefined system-wide security objectives.

The standard defines four distinct Security Levels (SL) based on the attacker's motivation, skills and resources:

- **Security Level 1:** Protection against casual or coincidental violations.
- **Security Level 2:** Protection against intentional violations using simple means with low resources and generic skills.
- **Security Level 3:** Protection against intentional violations using sophisticated means with moderate resources and specific IACS skills.
- **Security Level 4:** Protection against intentional violations using sophisticated means with extended resources and highly specialised skills.

IEC 62443-3-3 also defines seven Foundational Requirements (FRs), that are tied to a separate set of additional conditions. These are System Requirements (SRs), which specify the technical capabilities the system should have, and Requirement Enhancements (REs), which provide additional controls for complying with higher SLs. The Foundational Requirements and their main objectives are:

- **FR 1 – Identification and Authentication:** Ensure all users (human, software process or device) are identified and authenticated before gaining access.
- **FR 2 – Use Control:** Enforce assigned privileges to ensure users only perform actions they are authorised to do, preventing 'privilege creep'.
- **FR 3 – System Integrity:** Protect the IACS against unauthorised changes to hardware, firmware and software.
- **FR 4 – Data Confidentiality:** Protect sensitive information from unauthorised disclosure in communication channels and data storage.
- **FR 5 – Restricted Data Flow:** Segment the network into zones and conduits to limit the spread of a cyberattack across the system.
- **FR 6 – Timely Response to Events:** Ensure the system can notify authorities, log data and provide forensics when a security violation is detected.
- **FR 7 – Resource Availability:** Ensure the IACS remains operational and resilient against degradation or Denial of Service (DoS) attacks. >>

Which SL to pursue depends on the threat environment, system criticality and availability of resources, as the number and complexity of compliance requirements expands with each SL. For most modern industrial applications, SL2 strikes a good balance between security against more complicated intentional attacks and implementation feasibility.

THE PITFALLS OF TRADITIONAL OT NETWORKS

As industries embrace converged IT/OT infrastructures to boost operational efficiency and manageability, industrial control systems inevitably become exposed to a new dimension of cross-domain cyberattacks. This development has made rudimentary OT cybersecurity inadequate to handle rapidly evolving cyberthreats. The transition to converged networks has fuelled a surge in IT-originated exploitation attempts targeting popular OT protocols, up 84% in 2025, with most threats aimed at Modbus and EtherNet/IP¹. These vulnerabilities are highlighted even more by the fact that most OT networks are traditionally designed in a 'flat' architecture (Figure 1). In such setups, a concentrated security barrier protects connected network components against basic attacks, creating an exploitable single point of failure. When breached, attacks can easily spread to any other component in the network. Developing a multi-layered defence strategy helps mitigate many of the weaknesses of traditional OT networks.

IMPLEMENTING IEC 62443-3-3 FROM A NETWORKING PERSPECTIVE

IEC 62443 is a comprehensive suite of standards covering cybersecurity requirements for IACS components, systems and integration. While vendors focus on delivering security-hardened devices compliant with IEC 62443-4-2 SL 2, system integrators and asset owners must address the system-level requirements of IEC 62443-3-3. By redesigning vulnerable networks according to these standards, owners and integrators can build resilient network security and advance their efforts to achieve IEC 62443-3-3 system-wide compliance.

For the purposes of this article, we will focus on meeting IEC 62443-3-3 Foundational Requirements (FRs) for SL2 from a networking perspective. While these recommendations address some of the System Requirements (SRs) and Requirement Enhancements (REs), this is not an exhaustive list of measures required to achieve compliance.

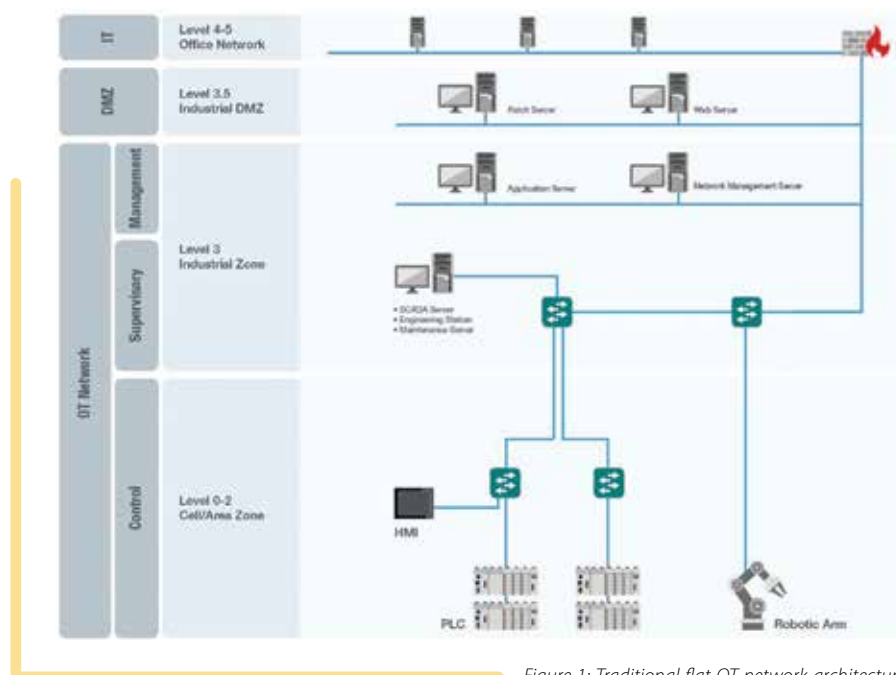


Figure 1: Traditional flat OT network architecture.

FR 1: Identification and authentication

An important tenet of cybersecurity is ensuring that only authorised users have access to network systems. There are multiple mechanisms available to verify the identity of users, either locally or remotely. Some of the most common methods of remote authentication and authorisation are TACACS+ and RADIUS.

Implementing remote authentication makes it possible to move away from vulnerable shared credentials towards centralised, multifactor user authentication. Encrypting authentication data safeguards data integrity and enhances security even further. Proper user authentication ensures that anyone attempting to access control systems from an untrusted network is verified and authorised, minimising the risk of tampering by bad actors.

FR 2: Use control

Besides making sure anyone allowed on your network is authorised to do so, it is just as important to limit access for each user to only systems and functions relevant to their responsibilities. Here is where the principle of 'least privilege' comes into play, which dictates that a user should only have access to the bare minimum required to fulfill their role. This helps prevent both accidental misconfiguration and intentional tampering by users operating outside the scope of their assigned tasks.

Measures such as role-based access control (RBAC) allow administrators to define access permissions based on user

role, providing only the absolute minimum required system privileges.

FR 3: System integrity

Guaranteeing the integrity of systems and data in transition is another cornerstone of a robust security framework to prevent unauthorised changes and tampering. At the device level, secure boot and trusted firmware serve as baseline checks to make sure only authentic, unmodified code can execute on your controllers and I/O devices. The next step is ensuring the integrity of communication channels by using encrypted, secure protocols such as HTTPS, TLS, SSH, and SNMPv3 to prevent data from being intercepted or manipulated during transit.

Disabling unused or unsecured physical and logical interfaces also reduces the attack surface and mitigates the risk of unauthorised entry points being exploited.

FR 4: Data confidentiality

Data in transmission can be highly vulnerable to interception, especially when it involves sensitive control parameters or system credentials. Ensuring the confidentiality of such data is a fundamental requirement to protect it from unauthorised disclosure, but protecting data across different network layers is often a major architectural challenge.

Leveraging industry-proven cryptographic mechanisms provides a standards-compliant method for encrypting moving data. It's crucial to have measures in place that protect confidentiality on different levels, such as MACsec for hop-by-hop Layer 2



AS INDUSTRIES EMBRACE CONVERGED IT/OT INFRASTRUCTURES TO BOOST OPERATIONAL EFFICIENCY AND MANAGEABILITY, INDUSTRIAL CONTROL SYSTEMS INEVITABLY BECOME EXPOSED TO A NEW DIMENSION OF CROSS-DOMAIN CYBERATTACKS

Quality of Service (QoS) prioritisation, in turn, ensures that critical data such as input from control systems is reliably transmitted, even in heavy traffic conditions.

Not to be overlooked is support for redundant protocols and architectures to provide communication failover capabilities in the event of a failure. At the hardware level, availability can be enhanced through robust redundancy built into the product design, such as redundant dual power supplies.

FROM A VULNERABLE TO A HARDENED ARCHITECTURE

Implementing the Foundational Requirements helps transform vulnerable networks into a resilient and secure foundation that brings us one step closer to designing IEC 62443-3-3 compliant IACS systems.

Figure 2 illustrates a hardened architecture where security is embedded into the fabric of the network. The system now features protected zones and boundaries, encrypted communication and real-time visibility. In such a security-hardened architecture, if one segment is compromised, other segments stay secure, enabling more resilient system-wide operations.

CONCLUSION: A UNITED FRONT FOR INDUSTRIAL SECURITY

Adopting a systemic view of cybersecurity is the only way to ensure long-term operational resilience in the digital age. When you design your network according to IEC 62443-3-3 principles, you aren't just checking a compliance box; you are building a defensible fortress for your assets.

By starting with pre-validated building blocks, complexity can be reduced, compliance costs lowered, and systems built that are truly secure by design.

1. Forescout Research 2026, 2025 Threat Roundup Report, <<<https://www.forescout.com/resources/2025-threat-roundup/>>>

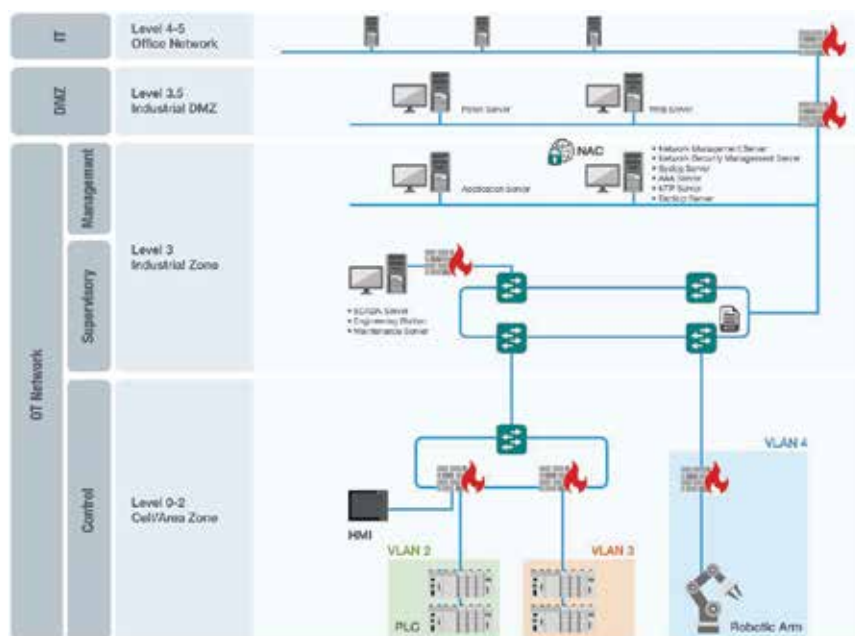


Figure 2: Security-hardened OT network architecture

encryption within the LAN, and secure VPN tunnelling (IPsec) for routing across untrusted networks. Equally important is ensuring that stored device configuration files are securely encrypted to prevent malicious actors from extracting network information and credentials.

Deploying these mechanisms side-by-side ensures data confidentiality across the entire system architecture.

FR 5: Restricted data flow

Data freely moving across a network is more vulnerable as it passes through more devices, offering potential attackers more opportunities to intercept or manipulate the traffic. In industrial network environments, there are many types of data of different criticality being processed by an equally broad range of devices, including production equipment, control systems and management devices.

Segmenting data to prevent the lateral movement of threats is another key pillar of sound network security. By separating the network, you can create operational areas with their own dedicated security measures (zones) and controlled communication paths (conduits) between these zones. In a segmented structure, if one network zone is compromised, the breach is contained and will not affect other networking zones.

The easiest way to create networking zones is by implementing a VLAN architecture, which logically groups networking devices into a single LAN environment. Deploying industrial firewalls with Deep Packet Inspection (DPI)

capabilities creates a robust defence layer that monitors and blocks any unauthorised traffic moving across zone boundaries based on user-defined policies.

FR 6: Timely response to events

Maintaining a secure control environment relies heavily on the ability to respond quickly to security events and incidents occurring on the network. Device- and network-level visibility play a critical role in enabling administrators to identify and mitigate potential threats.

Traffic monitoring functions and event logging provide supervisors with valuable insights into network activity, while configurable notifications alert of issues as they happen. Meanwhile, powerful network management software offers more holistic, network-wide visibility via real-time dashboards, topologies, and security asset management.

FR 7: Resource availability

This requirement states that control systems should remain operational in the face of a network attack or failure. Good resource management is critical for system reliability and security, as sudden operational disruptions not only incur heavy costs, but also expose the network to potential attacks.

Optimising network availability requires thoughtful implementation of both software and hardware measures. Communication load management functions such as rate limiters and storm control regulate incoming and outbound traffic volumes to prevent overloading, data loss and DoS attacks.

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The Black Sheath VSD ECO UV-resistant range is engineered to deliver stable motor control performance in demanding industrial and outdoor environments.

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Digital transformation for automotive product manufacturer



Australian automotive aftermarket solutions manufacturer MotorOne Group recently successfully implemented a new digital automation solution at its Melbourne facility, delivering 20% growth within months and creating a scalable foundation for future expansion.

Prior to the automation project, MotorOne's chemical development processes relied heavily on manual operations, rather than standardised procedures. The company embarked upon a digitalisation project with the goal of achieving a higher degree of consistency, quality control and scalability for the company's car wash and automotive care product lines. The company wanted to introduce a recipe-driven manufacturing process, enhance quality management and have better control of inventory to reduce waste and energy consumption.

"We really decided once we invested in this beautiful facility that we needed to automate, and we needed to be in front of the technology. If we don't get the consistency right, the cost is enormous," explained Greg Lewis, CEO of MotorOne.

The digital transformation focused on the facility's tank farm, where car wash and derivative products are formulated across standardised tanks at the facility. The solution needed to address recipe management, material traceability and process standardisation while providing a foundation for future expansion.

The project, delivered in partnership with Siemens' automation solution partner Mescada, saw MotorOne become the first company globally to integrate Siemens' cloud-based PCS Neo engineering platform with Siemens Opcenter's Manufacturing Execution System (MES), establishing a seamless digital thread spanning enterprise planning through to process control.

Siemens PCS Neo is a cloud-based evolution of the established PCS 7 platform that enables multiple engineers to collaborate simultaneously on system development and maintenance. The web-based production control system integrated seamlessly with Siemens Opcenter Manufacturing Execution System (MES), enabling MotorOne to create a comprehensive digital factory architecture based on Industry 4.0 standards.

While both technologies have been deployed separately in various industrial applications, the specific integration architecture implemented in this facility was a first for Siemens. The complexity of creating bidirectional communication between the cloud-based PCS Neo and Opcenter MES,

while maintaining real-time process control and accurate ERP data exchange, required extensive development and testing that positioned this as a pioneering implementation.

"PCS Neo is an evolution of PCS 7. It uses the same hardware, but the software that sits on top means it's cloud-based, allowing more accessibility," said Darryl Kaufmann, Head of Digital Industries at Siemens AUNZ. "What's special about this project is we've helped a small-medium enterprise implement a digital transformation strategy while introducing brand new technology that is future-proof."

Each tank at the manufacturing facility incorporates standardised I/O points and devices, enabling consistent recipe execution based on work orders generated by the MES.

The automation implementation has delivered significant operational improvements across multiple metrics. Recipe management has been completely standardised, with all manufacturing processes now captured and documented in detailed procedures. Quality control has been enhanced through barcoding systems that prevent incorrect raw materials from entering production batches.

Cornell D'Couto from Mescada, the system integrator, highlighted the sustainability benefits: "Having better control of your system processes means there's less rework and the ability to save on materials. Sustainability and waste reduction has been a key factor as part of this process."

The system provides enhanced visibility and traceability throughout manufacturing operations, enabling MotorOne to optimise production timeframes and support increased output. Process variability has been significantly reduced through precise ingredient control and standardised recipe execution.

Beyond immediate operational improvements, the digital transformation establishes a scalable platform for MotorOne's expansion plans. The standardised approach across the initial eight tanks provides a clear pathway for extending automation to additional production capacity as demand grows.

"That's going to allow us to double or triple our growth from where we are," Lewis said. "We've already seen 20% growth just in a few months since we rolled out this digitalisation project."

Siemens Ltd
www.siemens.com.au

NEWPRODUCTS

FLAME DETECTOR FOR HAZARDOUS AREAS



Emerson has announced a flameproof model for the Rosemount 965 Flame Detector, adding hazardous-location certification for applications where hydrocarbon flame detection is required. The flameproof model combines QuadSense technology, factory-calibrated-for-life operation, broad integration options and rugged enclosure protection to support fire protection strategies matched to application needs.

QuadSense technology uses four infrared sensors to help distinguish hydrocarbon fires from non-flame background radiation, supporting reliable detection and resistance to nuisance alarms. Under specified conditions, the detector can detect hydrocarbon fires at distances up to 45 m with response typically in less than five seconds. Five selectable sensitivity levels help users align performance with application needs.

The Rosemount 965 is factory calibrated for life, helping reduce recurring calibration routines. Infrared built-in test capabilities continuously verify optics and electronics integrity, supporting confidence between manual inspections. Multiple output options, including HART connectivity, support integration with standard communication infrastructures, while universal wiring helps simplify specification and streamline sitewide deployment. IP66 and IP68 enclosure protection supports performance in demanding operating environments.

The flameproof model can be applied in environments often found in oil and gas facilities, chemical and petrochemical plants, storage tank farms, hazardous materials storage areas and explosives or munitions sites. The Rosemount 965 also supports non-hazardous and light-industrial applications such as transportation infrastructure, public buildings, cable tunnels, semiconductor facilities, warehouses and other sites where hydrocarbon flame detection is needed.

Emerson

www.emerson.com/au/automation

SAFETY LIGHT CURTAIN WITH IO-LINK SAFETY

The Pilz PSENopt II Advanced IOLS safety light curtain with integrated IO-Link Safety combines protection, intelligent diagnostics and simplified connectivity into a single solution.

Engineered for reliable finger, hand and body protection in accordance with EN/IEC 61496-1/-2, the PSENopt II Advanced IOLS supports applications up to PL e / SIL 3. With IO-Link Safety, users can access real-time data from every individual beam, enabling faster commissioning, simplified troubleshooting and predictive maintenance based on signal quality insights. The safe single-beam evaluation feature also allows more precise object detection, offering greater flexibility in automated processes.

Designed with versatility in mind, the system includes muting options (L, T, X and external), flexible blanking modes, reduced resolution and the ability to operate either in IO-Link Safety or traditional OSSD mode for integration into both new and existing systems.

Along with enhanced diagnostics and zero dead zones, the PSENopt II Advanced IOLS delivers high robustness, easy installation and rapid commissioning.

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PURGE PRESSURISATION SYSTEM

Pepperl+Fuchs has expanded the capabilities of its 6000 Series purge and pressurisation system with a high-current output option, providing greater flexibility for hazardous-area applications that require higher electrical loads. By enabling direct switching of enclosure power within the system, the enhanced electronic processing control unit (EPCU) helps reduce the need for additional Ex-rated switching hardware, simplifying system design and lowering installation costs.

The upgraded EPCU features two enclosure contacts rated up to 12 A per contact, allowing a broader range of applications to be supported directly by the purge and pressurisation system. This is particularly beneficial for high-load equipment such as gas analyser systems, heated enclosures, and other applications where traditional solutions often require separate contactors or circuit breakers. By integrating the switching function into the control unit, the 6000 Series reduces wiring complexity, minimises panel space requirements and supports more compact enclosure designs.

The high-current option is fully integrated into the 6000 Series platform, a fully automatic Type X/Ex pxb purge and pressurisation system designed for use in Class I, Class II, Division 1 and Zone 1/Zone 21 hazardous areas. Combining controller, pneumatics, electrical I/O and user interface within a single enclosure, the system automatically energises enclosure power once safe operating conditions have been achieved. Compatible with existing 6000 Series infrastructure, including EPV-6000 vents, the high-current variants retain the platform's established functionality and global certifications while expanding application possibilities for demanding hazardous-area environments.

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NEWPRODUCTS

HMI PLATFORM

The Beijer X3 pro HMIs are designed to offer a versatile and secure HMI platform for iX-based applications.

Functionality can be customised using C# scripting, extended capabilities through NuGet packages, and a modern web browser. Adhering to IEC 62443-4-2 standards, they offer encrypted communication and secure data transfer.

Additionally, X3 pro web panels are available to provide a further choice of technology.

X3 pro HMIs come in 7-, 10-, 12-, 15-, and 21-inch screens, to fit any application need.

The X3 pro HMIs are also designed for simplicity and ease of configuration, and users can easily replace Beijer X2 panels with X3 due to the same panel size, cut-out, connector set-up and guided software transition. With the OS3 operating system and the iX-Developer 3 programming software, users benefit from an intuitive interface that enhances usability, simplifies device set-up and provides hardware diagnostics.

Controlbox

www.controlbox.com.au



POWER CONNECTORS



LAPP Australia's EPIC PowerLock connectors are engineered to provide safe and reliable high-current power distribution. Designed for both mobile and fixed installations, they help engineers reduce connection risk while maintaining consistent performance under load.

Delivering up to 660 A continuous capacity, the system incorporates IP67 environmental sealing and IP2X finger-safe protection for enhanced operator safety. Colour-coded and mechanically keyed housings minimise mis-mating, while a secure bayonet locking mechanism with secondary lock improves vibration resistance in demanding industrial settings. Termination options including crimp or set-screw configurations support installation flexibility and maintenance efficiency across varied site requirements.

Suitable for generators, motors, load banks, lighting distribution systems and heavy industrial infrastructure, PowerLock connectors are widely used across construction, events, mining and manufacturing sectors. Their robust design aims to deliver dependable power transfer for temporary or permanent installations.

LAPP Australia Pty Ltd

lappastralia.com.au

COMPACT GAS FLOW METER AND CONTROLLER

The Bronkhorst FLEXI-FLOW Compact is an all-in-one gas flow meter and controller designed to simplify measurement and control in space-constrained systems. The instrument combines gas flow measurement and control, pressure measurement and control, and temperature measurement in one compact device, helping engineers reduce component count while improving process insight.

Built for gases, FLEXI-FLOW Compact uses a thermal measuring principle and supports applications ranging from desktop bioreactors and analytical equipment to fuel cell production. An onboard database of 22 gases enables real-time conversion based on actual process conditions, supporting high measurement accuracy across changing operating requirements.

The series is available for ranges from 0–500 l/min and 0–16 bar(g), with flow accuracy up to $\pm 0.5\%$ reading plus $\pm 0.1\%$ full scale and pressure accuracy of $\pm 0.5\%$ full scale.

The instrument also provides repeatability below $\pm 0.2\%$ reading, operation from 0–50°C, and IP40 ingress protection.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au



COMBINED DRIVE SOLUTION

NORD Drivesystems has released NORDAC FUSION, which combines asynchronous motors (IE3) and permanent magnet synchronous motors (IE5+) in ventilated and unventilated versions with a decentralised NORDAC ON frequency inverter.

The company says that due to the optimal electrical and mechanical adjustment of both components, NORDAC FUSION achieves higher power density, while keeping the installation space as small as possible, and that users will benefit from a ready-to-use system that operates reliably once connected. This fusion of motor and drive eliminates extensive parameterisation or time-consuming selection of components.

The optimised motor/inverter combinations cover a power range from 0.31 to 3.7 kW. They feature consistent safety and communication properties, are suitable for worldwide use, and can be complemented with a gear unit from the manufacturer's modular product range.

The decentralised frequency inverters are characterised by their compact design, full plug-in capability and high reliability. Special features include the integrated PLC and their multi-protocol Ethernet interface. Profinet, EtherNet/IP and EtherCAT can be easily set via parameters. Integrated safety functions enable safe operation of almost all motion sequences in automated production.

Apart from STO and SS1, the NORDAC ON series also features the motion monitoring function SLS, SMS or SSM for failsafe control. They can be integrated via PROFIsafe or FSoE into a failsafe application within an existing industrial Ethernet network and standalone use is also possible. The safe digital inputs and outputs can be used to incorporate failsafe peripheral components or functions.

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THE ADVANTAGES OF USING INTRINSIC SAFETY IN HAZARDOUS LOCATIONS

Derek Sackett, Senior Product Marketing Specialist, Phoenix Contact USA

istock.com/innatsu

By limiting electrical and thermal energy below ignition thresholds, intrinsically safe technology prevents fires and explosions without the need for flameproofing.

In hazardous industrial environments — from oil refineries and chemical plants to grain silos and mining operations — the presence of flammable gases, vapours, or combustible dust creates constant risk of fire and explosion. While traditional fire and explosion protection methods such as containment enclosures and suppression systems aim to control the aftermath of an ignition event, intrinsically safe (IS) technology takes a fundamentally different approach: it prevents ignition from occurring in the first place.

Below are 10 advantages of using intrinsic safety in hazardous areas when feasible.

1. USE OF STANDARD, SAFE AREA DEVICES

Intrinsic safety technology permits the use of some safe area devices in lieu of explosion-proof devices as long as they meet certain requirements.

US and global requirements for hazardous location wiring practices allow two types of devices to be used in an 'intrinsically safe circuit' (NEC article 504.2, 504.4, and 504.10(B)). The first type of device is an 'intrinsically safe apparatus', which must be tested, approved, and labelled as such according to UL 913. The second is called a 'simple apparatus'. A simple apparatus only needs to meet a few limitations of electrical parameters to qualify, and then does not have to be tested, approved, or labelled as an intrinsically safe or hazardous area device. The electrical parameter limitations are that the device cannot be capable of generating more than 1.5 V, 100 mA, or 1.5 W, or dissipate more than 2.5 W. Some examples of this type of device are thermocouples, RTDs, switches and LEDs.

What's so great about being able to use a normal area (safe area) device? Typically, safe area/non-Ex devices cost less and are more readily available than hazardous area-

rated devices. There's also a good chance you're already using them in your safe area applications. Why buy, stock and maintain more parts than you have to?

In contrast, when using explosion-proof technology for hazardous area wiring technology, there are no safe area options. A device designed to withstand the required explosion containment requirements would be overkill, bulky and cost more than the market would bear.

2. SAFEST HAZARDOUS AREA TECHNIQUE

Intrinsically safe is the only technique allowed for Zone 0, the continuous presence of hazardous material.

Instead of two hazardous area divisions as defined by the NEC and CEC (Canadian Electrical Code), ATEX (European Union) and the International Electrotechnical Commission (IEC) use three (zones), Zones 0, 1, and 2, with Zone 0 being the most continuously hazardous. According to ATEX, IECEx, and the US national standard NFPA (article 505.5), which addresses zones, only the power-limiting, electrical control technique of intrinsic safety (ia) is allowed to be used as an electrical signal medium into and out of a Zone 0 area. Compare this to Ex d (flameproof — the global version of explosion-proof), which is based on containment and is only allowed into Zones 1 and 2. So why is intrinsic safety considered safe for Zone 0 (an area always considered hazardous)? The reason is fault tolerance.

3. FAULT-TOLERANCE

IS technologies can remain safe after faults develop in cables and faulty components.

Because faults in electrical circuits and devices can cause hazardous voltage, current and stored-energy levels, safeguards are part of the design requirements of intrinsically safe apparatus and associated apparatus. Some examples of these safeguards are fuses on any incoming signal termination to limit hazardous currents into the hazardous area. Transformer isolation is also used to limit hazardous voltage spikes or wrong high-voltage terminations from reaching the hazardous area. Diodes are then used to limit the finer levels of voltage.

The fault-tolerant part comes into play via the redundant protective circuits required. There are three types or levels of intrinsically safe Ex i devices: ia, ib, and >>

ic (article 505.2 FPN). Type ia must be able to withstand two faults and retain its intrinsic safety to work in Div. 1 and Zone 0. Type ib must be able to withstand one fault and maintain its intrinsic safety circuit to work in Zone 1 areas. Type ic has no redundancy requirement and is approved for use in circuits into the Div. 2 and Zone 2 areas.

In contrast, there are no fault-tolerance requirements for redundancy in explosion-proof and flame-proof technologies. If an accident happens, or human mistake reduces the containment properties of the devices, there are no back-up devices to automatically take over.

4. LIVE MAINTENANCE

Intrinsic safety is the only hazardous location wiring practice that permits live work on circuits without gas clearance certificates and with power applied.

With live maintenance of an electrical circuit, one of the hazards is the creation of an arc or spark when shorting of a circuit occurs. But in a properly designed IS circuit, even if there is electrical energy present, there will not be enough energy to cause an arc or spark with enough energy behind it to ignite the hazardous material. The theory behind intrinsic safety is that the modules are designed to limit the amount of energy onto a circuit below the minimum ignition energy (MIE) of hazardous materials. If a properly designed intrinsic safety barrier or isolator would fail, they are designed to fail safe as described above.

Because the other common hazardous location wiring practices (explosion-proof, purged enclosures) do not limit energy below the MIE, but rely on physical containment and separation, opening one of these enclosures without shutting off power would expose their hazardous electrical energy to the hazardous atmosphere.

5. LEAST EXPENSIVE

Using IS devices can lead to large savings in explosion-proof enclosures, conduit, fittings, protected cable, special glands, seals etc.

Because intrinsic safety limits the energy or ignition source in a hazardous location, it allows the use of safe area cabling, as long as it does not act like a conduit and transmit explosive gases from the hazardous areas to a safer area.

Containment technologies use mechanical containment techniques to

contain an explosion within the special engineered, heavy-duty, cast metal electrical enclosures, conduit and fittings. Access to the enclosure is either through a lid, in which both the lid and enclosure body surface are machined to tolerances engineered to allow the hot gases to escape in a design-controlled manner, or via a machine-threaded lid and enclosure body. These heavy-duty enclosures also require the entries into and out of the enclosure to be machine-threaded holes. Seal-offs are then used to keep hot gases from escaping via the conduit. The rigid conduit runs need to be cut, threaded, bent, fit and secured into place, which adds to the project installation time and cost.

6. SAFE AREA WIRING METHODS

With IS technology there is no need for added installation cost of explosion-proof conduit

because the system is electrically protected at the source.

Of course, to help eliminate any downtime, one still might want to protect the conductors to a certain degree, but the need to do this to prevent an explosive situation is not necessary.

Another advantage in using safe area cabling is the flexibility of acceptable safe area wiring. This offers the advantage of quicker and easier installation and the possibility of reusing the flexible cabling and conduit if the installation is temporary.

7. SAFE FOR PERSONNEL

Compared to the larger voltages and currents typically used in circuits found in Ex d technologies, IS circuits are very safe for personnel and equipment.

The heavier lifting or moving of objects typically done in non-combustible areas with



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BECAUSE FAULTS IN ELECTRICAL CIRCUITS AND DEVICES CAN CAUSE HAZARDOUS VOLTAGE, CURRENT AND STORED-ENERGY LEVELS, SAFEGUARDS ARE PART OF THE DESIGN REQUIREMENTS OF INTRINSICALLY SAFE APPARATUS AND ASSOCIATED APPARATUS



electrical energy is accomplished instead with pneumatic or hydraulic energy, which is controlled by low-level, safe electrical energy.

8. SAFEST METHOD

IS technology is immune from problems that can arise in containment systems, such as improperly secured explosion-proof covers, sealed conduits, marred surfaces, etc.

Explosion-proof enclosures are specially designed to withstand an internal explosion and exhaust the hot gases at a certain rate across the face of the enclosure or through the gap of a threaded enclosure, cooling the hot gases. If the lid is not secured properly (bolts missing or not tightened down), the machined face surface marred or scratched, or a threaded lid not tightened, hot gases could be allowed to escape.

If the explosion-proof structures or devices are not properly installed or become

insecure via accident or ambient conditions over time, they could leave an opening for hot vapours into a hazardous area or hazardous gas transmission to an area considered safe.

9. LOOP ISOLATION

Intrinsic safety isolators can be used to provide loop-to-loop isolation and eliminate ground loops.

Sometimes simply referred to as galvanic isolators, these devices are not only designed to limit electrical energy in a circuit (the IS part), but most will also condition the analog signal according to its function.

For example, a 4-20 mA analog repeater might provide loop isolation and add power to the signal. Or an IS-rated thermocouple transducer might go a step further by filtering, isolating, and converting the signal.

If you find yourself having signal issues and determine certain circuits could require loop isolation, it might be worth the quality of your product to consider accomplishing the Ex circuit protection and signal conditioning in one step by using an intrinsically safe Isolator.

10. GLOBAL ACCEPTANCE, ONE STANDARD DESIGN

Intrinsic safety is a well-defined universal approach to safely installing instrumentation and control devices into hazardous locations, with virtually identical standards across the world and applicable to all industries.

From the ATEX scheme, which most of the EU follows, to the IECEx scheme, which most of the rest of the world follows, there are very few, if any, changes. Even the NEC and CEC standards, which the US and Canada follow, adopt most of IECEx and change very little. Because of this, manufacturers of devices using intrinsic safety circuits can easily and cost-effectively design devices that fit approvals around the world. This, in turn, keeps design costs down for global engineering firms.

DISADVANTAGES

Intrinsic safety however does have a few disadvantages.

There are limitations to intrinsic safety technology and applications. The biggest is probably the technology method itself: energy limitation. Due to this, the ability to power devices with electrical energy is restricted to smaller, low power-consuming sensors, instruments, and regulating devices. With that said, it still can be used in conjunction (to monitor and control) with other forms of safer or possibly large-power energies (such as pneumatics and hydraulics) in hazardous locations.

The second most commonly stated disadvantage with intrinsic safety technology is that it requires more engineering time than the other technologies, particularly if it's an unfamiliar technology. With an explosion-proof design, you need to choose the proper hazardous area enclosure, and the same with intrinsic safety. In addition, there are only two more pieces of information needed: the properly associated apparatus (intrinsic safety isolator), and then making sure the parameters of the field device, the intrinsic safety isolator, and the cabling make up an intrinsically safe circuit.

NEWPRODUCTS

80 GHZ RADAR LEVEL TRANSMITTERS

Hawk Measurement Systems has announced the launch of its Senator H80 range of 80 GHz FMCW radar level transmitters designed to deliver greater accuracy, flexibility and cost-effective performance across liquid, slurries and solids applications.

The Senator H80 Radar Series is said to offer plant operators a smarter alternative to over-engineered, high-cost level systems without sacrificing reliability or precision, and completes HAWK's level measurement instrument offering along with its established range of acoustic, ultrasonic, microwave, guided wave radar, fibre-optic, laser and sonar solutions.

80 GHz FMCW radar technology provides a narrow beam angle, high signal clarity and reliable measurement in challenging conditions such as steam, dust, foam, turbulence and vapour.

The range includes two core models: the Senator H80C compact radar, a lightweight design suitable for tighter installations and moderate ranges up to 30 m, and the Senator H80I Integral Radar, built for more demanding environments with a robust housing, extended measuring ranges up to 120 m for liquids and solids, and high-temperature versions capable of withstanding up to 260°C.

Commissioning and operation are streamlined through Bluetooth connectivity, PC software and intuitive configuration tools, reducing set-up time and minimising the need for specialist expertise. The Senator H80I also features an integrated keypad and display for onsite configuration and diagnostics.



Hawk Measurement Systems Pty Ltd
www.hawkmeasure.com



PLEATED FILTERS

Camfil's pleated filters take advantage of the company's HemiPleat technology to keep pleats evenly spaced and fully open using synthetic beads. This ensures the entire filter surface is exposed to airflow, delivering full media utilisation and higher filtration efficiency.

The open pleat structure improves airflow and reduces pressure drop across the filter, both at the start and throughout its life. Lower resistance means reduced energy demand from fans and less compressed air needed for cleaning, helping cut operating costs.

HemiPleat also enhances dust release during pulse cleaning. Filters capture more contaminants and release them more effectively, preventing clogging and extending service life. Testing shows these filters hold more dust before cleaning is required, reducing maintenance and downtime.

When combined with other Camfil systems like the Gold Series X Flo, HemiPleat is designed to deliver optimal media use, high cleaning efficiency and longer-lasting performance. The result is cleaner air, improved reliability, and lower total cost of ownership.

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LINE SCAN CAMERA

The pco.horizon 9.1 bi TDI CLHS Line Scan Camera from Excelitas features 9K resolution and 256 TDI stages for precise inspection applications requiring high sensitivity, resolution and image stability. Its robust design, flexible thermal management and easy integration make it suitable for demanding tasks in material testing, print verification, web inspection, flat panel inspection, industrial quality inspection, machine vision, optical inspection, PCB and electronics inspection, and wafer inspection.

Equipped with a sensor pixel size of 5 μm , a temperature-stabilised, back-illuminated CMOS sensor and dual photosensitive bands, it is designed to provide high image quality and sensitivity at line rates up to 600 kHz. The Camera Link HS (CLHS) interface enables fast data transmission with simplified cabling for integration into high-performance vision systems.

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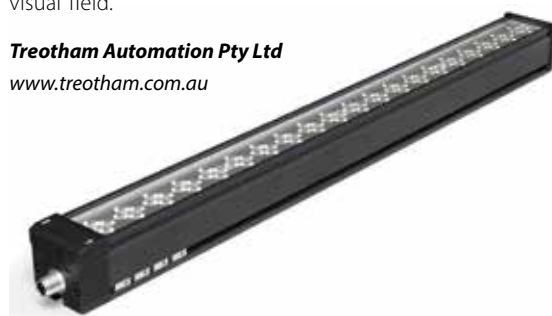
MACHINE VISION LED BAR LIGHT

The wenglor LBF machine vision LED bar light has been designed to reliably handle demanding inspection tasks with different light sources and high light output to provide stable image quality even at high cycle times. Precise synchronisation with camera exposure and conveyor speed makes it particularly suitable for scanning tunnels, high-speed sorting and dimensional inspection.

With a light output of up to 2.5 million lux at a working distance of 200 mm and a fast rise time of less than 800 ns, the LBF light offers extremely short light pulses and a fast response time so that motion blur is effectively avoided during image recording.

The T-slot mounting on three sides of the LED bar light enables quick and flexible integration into different image processing applications. Mounting adapters and a wide range of other mounting accessories facilitate installation and individual adjustment. Due to the compatibility with angle changers, the beam angle of the LBF bar light can be adjusted in a targeted manner, thereby achieving homogeneous and uniform illumination across the entire visual field.

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NEWPRODUCTS

RACK-MOUNTED DATA ACQUISITION PLATFORM

The Dewesoft SIRIUS XR rack-mounted data acquisition (DAQ) platform is designed for demanding test and measurement applications, and combines high-channel-count data acquisition, integrated signal conditioning and flexible system scalability in a compact rack-mounted architecture. Available in XR5 and XR9 configurations, the platform supports a wide range of measurement requirements across aerospace, automotive, defence, energy, research and industrial testing environments.

The platform supports acquisition of voltage, current, strain, vibration, IEPE, charge, resistance, temperature, digital I/O, CANbus and encoder signals within a single integrated system. Users can configure systems using Dewesoft's SIRIUS X and SIRIUS XHS measurement modules, enabling both high-dynamic-range measurements and high-speed transient capture from a common hardware platform.

SIRIUS XR incorporates a scalable architecture with integrated networking, optional embedded computing and high-speed data-logging capabilities. Built-in network switching and PTPv2 synchronisation support distributed measurement systems, while dual 10 GbE connectivity provides high-throughput data transfer for large-scale testing applications.

For applications requiring precise positioning and timing, SIRIUS XR can be combined with Dewesoft GNSS and RTK solutions to provide centimetre-level positioning accuracy for vehicle, navigation and mobility testing.

High-speed SIRIUS XHS modules support bandwidths up to 5 MHz and sampling rates up to 15 MS/s, while SIRIUS X modules provide 24-bit resolution with Dewesoft's DualCoreADC technology and alias-free acquisition for precision measurements.

Metromatics Pty Ltd
www.metromatics.com.au



RUGGED WINDOWS 11 TABLETS

Getac has announced the expansion of its ZX80 range of 8-inch fully rugged tablets with the launch of the ZX80W and ZX80W-EX Windows 11 devices built on ARM architecture.

The ZX80W and ZX80W-EX both utilise Qualcomm's QCS6490 platform, built on ARM architecture, for high energy efficiency and high performance-per-watt. Both devices also feature 12 GB of inbuilt LPDDR5 memory and 256 GB of universal flash storage.

By leveraging ARM's high thermal and energy efficiency, the ZX80W runs Windows 11 IoT Enterprise LTSC in a compact, fanless chassis.

The ZX80W and ZX80W-EX also feature a 6th Generation Qualcomm AI Engine to unlock real-time intelligence at the edge, reducing cloud dependency for faster, more reliable processing when an internet connection is patchy or unavailable.

Both devices are MIL-STD-810H and IP67 certified, vibration and 1.8 m drop resistant, feature a daylight-readable display, and have a wide operating temperature range of -29 to +63°C for the ZX80W and -21 to 55°C for the ZX80W-EX. Both are lightweight with the ZX80W weighing 590 g and the ZX80W-EX weighing 780 g.

In addition, the ZX80W-EX is also ATEX/IECEX Zone 2/22 certified for operator safety in hazardous and/or potentially explosive environments.

Getac Technology Corp
www.getac.com



FIRE-RATED CABLE RANGE

LAPP Australia's FIRE 3013 MC 0.6/1kV cable is engineered specifically for environments where continued circuit integrity under fire conditions is essential. Designed and certified to AS/NZS 3013, WS52W and AS/NZS 5000.1, the cable is designed to deliver up to two hours of operation during a fire, helping ensure vital systems remain active when they are needed most.

The cable range is suitable for demanding industrial applications, including processing plants, mining operations, infrastructure and critical facilities where shutdowns can have significant safety and financial consequences.

A key feature of the FIRE 3013 MC is its Low Smoke Zero Halogen (LSZH) sheath. In the event of a fire, the cable emits minimal smoke and no corrosive halogen gases, improving visibility for evacuation while helping protect sensitive equipment from damage.

The cable also incorporates Class 5 flexible bare copper conductors, allowing for easier handling and installation.

LAPP Australia Pty Ltd
lappaustralia.com.au





Weigh smarter with METTLER TOLEDO's IO-Link

In today's fast-paced industrial landscape, automation is no longer a luxury, it's a necessity. Across the manufacturing, packaging and process industries, companies face mounting pressure to increase efficiency, maintain product quality and ensure safety, all while reducing downtime and operational costs. However, these goals come with their fair share of challenges, especially when it comes to precise measurement and data integration.

Accurate weight measurement is critical in automated systems, impacting everything from batching and filling to quality assurance. However, inconsistencies due to environmental factors, mechanical wear or communication delays can compromise data reliability, leading to costly errors or rework.

Modern production lines often consist of multiple devices and control systems. Integrating weighing components seamlessly into these systems can be a daunting task, often requiring extensive wiring, configuration and troubleshooting. Unexpected equipment failure or sensor malfunction can halt operations, causing significant production losses. Traditional sensors offer limited diagnostic capabilities, making it challenging to predict failures before they happen. Process industries often operate in tight spaces and harsh conditions, including exposure to vibration, temperature fluctuations, dust and moisture: sensors need to be robust and compact without sacrificing performance.

This is where innovative solutions like the SWP331D-IOL Weighing Sensor and the SLP33xD-IOL Load Cell come into play, turning challenges into opportunities. These challenges are met head-on by bringing precision, connectivity and durability to the forefront of automation technology. The SWP331D sensor delivers rapid and highly accurate weight measurements, ensuring automated processes maintain tight tolerances. The SLP33xD-IOL load cell complements this with rugged construction that withstands harsh conditions without compromising accuracy. Together, they provide reliable data even in the harshest environments.

Both devices utilise IO-Link, a smart communication protocol that simplifies integration by enabling bi-directional digital communication between sensors and control systems. This means quick setup, remote configuration and real-time data monitoring, all reducing commissioning time and enabling rapid troubleshooting. Due to the IO-Link's extensive diagnostic capabilities, these sensors provide early warnings on potential issues such as overloads, temperature anomalies or mechanical faults. Operators can schedule maintenance



before failures occur, keeping production lines running smoothly and reducing costly unplanned downtime.

The compact footprint of the SWP331D-IOL sensor makes it ideal for installation in confined spaces, while the SLP33xD-IOL load cell's rugged design resists environmental stressors typical in industrial settings. Their durability ensures longevity and consistent performance, even under demanding conditions.

Consider a packaging line where precise product weight is crucial. Using the SWP331D sensor and SLP33xD load cell, operators can monitor weights in real time, automatically adjusting filling processes to reduce product giveaway and waste. Smart diagnostics alert maintenance teams to potential issues before they cause downtime, improving overall productivity.

Automation is evolving, and so are the demands on measurement technology. The SWP331D-IOL Weighing Sensor and SLP33xD-IOL Load Cell represent the future of smart, connected weighing solutions. They address key industry challenges with innovation and reliability, enabling businesses to improve efficiency, reduce costs and maintain quality standards.

Investing in these advanced sensors is more than just upgrading technology, it's about embracing smarter processes and paving the way for sustainable growth.

Contact METTLER TOLEDO on 1300 659 761 or via info.mtaus@mt.com for more information, or visit *Enable Smart Weighing With IO-Link* at <https://bit.ly/4fdMKos>

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METTLER TOLEDO

VALVES, DATA CENTRES AND THE INVISIBLE INFRASTRUCTURE OF AUSTRALIAN INDUSTRY

Walk through any brewery, mine site or water treatment plant and you'll see the same thing: kilometres of pipework, banks of valves and quiet little boxes full of electronics.

Today, however, the conversation in boardrooms is dominated by digital transformation, AI and data. Australia already hosts more than 250 data centres, putting us among the top locations globally despite our size.

There is a harder truth as well: data centres are energy- and water-hungry. Cooling systems, water use and energy efficiency are no longer 'engineering details' buried in the back of a P&ID, they are front-page issues. And the decisions that shape those outcomes are often made in the last metre of the process: the valve, the sensor, the control loop that either wastes or preserves resources every second of every day.

Across manufacturing, mining and water, I see the same pattern emerging. Australian businesses are pouring billions into digital technologies, and surveys show industrial leaders prioritising intelligent automation, IIoT connectivity and real-time analytics. Yet when I visit sites, I still find operators walking around with clipboards, manual valves that 'no one wants to touch', and brilliant software projects starved of reliable field data.

Simply, we are over-investing in dashboards and under-investing in instrumentation and control. We are trying to build digital twins on foundations of uncertain measurements, orphaned valves and aging control panels. We celebrate cloud strategies while tolerating process skids that no one has properly documented for 15 years. In that environment, every promise of optimisation is built on sand.

A valve is not just a valve. It is the difference between a stable control loop and a system that hunts and trips. Between a cooling plant that quietly maintains setpoint and one that spikes energy demand on hot days. Between a water plant that can confidently move to demand-driven operation and one that must run flat-out 'just in case'. In a world of escalating energy costs, water constraints and ESG scrutiny, that is not a minor detail; it is a strategic lever.

More consideration needs to be given to the full instrumentation and valve lifecycle, from installation through commissioning, maintenance, optimisation and, when needed, replacement, so that a plant's performance in year 10 is equivalent to year one.

From a sustainability perspective, this matters as much as any new 'green' announcement. Where it is technically and commercially viable, it is becoming more prevalent to maintain, upgrade and extend the

life of good equipment than to rip and replace. This reduces capex, reduces embodied carbon and avoids the waste that comes with a constant churn of new hardware.

Of course, there are times when the right answer is a new technology or a full redesign, but that decision should come from a long-term view of the process.

For data centres, that might look like smarter control of cooling water and refrigerants, dynamic setpoints linked to real-time load, or high-integrity leak detection that protects both assets and communities. In mining, it might be dust suppression and tailings circuits that are instrumented and automated enough to support credible ESG reporting. In food and pharma, it might be hygienic skids that arrive with validated, standardised automation out of the box, and a lifecycle support plan, so operators can focus on quality, not troubleshooting.

If we are serious about making Australian industry both competitive and sustainable, we have to respect the 'boring' parts of the system. Valves, sensors and control cabinets are not glamorous, but they are where energy, water and product are won or lost, year after year.

My challenge to leaders in manufacturing, processing, mining and digital infrastructure is this: bring your operations and automation teams into strategic discussions early. Ask where your measurements are weak, where your control is fragile, and where complexity is quietly driving risk and unnecessary replacement. And then demand more from those of us who supply the hardware, not just catalogues, but genuine partnership across the full lifecycle of your assets.

Because in the end, a valve is never just a valve. It is a decision about how seriously you take reliability, efficiency and sustainability, not just on day one, but for the decades that follow.

Cuong Vo, Director Region East Pacific, Bürkert Fluid Control Systems, has over 20 years' experience in process control and automation. Specialising in guiding organisations through transformative changes, he prioritises customer-centric approaches for sustainable growth.



WIRELESS IIoT ASSET HEALTH PLATFORM

The Emerson Synchros IIoT platform is a suite of technologies that aims to expand asset health visibility and improve maintenance decisions through a flexible wireless architecture designed for rapid deployment across existing facilities.

Across many operations, maintaining and tracking assets still depends on periodic manual rounds due to cost and logistical issues. This often leaves gaps where developing issues can go undetected. The Emerson Synchros platform aims to provide a more practical and scalable approach to continuous monitoring, allowing maintenance and operations teams to digitise inspection points and extend visibility using a flexible wireless architecture built on WirelessHART technology.

Built for critical process industries — including chemical, oil and gas, power, life sciences, and water/wastewater — the Emerson Synchros platform enables organisations to start with high-value monitoring applications, and then expand over time using a common platform that works with existing infrastructure.

The initial release includes the Rosemount Synchros Temperature Monitor and the Rosemount Synchros Wireless Repeater, which together provide scalable wireless monitoring capability. The temperature monitor digitises previously manual measurements, while the repeater extends network coverage to enable broader deployment without additional infrastructure.

The Rosemount Synchros Temperature Monitor is designed to gather surface and ambient temperature data that can reveal abnormal conditions across assets such as pumps, heat exchangers, rotating equipment and steam systems. As the platform evolves, Emerson will introduce additional devices and connectivity options.

Emerson

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MUTING IN PRACTICE

WHEN SAFETY BECOMES A VULNERABILITY

Dr Albrecht von Pfeil, Director Safety Solutions, Leuze electronic

Designed to allow objects to pass through safety barriers in factories, muting can also introduce new safety risks if not implemented correctly.

Muting allows the safety function on machines or systems to be temporarily bypassed so that material can be fed in or out through protective devices such as light curtains or laser scanners without interrupting the production process. However, in doing so, personnel safety must be guaranteed at all times.

Muting applications often reach their limits in practice, however, allowing incorrect operation and manipulation. In such cases, alternative security concepts are required.

UNCONSCIOUS RISKS

Various types of muting are used in industrial automation: whether they be 2-sensor, 4-sensor, time-controlled or sequence-controlled. The IEC 62046 international standard¹ regulates the requirements for entry and exit stations with muting and stipulates in particular that:

- muting must be activated via at least two independent bridging signals
- muting must offer protection against foreseeable incorrect operation or manipulation.

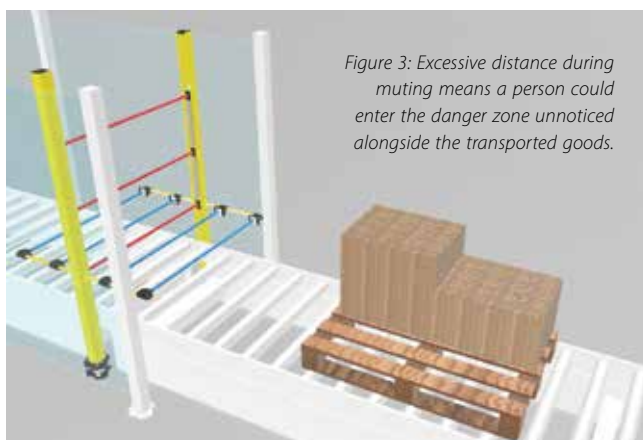
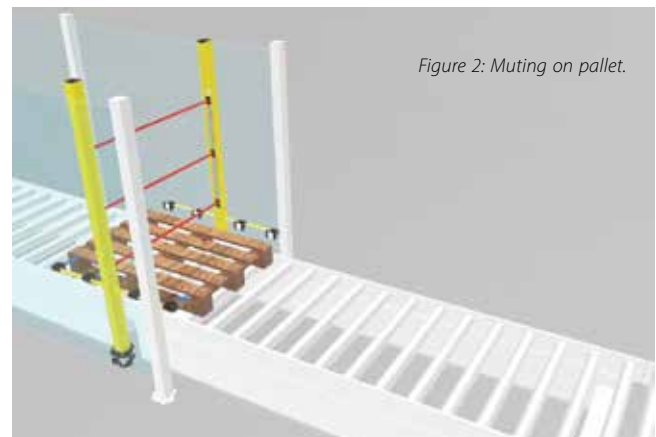
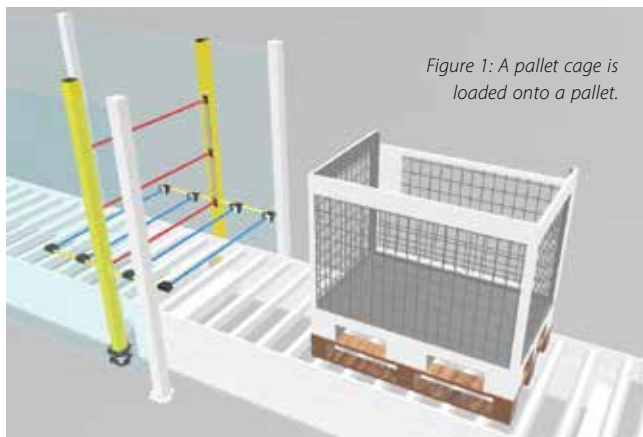
The standard thus defines clear requirements for the implementation of muting applications. In practice, however, it is not always fully complied with — either because the specific application requirements are not fully known and may therefore differ from real-life conditions, or because risky compromises are deliberately made to achieve high process stability. As a result, safety functions become less

effective, and manipulation or incorrect operation are more likely.

For operators, this means an unconsciously increased liability risk and potentially serious consequences for employee safety.

HAZARD 1: SAFETY GAP DUE TO PALLET MUTING

In automated systems, meshed containers or other objects that are difficult for muting sensors to detect are often fed onto or discharged from pallets (Figure 1). The openings in the mesh structure prevent the muting sensors from generating a stable switching signal, making it impossible to mute the safety device. In practice, the pallet itself is sometimes used as a muting trigger (Figure 2) — a procedure that is not permitted, since a person could, for example, simply place an empty pallet in the safety device and deliberately disable the protective device.



SOLUTION 1: SMART PROCESS GATING (SPG)

The safety gap caused by pallet muting can be reliably closed with smart process gating (SPG), in which the bridging function is activated by two independent control signals without external muting sensors. The gating on the safety light curtain is activated by:

- a control signal (CS) from the system control as the first (initiation) signal
- a protective field interruption (PFI) signal, triggered by the transported goods in the light curtain protective field, as a second (verification) signal.

The gating function is activated by the correct sequence of CS switching signal and protective field violation and is monitored by the light curtain. Shortly before the transported goods enter the protective field, the process control system (PLC) sends the CS switching signal to the safety light curtains. The timing must be set so that the distance between the transported goods and the protective field is less than 200 mm, preventing a person from passing through immediately before the goods.

If the transported goods enter the protective field within four seconds, the light curtain uses its own PFI signal and

suppresses a safety shutdown. Gating ends either automatically immediately after the conveyed material has passed through and the protective field has been cleared, or by resetting the CS switching signal via the PLC.

This method enables a particularly compact and space-saving system design, as no additional muting sensors are required directly upstream or downstream.

HAZARD 2: SAFETY GAP DUE TO INCOMPLETELY LOADED PALLETS

If a pallet is only partially loaded, or if the transported objects are significantly narrower than the conveyor system, a gap will occur during muting. A person can enter the danger zone through this gap without the safety function being triggered (Figure 3). To close the safety gap, the standard limits the maximum permissible clearance next to the transported goods to 200 mm. In real-world applications, however, passage gaps are often significantly larger, making it easy to bypass the protective device.

SOLUTION 2: ACCESS GUARDING WITH DYNAMIC FORMAT ADAPTATION

The hazard caused by partially loaded pallets can be eliminated by means of

access protection with dynamic format adjustment. Here, two safety laser scanners generate a joint, closed, vertical protective field. In addition, distance sensors installed on both sides of the conveyor belt detect the position and width of the goods on the pallet — or alternatively this can also be determined using the scanners' integrated measuring function. The safety system uses this information to release a corresponding area in the protective field through which the transported goods can be conveyed without interruption (Figure 4).

By doing it this way, access to the sides of the goods remains secured in accordance with standards. After the transported goods have passed through, the protective field is automatically closed again. If a person is walking or driving alongside them, this is also reliably detected. This safety solution's innovative safety concept enables Performance Level d in accordance with ISO 13849-1².

1. International Electrotechnical Commission 2028, IEC 62046:2018: *Safety of machinery — Application of protective equipment to detect the presence of persons.*
2. International Standards Organization 2023, ISO 13849-1:2023 *Safety of machinery — Safety-related parts of control systems Part 1: General principles for design.*

NEWPRODUCTS

EDGE AI PLATFORM

Advantech has announced that its MIC-735 edge AI platform is progressing towards validation through the NVIDIA Halos AI System Inspection Lab, positioning it as a platform aligned with NVIDIA's safety-focused Physical AI framework.

Built on the NVIDIA IGX Thor T5000 architecture, the MIC-735 is designed for robotics, autonomous mobile robots (AMRs), intelligent machines and industrial automation operating in real-world environments. Through the Halos validation process, the platform aligns with key functional safety standards, including IEC 61508 and ISO 13849, helping simplify compliance, streamline safety-related development and reduce downstream certification efforts.

The MIC-735 integrates onboard and external sensor data to enhance system-level safety, enabling real-time risk mitigation and deterministic operation for safety-critical AI applications. Its architecture supports secure emergency stop (E-Stop) functionality over IP networks, fleet-wide control through an endpoint controller, and localised intervention with Wireless E-Stop Pro, making it suitable for dynamic industrial environments.

Supporting a 10-year product lifecycle, the MIC-735 is compatible with the NVIDIA AI Enterprise-IGX software stack, including NVIDIA NIM microservices, NVIDIA Isaac robotics platform, NVIDIA Metropolis for vision AI, and NVIDIA Holoscan with Sensor Bridge technologies for high-bandwidth, synchronised sensor communication.

In addition to its functional safety alignment, the MIC-735 has been officially certified by NVIDIA as a deployment-ready AI platform, meeting rigorous requirements for performance, security, scalability and software integration. This enables faster deployment while providing a trusted foundation for next-generation robotics, vision AI and critical medical applications.

Advantech Australia Pty Ltd
www.advantech.net.au



ELECTROCHEMICAL CONVERTER FOR PH AND CONDUCTIVITY

The Control 800 series of electrochemical converters from Optek combines high performance digital conductivity and analog pH measurements with more intuitive operation. They have been designed for easy integration into skids and panels to cover a wide range of bioprocess applications in both conventional stainless steel and single-use systems.

The C800 converters are suitable for use with Optek digital conductivity sensors ACS60 or ACF60 and pH-electrodes, and are designed for the continuous monitoring of pH and conductivity. The C800 series is available with one or two channels in variants for one or two conductivity probes and one mixed variant for conductivity and pH. Operation and programming is via push buttons on the front panel with full text menus in nine languages. The converter parameter set can be read out and stored via a USB connection on the front panel, which allows for quick configuration of several instruments. The C800 software is dedicated to electrochemical sensors and their specific calibration and measurement set-up.

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



MINIATURE LOAD CELL

The FUTEK LSB206 Miniature Digital S-Beam Jr. load cell is designed to provide lab-grade accuracy in a rugged, compact form factor — 19 mm high and 9.5 mm wide — making it suitable for space-restricted applications in robotics, aerospace, medical devices, industrial automation and OEM product development.

It also features integrated electronics that provide direct SPI or UART digital output, eliminating the need for external signal conditioning hardware, simplifying integration and reducing system complexity.

The LSB206 offers an accuracy of $\pm 0.1\%$ nonlinearity, $\pm 0.05\%$ repeatability and up to 15-bit noise-free resolution. It also has rugged construction, being made of 17-4 PH stainless steel, and has 1000% overload protection in compression and 500G shock resistance. It is fatigue-rated for 100 million cycles and runs on 3–5 VDC, consuming 78 mW of power.

Metromatics Pty Ltd
www.metromatics.com.au





INDUSTRIAL EDGE GATEWAY

Belden has released the ProSoft Technology ELX3 ProLinX edge gateway, designed to unite OT protocol conversion with lightweight, Docker-based edge application hosting on a single ruggedised hardware platform, enabling organisations to deploy data acquisition, digital connectivity (including digital twin/asset monitoring) and CPU-based edge analytics directly at the machine level. The gateway gathers and processes data at the network edge for localised decision making.

The ProLinX Edge Gateway is designed for large, complex industrial networks with a growing number of connected devices. Manufacturers and energy operators can run compact AI inference models, digital twin connectivity agents and near-real-time analytics containers alongside EtherNet/IP-to-Modbus TCP/IP protocol gateway functions within a single device rated for harsh environments.

The gateway offers features that allow users achieve OT protocol conversion by enabling EtherNet/IP and Modbus TCP/IP data exchange; and deploy user-defined containers by empowering custom code and algorithm creation for advanced applications like machine learning and predictive maintenance, digital twin/asset monitoring and near-real-time analytics.

Engineered to withstand shock, vibration and electromagnetic compatibility (EMC) tolerances, with an operating temperature range of -40°C to +70°C, and rated for Class I, Division 2 environments, the ProLinX Edge Gateway is suitable for use in harsh environments.

An industrial-grade solution, the gateway addresses the complex requirements of varied industries, including automotive, consumer packaged goods, food and beverage, machine building, process manufacturing, material handling, metals, mining, oil and gas and water and wastewater.

Belden Australia Pty Ltd
www.belden.com

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THE ACCELERATING DECLINE OF FIELDBUS AS ETHERNET TAKES OVER

HMS Networks has released its annual analysis of the industrial network market, tracking how factories and machine builders connect their automation systems.

The long-running shift from traditional fieldbus technologies to industrial Ethernet has continued through another full year according to HMS Industrial Networks' annual study of the industrial network market.

The HMS Networks analysis is now in its 12th year, and is based on a combination of market insights, internal data, and input from key stakeholders in the industrial automation industry. The study focuses on newly installed nodes in factory automation worldwide, each node being a device or machine connected to an industrial control network.

After the slowdown of 2024, the market stabilised over the last year. Component availability has returned to normal levels and inventory cycles in highly automated sectors have largely been worked through.

While Europe's automotive sector continued to face headwinds, broader manufacturing activity recovered modestly, and capital spending on new automation projects resumed in most regions. The 2026 study confirms HMS Networks' expectation of approximately 7.7% average annual growth in newly installed nodes over the next five years, with continued migration of the remaining fieldbus install base to industrial Ethernet driving much of that expansion.

INDUSTRIAL ETHERNET REACHES 79% OF NEW INSTALLATIONS

The 2026 analysis shows that industrial Ethernet now accounts for 79% of new nodes, up from 76% in 2025. The three leading Ethernet protocols continued to consolidate their position, together representing roughly three-quarters of the wired protocol market.

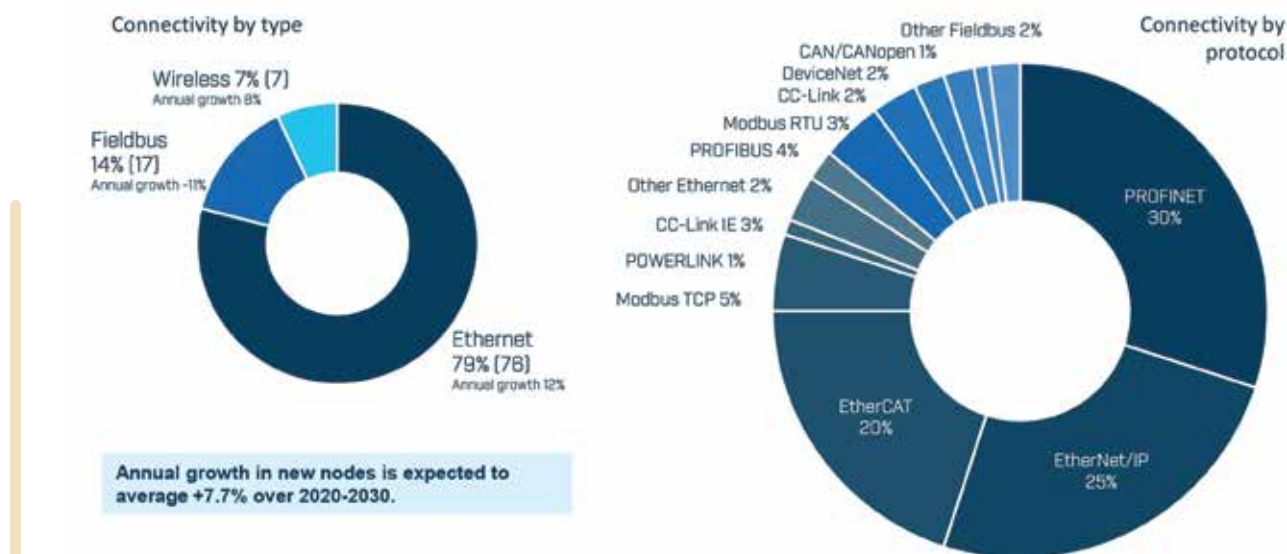


Figure 1: Industrial network market shares 2026.

For the industrial Ethernet protocols:

- Profinet has strengthened its lead at 30% (up from 27%).
- EtherNet/IP followed at 25% (up from 23%).
- EtherCAT continued a strong trajectory at 20% (up from 17%).
- Modbus TCP held steady at 5%.
- CC-Link IE remained stable at 3%.
- POWERLINK declined to 1% (from 3%).
- Other Ethernet protocols account for the remaining 2% as market consolidation around the major networks continues.

FIELDBUS DROPS TO 14% AS PROFIBUS INSTALLATIONS DECLINE

Fieldbus technologies now represent 14% of new nodes, down from 17% in 2025. Profibus & Profinet International's own published figures showed Profibus new-node installations dropping from 1.1 million in 2024 to 1.0 million in 2025, a 9% decline corroborated by HMS Networks' internal data and by HMS's industry survey.

For the major fieldbus protocols:

- Profibus remains the most widely used fieldbus but drops to 4% (from 5%).
- Modbus RTU has held steady at 3%, reflecting its continued role as the universal low-cost serial protocol.
- CC-Link, DeviceNet and CAN/CANopen each remain in the 1–2% range with modest further decline.
- Other Fieldbus protocols collectively account for 2%, down from 4%, as the long tail of legacy networks fades.

WIRELESS REMAINS STEADY AT 7% UTILISATION

Wireless technologies continue to connect 7% of new node installations, unchanged from 2025. Wireless retains its established role as a complement to wired industrial networks, particularly valuable for mobile equipment such as AGVs (automated guided vehicles) and AMRs (autonomous mobile robots), retrofitted machinery and IIoT sensors in hard-to-reach locations. 5G remains an area of significant interest but with slow industrial deployment. The complexity of private 5G infrastructure is the most commonly cited

barrier. Early industrial 5G deployments continue to grow, particularly in Asia, but the technology has yet to deliver the breakthrough adoption many in the industry expected.

REGIONAL INSIGHTS

In Europe, Profinet and EtherCAT continue to lead, with strong activity around APL (Advanced Physical Layer) for process automation and SPE (single-pair Ethernet) for sensor-level connectivity. The decline in Profibus is most visible in Europe, where the install base is largest and the migration to Profinet most advanced.

As expected, in North America EtherNet/IP remains the dominant protocol, particularly in automotive and discrete manufacturing. Adoption of IO-Link, APL and SPE is gaining clear momentum, supported by interest in OT cybersecurity ahead of the regulatory landscape taking shape around CRA and IEC 62443.

In Asia Profinet and EtherCAT both continue to grow in the Chinese market. CC-Link IE, the first industrial protocol with TSN mechanism, maintains a strong regional foothold.

WHAT HAPPENS NEXT?

"Twelve years of data tell a remarkably consistent story," said Magnus Jansson, Director of Product Marketing, at HMS Networks. "The migration from fieldbus to industrial Ethernet is now in its later stages, but the more interesting question is what happens next. When nearly everything is Ethernet, the conversation shifts from 'which protocol?' to 'what is running on top of it?', functional safety, cybersecurity, TSN, OPC UA, single-pair Ethernet, and IT/OT convergence. That is where the complexity — and the differentiation — will increasingly sit.

"The 2026 numbers also reinforce something we have been seeing in our industry survey: cybersecurity is now cited by nearly half of respondents as a top integration challenge, and 93% expect OT cybersecurity to change substantially over the next five years. The protocols matter, but the layers above them increasingly define how factories actually operate."

Credit: HMS Networks.

Going for gold: mine upgrades DCS for long-term efficiency



Everest Metals Corporation's Revere Gold project covers 171 km², and is located 90 km northeast of Meekatharra in a prolific gold producing region of Western Australia's Murchison Region.

With high market prices for gold, and a location with outstanding potential for efficient extraction, Everest Metals sought a plantwide control system that would drive long-term efficiencies. Just as importantly, given the favourable market conditions, they needed it delivered quickly.

"Another key consideration for this project was that it could operate without full-time electricians stationed on site. Fault-finding and diagnostics needed to be able to be done remotely and in real time," said Harikrishnan Subbian, director of EQ Logic, a Rockwell systems integration partner. EQ Logic has successfully delivered end-to-end PlantPax solutions on projects of all sizes.

After seeing the scope of work, EQ Logic determined that Rockwell's PlantPax DCS would provide the best solution for Everest Metals Corporation in both the short and long term.

"Not only did PlantPax fit the scope of work, but since we were working to short commissioning times to benefit our customer, having fast responses to technical questions is highly valuable to us, and allowed us to deliver effectively to a happy customer," Subbian said.

The PlantPax system was tailored by EQ Logic to seamlessly integrate with other Rockwell products such as CompactLogix processors, PowerFlex drives and Point I/O modules.

"PlantPax provides a plantwide, scalable, integrated control and information platform that helps producers make better, faster production decisions, improve efficiency, and reduce operational risk," said Adrian

Giecco, regional director, South Pacific, Rockwell Automation. "Gold mining operations like this one need to be flexible and adaptable to changes, while keeping downtime to a minimum because every second they're not producing, they're not earning."

"With a system like this, information is key. You're only as good as the information in front of you — so having quality data in real time drives greater efficiencies and better results," Subbian said.

"All commissioning was able to be done remotely, and ongoing diagnostics and fixes will also be able to be done this way. Given the remoteness of the site this is critical feature," he added. "As the Revere Gold project progresses toward its initial Mineral Resource Estimate and beyond, the scalable PlantPax platform ensures the control system can grow alongside the operation without disruption."

The Revere Gold project has potential for further growth, with Everest Metals Corporation identifying a "clear pathway to an initial Mineral Resource Estimate in the short term and increase beyond 334,000 oz exploration target, positioning Revere as a cornerstone asset for EMC".

"EQ Logic and Rockwell Automation worked tirelessly with us to meet ambitious commissioning deadlines, and achieve outstanding results," said Simon Phillips, business development and investor relations, Everest Metals. "Everest Metals invests every dollar with the intent to maximise value, and this control systems integration is already delivering value, and has the features to continue adding value to our operations."

Rockwell Automation Australia
www.rockwellautomation.com/en-au.html



IMARC 2026 WILL BRING THE MINING WORLD TO SYDNEY

Now is the time for robust conversations and new thinking as we seek solutions to support mining in creating national resilience and global prosperity.

What: International Mining and Resources Conference + Expo

When: 27-29 October 2026

Where: ICC Sydney

Mining's critical delivery and sustainability challenges will be examined from all angles at the International Mining and Resources Conference + Expo (IMARC), which returns to ICC Sydney on 27–29 October after a record 2025 event.

IMARC's 2026 program, featuring speakers such as Australia's resources minister Madeleine King, Agnico Eagle director Felicia Binks, BHP innovation strategy head Marley Palin, Fortescue integrated operations director Katie Charuga and Perenti CEO Vanessa Torres, will give attendees unique insights into:

- A rapidly changing global mineral processing and refining landscape
- US and Europe resources and supply chain resets
- Crucial mine and downstream funding trends
- Markets and policies altering the future of mineral supply
- Leaders in permitting and regulatory reform
- Project pipeline opportunities and constraints.

"When global competition for mining investment is intensifying and our critical minerals are in hot demand for energy, electrification and strategic strength, IMARC 2026 is a tremendous opportunity for MCA members and the broader industry to connect with other mining companies, capital markets, governments, technology providers and industry leaders from more than 120 countries," said Minerals Council of Australia CEO Tania Constable. "Now is the time for robust conversations and new thinking as we seek solutions to support mining in creating national resilience and global prosperity."

More than 500 mining, finance and government leaders from all over the world will gather at IMARC 2026.

New South Wales Minerals Council CEO Stephen Galilee said that in a climate of global economic uncertainty it was vital governments supported industries such as mining that delivered stability.

"It is crucial we come together at an event such as IMARC to understand what

that support should look like today and into the future," he said.

Workshops, networking platforms and complimentary transport to and from key New South Wales mining centres will ensure mine site leaders typically stationed a long way from the event venue can profit from IMARC.

"As mining professionals it's easy to become focused on the challenges and processes within our own operations," said New South Wales Southern Coalfield mine superintendent and IMARC Advisory Committee member Garrick Alden. "IMARC provides an opportunity to step back, see what is happening across the broader industry and learn about new technologies, innovations and approaches being used elsewhere."

"Attendees can take those learnings back to site and evaluate what could improve safety, efficiency and overall performance at their own operation."

"With free entry and transport available through the NSW Delegate Mining Initiative, it's an opportunity that shouldn't be missed."

AUSTRALIA'S GREEN METALS GAMBIT: THE TECHNOLOGIES TO DECARBONISE STEEL

A switch to green iron, powered by renewables, could grow Australia's iron ore export earnings from \$116 billion in 2024–25 to around \$386 billion a year by 2060, according to projections from the Superpower Institute headed by economist Ross Garnaut. Australia is already by far the world's biggest exporter of iron ore, supplying just under 55% of global market share in 2024 (nearly all of it is from the Pilbara region in WA) and the world's largest alumina exporter. Australia faces a significant obstacle however, if it is to transform the world's largest iron deposits into fossil-free metals, according to news from the CSIRO.

With iron and steel production alone responsible for a massive 6–8% of global carbon dioxide emissions, and aluminium a further 2%, there's global demand for decarbonisation of metal production, and this is where the problem lies.

"Making metals is an energy-intensive business," said Keith Vining, CSIRO Group Leader for Green Metals Production. "Pilbara iron ores are challenging materials in existing low carbon iron-making processes."

The problem lies in impurities (mostly silica and alumina) which push the ratio of iron content down and raise the ratio of waste rock and minerals, known as 'gangue'. These impurities are tightly bound to iron oxide in the rock and need to be removed via high-temperature processing.

Traditional blast furnaces use coal to remove oxygen and associated impurities from iron ore in the steelmaking process, while the newer direct reduction (DRI) process uses gas or hydrogen as a reducing agent instead of coal. But DRI typically requires ores with an iron content over 67% which excludes Australia's lower-grade Pilbara ore. With 55–62% iron, Pilbara ore is not pure enough for current low-carbon and carbon-free technologies.

WORKING ON A SOLUTION

Instead of waiting decades for new technologies to emerge, CSIRO is currently testing adaptations of existing DRI technology that can work with Pilbara ore.

"We want to use existing technologies because the pathway for brand new technologies is so much longer," Vining said.

CSIRO researchers are part of a cross-industry project testing whether the current narrow specifications around the operating envelope for DRI can be expanded and whether, by accepting some productivity

loss, Australian iron ore could be viable for these new processes.

VALUE-ADD OPPORTUNITY

The potential economic benefits are enormous. Australia's steelmaking capacity is relatively small and limited with just two major steelworks at Whyalla and Port Kembla using primary ore. The economic opportunity lies in processing iron ores.

The Superpower Institute's \$386 billion annual revenue projection is based on ramping up green iron production gradually



between now and 2060. Transforming our metals production away from fossil fuels would shift Australia from ore exporter to value-added producer, embedding renewable energy into what the nation ships overseas.

"Is it doable? Theoretically, yes, absolutely," Vining said. "Those numbers are not based on everything suddenly getting made into a green iron product. The production ramps up over that period of time, so they're pragmatic sort of numbers; but we need a lot of other things to come together, for us to pull it off."

INFRASTRUCTURE GAP

The biggest barrier to achieving that \$386 billion opportunity, Vining said, is that it requires a massive investment in infrastructure, including the development of an industrial-scale renewables grid to service metals processing works.

"We're going to need a renewable energy network at a scale that simply does not exist at the moment," he said.

Beyond the renewable energy network itself, Australia faces the challenge of building processing plants in an area with

some of the world's highest capital costs. The Pilbara region is remote and its ports are configured for outgoing shipments, not incoming materials and equipment.

"Most things have to go into Fremantle, and get trucked to the Pilbara," Vining said.

That's a journey of more than 1300 kilometres by road, and all of the labour will need to fly in and fly out.

Energy costs must also come down to competitive levels. Producing hydrogen from renewable energy is currently too expensive to compete with Chinese blast furnaces, even before factoring in labour and capital costs.

BRIDGE TECHNOLOGY

Near-term projects are already moving forward using reformed natural gas (methane) as a bridge fuel. At 700–1000°C, gas reforming uses steam to convert methane into hydrogen and carbon monoxide.

"Using that process is actually 50% less CO₂-intensive than using solid carbon in a blast furnace," Vining said.

BHP, in a partnership with Korean steelmaker POSCO, has announced plans for

a hydrogen-ready DRI demonstration plant adjacent to POSCO's steelworks in Korea established to process Pilbara ores without these first going through a pelletising process.

Another joint venture, NEOSMELT — led by BlueScope, in partnership with Rio Tinto, BHP, Mitsui and Woodside Energy, and supported by the Australian Renewable Energy Agency — will build an electric smelting demonstration facility in Kwinana, south of Fremantle in Western Australia. The project involves feeding direct reduced iron into an electric smelting furnace, with plans to operate for three years to test the technology at scale.

THE PROJECTS MAKING AUSTRALIAN ORE WORK

A key focus for CSIRO is adapting Pilbara ore for these new processes, with research spanning the full production chain, from grinding to pelletising to electric smelting.

CSIRO's three-year India-Australia Green Steel Partnership supports five different projects to reduce emissions and address the challenge of processing low-grade iron ores without fossil fuels. Under this program, researchers have developed what Vining describes as "a very promising method for making the pellets that will go into the shaft furnace".

On the pre-processing front, CSIRO is working both sides of the energy-intensive grinding circuit that breaks ore down into fine particles suitable for processing. In the first stage of the process, researchers are finding ways to selectively remove more of the unwanted material like silica and alumina, so less ore goes through the energy-intensive grinding step. After grinding, they're improving classification systems to avoid recycling fine material back through the circuit.

The key technology in that classification stage is the hydrocyclone, which uses water and centrifugal force to sort particles at industrial scale.

"The challenge is trying to get the accuracy of a sieve with the throughput of a hydro-cyclone," Vining said.

CSIRO is also building end-to-end pilot-scale capability, from pelletising to gas-based DRI to electric smelting, to simulate the complete process with Australian ores. The pilot is in the early stages with industry and university partners being established, and will couple an electric smelting furnace with existing pelletising equipment.



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PRODUCING HYDROGEN FROM RENEWABLE ENERGY IS CURRENTLY TOO EXPENSIVE TO COMPETE WITH CHINESE BLAST FURNACES

istock.com/raihel6769



As automation accelerates, machine safety must evolve with it

Ella Averill-Russell, IICA Sydney Branch Manager

Food and beverage manufacturers are increasing their use of robotics and automation to improve production efficiency, address workforce constraints and achieve greater consistency across processing, packaging and materials handling operations.

Robotic pick-and-place systems, automated packaging lines, palletising systems and increasingly flexible production equipment can deliver significant operational benefits. However, integrating these technologies into new or existing facilities also changes the machine safety requirements that plant managers, engineers and operations teams need to consider.

Machine safety should not be treated as a separate compliance exercise undertaken after an automation system has been designed. Effective safeguarding begins with understanding the machine, its operating modes, foreseeable interactions and the tasks personnel will perform throughout its lifecycle.

This is particularly important in food and beverage manufacturing.

Production environments may require frequent product changeovers, cleaning and washdown procedures, fault finding, maintenance access and regular interaction between personnel and automated equipment. Each activity can introduce different hazards and operating conditions that need to be considered during the risk assessment and system design process.

Physical guarding remains fundamental to many machine safety applications. However, increasingly automated production environments may also require safety interlocks, light curtains, safety scanners, safety controllers and safe motion functions to manage risk while maintaining practical access to equipment.

Robotic applications require particular attention.

The installation of an industrial or collaborative robot does not, by itself, determine whether an application is safe. Risk assessment must consider the complete robotic system, including the robot, end-of-arm tooling, payload, surrounding machinery and the ways operators and maintenance personnel interact with the application.

The required safety measures will depend on the hazards identified and the intended operating conditions.

Integrating machine safety earlier in an automation project can also deliver operational benefits. Retrofitting safeguards after equipment has been installed may introduce additional engineering costs, production delays and operational constraints. Early consideration allows safety requirements to be incorporated into machine layouts, control architecture and operating procedures from the outset.

For existing food and beverage plants, the challenge can be more complex. New robotics and automation technologies are frequently integrated alongside legacy machinery and control systems. Changes to production processes, machine layouts or operating procedures may alter existing risks and should trigger a review of the machine safety strategy.

The objective is not simply to add more safety devices: it is to develop a safeguarding approach appropriate to the application, the level of risk and the operational requirements of the plant.

As robotics and automation continue to advance, food and beverage manufacturers need machine safety strategies capable of evolving with their production environments. By considering risk assessment, safeguarding and functional safety as integral elements of automation design, manufacturers can develop systems that protect personnel while supporting productivity, maintainability and long-term operational performance.

WHAT'S ON?

September

ACRNA Conference 2026

1–2 September 2026

The Star, Brisbane

acrna.org/conference/

IICA Technology Expo Mount Gambier

2 September 2026

The Barn, Mount Gambier

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=IICAMTGAMB

IICA TÜV Functional Safety Engineer SIS Training — Adelaide

8–11 September 2026

Ibis Adelaide

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=TUVADE2026

IICA Technology Expo Melbourne

17 September 2026

Marvel Stadium, Melbourne

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=IICAMELB26

Chemeca 2026

28–30 September 2026

Marvel Stadium, Melbourne

www.chemeca.org

October

IICA Technology Expo Darwin

14 October 2026

Darwin Turf Club, Fanny Bay NT

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=IICADARWIN

Workplace Health & Safety Show

21–22 October 2026

ICC Sydney

whsshow.com.au/sydney

International Mining and Resources Conference + Expo (IMARC)

27–29 October 2026

ICC Sydney

imarcglobal.com

IICA Technology Expo Gladstone

28 October 2026

Gladstone Entertainment Convention Centre

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=IICAGLAD26

All Energy Australia

28–29 October 2026

Melbourne Convention and Exhibition Centre

www.all-energy.com.au/en-gb.html

November

IICA TÜV Functional Safety Engineer SIS Training — Brisbane

10–13 November 2026

The Sebel, Brisbane

iica.org.au/Web/Web/Events/Event_Display.aspx?EventKey=TUVBNE2026



INTERNATIONAL MINING AND RESOURCES CONFERENCE + EXPO



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The International Mining and Resources Conference + Expo (IMARC) is Australia's largest and most influential mining event, where global and local mining leaders come together to shape the future of the industry. As well as connect with over 500 suppliers, technology managers will gain valuable insights through sessions focused on AI, data-driven decision making, electrification, digital transformation & infrastructure, and autonomous operations.

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500+
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FROM SMART SENSORS TO AUTONOMOUS FACTORIES

Recently, I watched one of the many news features examining the extraordinary growth of artificial intelligence and the infrastructure required to support it. The discussion centred on the vast AI data centres being built around the world — facilities that demand enormous computing power, consume significant amounts of electricity and, in many locations, require substantial water resources for cooling.

As someone who has spent my career in industrial automation, I found myself thinking: What does this mean for the world of factory automation and industrial sensing?

More specifically, I began to wonder whether the future of AI would always require ever-larger data centres, or whether some of that intelligence could increasingly be decentralised at least in an industrial ecosystem and placed closer to where information is generated: in the sensors themselves.

Ten years ago, most industrial sensors were designed to perform one task exceptionally well. A photoelectric sensor detected the presence of an object. A pressure sensor measured air pressure. A linear position sensor reported the location of an actuator. These devices were reliable, accurate and robust, but they were fundamentally sources of data rather than sources of intelligence, with little awareness of the broader process occurring around them.

Today, that model is changing rapidly.

Modern smart sensors can provide not only measurement values but also diagnostics, health information and process insights. IO-Link enabled devices, for example, allow operators to access detailed condition monitoring information, parameter data and predictive maintenance indicators that were simply unavailable a decade ago and have ever-increasing onboard processing power.

The real excitement begins when AI enters the equation and is combined with these connected sensors.

In the not-too-distant future, many industrial sensors may include embedded AI models capable of interpreting events and making decisions locally. Rather than transmitting vast quantities of raw data to PLC controllers and external systems, sensors could process information at the source and communicate only meaningful outcomes. If successful, this shift towards edge intelligence could help reduce both network traffic and some of the computing demand currently placed on large data-centre infrastructure, while simultaneously delivering faster and more reliable automation decisions.

Having spent my career helping manufacturers solve challenges through sensing and automation, I am excited about what lies ahead. The convergence of AI, intelligent sensors and industrial connectivity has the potential to unlock levels of productivity, quality and sustainability that were once unimaginable. Achieving these outcomes will be essential if Australian manufacturing is to remain competitive, resilient and globally relevant in the years ahead.



Jim Wallace is Sales Director at Balluff AUNZ with over 30 years in the industry. He's passionate about helping businesses improve with smart sensor technologies, especially in condition monitoring and evaluation solutions.



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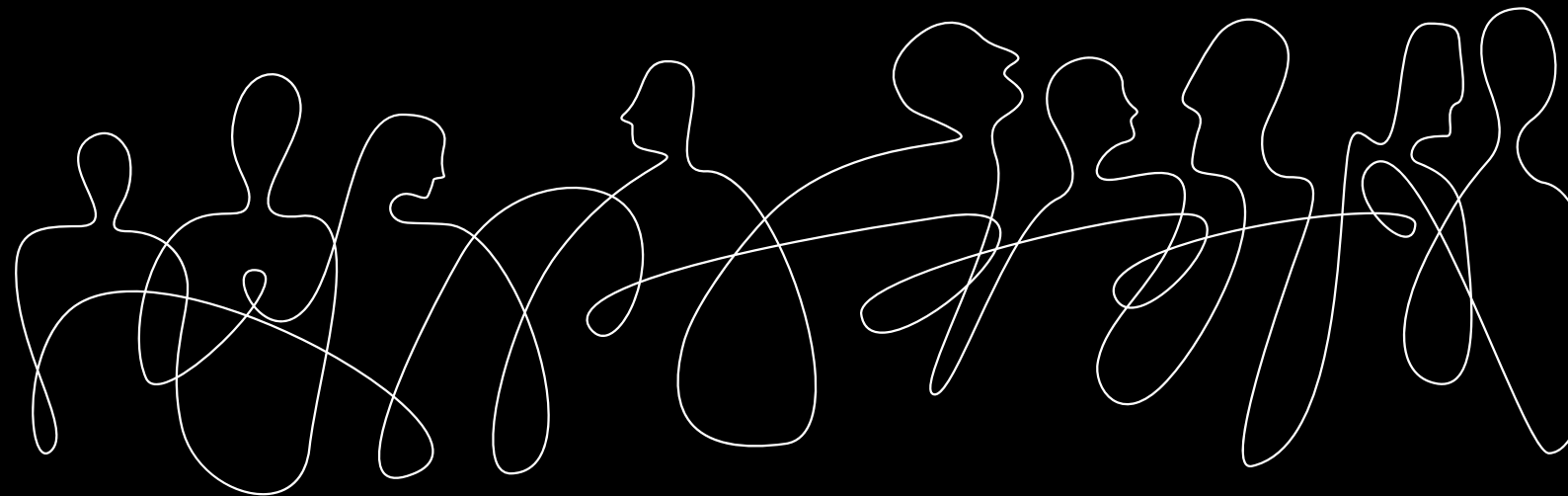
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