WNIPT

August 2017 vol.31 no.3
PP100007403

WHAT'S NEW IN PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

The next level of industry

MELSEC iQ-F series

MITSUBISHI ELECTRIC
Changes for the Better

New flowmeters equip plants for the future

For almost 40 years, Endress+Hauser has been able to offer one of the world's most comprehensive product ranges for flow measurement of liquids, gases and steam. The Proline family of measuring devices has contributed significantly to this success and is now once again wowing users with unique innovations for even greater safety, product quality and process availability.

Endress+Hauser

People for Process Automation

Heartbeat Technology

A further highlight is Heartbeat Technology, which is now integrated into all Proline devices. Heartbeat Technology provides a continuous health check of the flowmeter, ensuring key parameters are performing within specification at all times. Deviation from the factory reference values will trigger warnings as per NAMUR NE 107. Verification and monitoring can be added to the Heartbeat diagnostics to provide on-demand reporting, trend analysis and live quantitative performance data. The operator does not need to be present in the field: verification can be started at any time via all available interfaces. This makes it possible, for example, to extend complex, application-specific calibration cycles, thus saving time and money. All this reduces the complexity and risks involved in a system.

In all industries, the requirements surrounding safety, legal standards, efficiency and quality are always on the rise. In addition, process systems operators must also deal with increasing costs and pressure from competitors. Last but not least, emerging opportunities for digital interconnectivity through 'Industry 4.0' are gaining significance within process automation.

With numerous innovative functions and device properties, the new Proline 300 and Proline 500 make universal flow measurement possible in all applications in the process industry – from quantity measurement and process monitoring, right up to monitoring tasks and custody transfer measurements. Proline 300/500 not only measures the flow in pipes with the greatest accuracy but it also provides a view into the process, ensuring that plant operators receive a wealth of important diagnostic and process data. This leads to optimal process monitoring, fewer periods of downtime and therefore more efficient process control.

Added value thanks to information from the field Proline 300/500 is equipped with unrivalled functions that supply the user with comprehensive process information. It is not only possible to retrieve device, diagnostics, service or process data via the control room, but this can now been done on site thanks to a web server integrated into the measuring device. This allows for direct connection to a laptop without the need for additional software or hardware.

Comprehensive remote data retrieval is also possible via the installed wireless connection, simplifying maintenance. The unique data storage concept, known as HistoROM, automatically restores the configuration data of a measuring device following a service call.

Proline 300/500 has been developed entirely in accordance with SIL guidelines (IEC 61508) and thus guarantees the greatest safety during operation. The warning messages displayed in the event of an error in accordance with NAMUR NE107 also contribute to operational safety, as these indicate immediately if a device is defective, requires maintenance or is running outside the predefined specifications.

Multivariable and high-quality sensors Since 1993, the Proline device family has been subject to constant development. As a state-of-the-art transmitter, Proline 300/500 can be freely combined with any of the Promass (Coriolis) and Promag (electromagnetic) sensors, which have proven themselves time and again. Depending on the measuring principle, several process variables can be measured at the same time using only one device. With the Coriolis flow measuring principle these include mass flow, volume flow, density, concentration, viscosity or temperature; the electromagnetic measuring principle focuses on volume, flow, temperature, and electrical conductivity.

Every Proline 300/500 measuring device is checked using accredited, fully traceable calibration facilities before delivery (ISO/IEC 17025). This guarantees the same high level of measurement quality no matter where the production site is located. The robust design of all Endress+Hauser sensors also guarantees optimum measurement performance, even under highly fluctuating process conditions.

Looking to the future with Proline Proline 300/500 has a unique range of signal outputs and protocols: HART, PROFIBUS, FOUNDATION Fieldbus, Modbus RS485, EtherNet/IP and PROFINET. This ensures that you can integrate Endress+Hauser flowmeters seamlessly into your existing infrastructures or automation systems. Thanks to the transparent flow of diagnostics and measurement data – from the sensor to the process control system – unimagined possibilities are now becoming reality, ensuring safe and comprehensive process control.

For more information
please visit www.au.endress.com

Endress+Hauser
People for Process Automation

Plastic, stainless steel, die-cast zinc: the universal I/O system with IP 67 protection for all applications.

Fieldbus Box

EtherCAT Box

Zinc die-cast box

Stainless steel box

www.beckhoff.com.au/ip67

The wide range of extremely compact and robust Beckhoff I/O modules with IP 67 protected housings is designed for all industrial applications. The broad spectrum of signals ranges from standard digital I/O to complex analog technology to compact Drive Technology.

- **Fieldbus Box (plastic, IP 67):** 12 different fieldbus systems for universal application
- **EtherCAT Box (plastic, IP 67):** high-performance for all applications, directly on the machine
- **EtherCAT Box (stainless steel, IP 69K):** for hygienic applications in the food, chemical or pharmaceutical industries
- **EtherCAT Box (die-cast zinc, IP 67):** for harsh environmental conditions in "heavy-duty" industries

IPC
I/O
Motion
Automation

New Automation Technology **BECKHOFF**

0817

WHAT'S NEW IN
PROCESS TECHNOLOGY
AUGUST 2017

CONTENTS

READ ONLINE!

This issue is available to read and download at
www.processonline.com.au/magazine

ON THE COVER

Mitsubishi Electric's FX5U range introduces the next generation of the highly successful MELSEC-F compact controller family. First launched over 30 years ago, Mitsubishi Electric has sold over 13 million CPUs worldwide.

The Mitsubishi MELSEC-F series has undergone many advancements in this time, making way for the next-generation MELSEC iQ-F Series, the FX5U and FX5UC, with even greater processing power, enhanced high-speed bus, expanded built-in functions, network compatibility, advanced SSCNET III/H support, and improved engineering environment with parameter settings in GXW3 engineering software.

From standalone use to networked system application, MELSEC iQ-F brings your business to the next level of industry.

Mitsubishi Electric's iQ platform brings together a full automation suite, including the GOT2000 range of HMIs, the powerful modular automation controller iQ-R series, the high-performance FR-A800 range of inverters and the high-function MR-J4 servo systems, developed to provide a next-generation automation environment focused on adding value while reducing TCO.

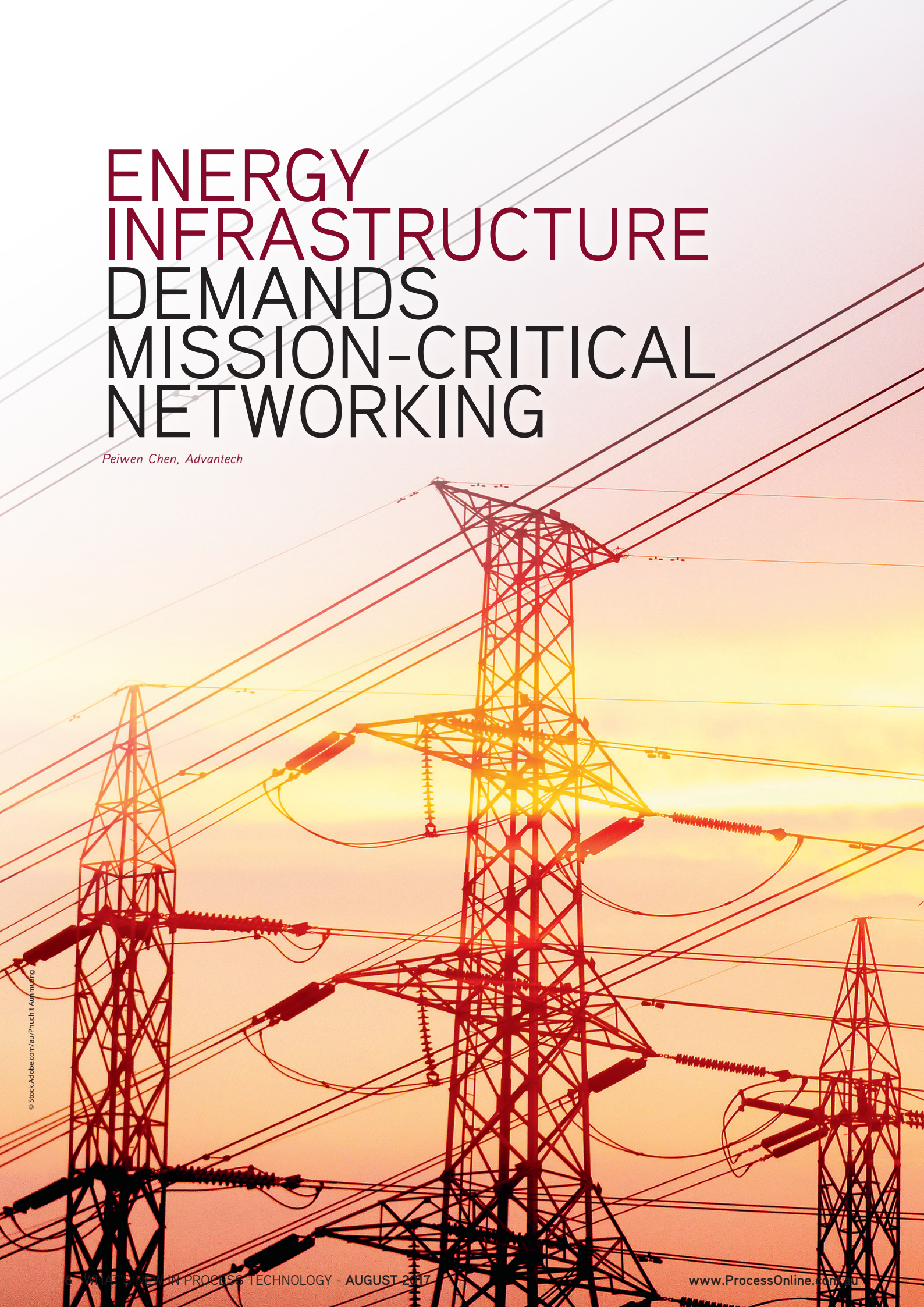
Mitsubishi Electric is one of the world's leading names in the manufacture and sales of electrical and electronic products and systems used in a broad range of fields and applications. As a global company, Mitsubishi Electric is applying its technologies to contribute to society and daily life around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

Mitsubishi Electric Australia
www.mitsubishi-electric.com.au

MITSUBISHI ELECTRIC
Changes for the Better

ENERGY INFRASTRUCTURE DEMANDS MISSION-CRITICAL NETWORKING

Peiwen Chen, Advantech



© Stock.Adobe.com/au/Phuchit Auttmyang

Standard networking methods are acceptable for most SCADA systems, but mission-critical power transmission and distribution system messaging and real-time control demands a zero-loss solution.

As far back as the early 1990s, the electrical power industry was looking for ways to standardise the increasing numbers of 'intelligent electrical devices' used in substation equipment. Up to that point, much of the interconnection was hardwired, and intelligent communication was commonly achieved with serial protocols. These efforts eventually led to a new IEC 61850 standard titled 'Communication networks and systems for power utility automation'. The standard was needed to ensure real-time substation automation applications could be implemented using digital communication networks.

This standard was initially released in the early 2000s, and it defined communications methods and services to promote high interoperability among all makes of hardware. More recently, this standard has been updated to what is commonly known as IEC 61850 Edition 2 to add extensions and improvements, and to correct various shortcomings.

Key portions of IEC 61850 identify data structures, commands and conformance testing requirements. Without rigorous testing methodology and certification, it is impossible to ensure various products will interoperate properly and meet the constraints defined within the standard. Therefore, it is imperative that any devices to be integrated within a network are in compliance with the IEC 61850 standard, which means each device must undergo conformance testing by a suitable agency and receive a certificate.

One update in IEC 61850 Edition 2 from the previous version was the addition of maximum allowable recovery time requirements for various communication events (some of these values are actually zero time), which can only be achieved by means of higher availability for communications links. Fortunately, the rise in prominence of industrial Ethernet has provided various redundancy solutions meeting these needs. As Electric Light & Power (ELP.com) states, "With Ethernet advancements, communications is no longer a limiting factor inside or outside substations." Furthermore, "the engineering definition and structure defined in the standard will simplify engineering and integration for the technical team".[1]

IEC 61850 is able to fulfil the link redundancy requirements in part by referencing IEC 62439-3, which is titled 'Industrial communication networks - High availability automation networks - Part 3: Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR)'. It identifies methods, protocols and topologies for achieving Ethernet network redundancy.

Benefits of hardware-based network redundancy

Clearly, the communication redundancy requirements indicated by the IEC standards set the direction for the power utility automation industry. Specific approaches employing hardware-based network redundancy solutions in compliance with IEC standards offer a number of benefits:

- Compliance with IEC 61850 Edition 2 to provide total communication redundancy
- Promotion of interoperability
- Mixed topologies possible
- The ability to connect with non-redundant networks
- No impact on CPU loading
- Simplified network upgrades

Perhaps the most compelling reason to select hardware-based redundancy is that all elements will unmistakably be certified as compliant with a common standard, leading to a total solution. Any other hybrid approach using non-compliant devices or a mix of hardware and software calls into question whether it is truly compliant with the standards. T&D World (TDWorld.com) reminds us that historically, proprietary equipment from various manufacturers would not interoperate, leading to implementations that were "piecemeal and fragmented. One might say they were mutually incompatible and kept that way with an assortment of nonstandard messaging protocols. It was the technological equivalent to the Tower of Babel."[2]

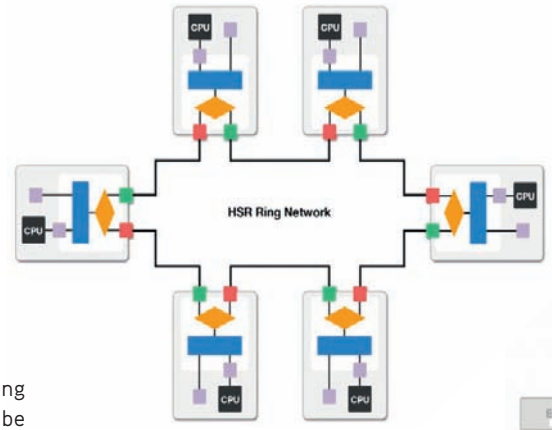


Figure 1: A HSR ring network.

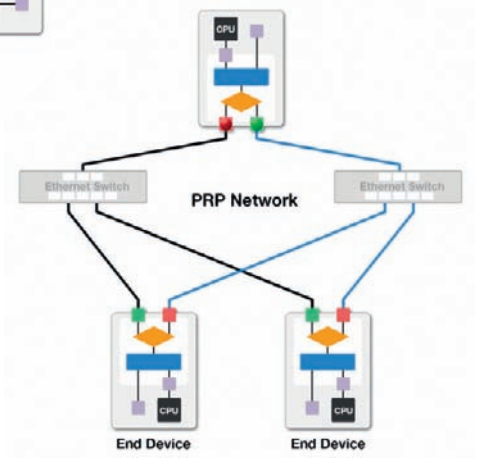


Figure 2: A PRP network.

In direct contrast to the old way of doing things, HSR and PRP are specified to be interoperable with each other and among devices complying with these standards. Generally speaking, it is most straightforward to implement HSR as a ring and PRP as a parallel star. However, there are times when the architecture may require more complex or mixed topologies, such as multiple coupled rings, or connection to single-port devices, or interconnection of HSR and PRP networks.

Hardware-based components are available to handle these situations in a standard manner. In fact, specific devices called redundancy boxes (RedBoxes) are available to allow any one-port device or non-redundant network to connect seamlessly into a redundant HSR or PRP network.

Looking at performance, hardware-based network redundancy devices are purpose-built for this role. Therefore, they handle all redundancy functions on board and are completely transparent to any external devices. Not only does this simplify implementation, it means that there is no additional CPU loading for any other devices. In the case of industrial automation computers, embedding all the redundant networking functionality on the network adapter ensures the computer can operate optimally and not be hindered in any way by networking issues.

Power automation network redundancy requirements

What exactly does it mean for hardware to offer the right redundancy capabilities for switchgear and substation networking? The IEC standards spell out the performance requirements and indicates some ways of achieving them:

- Must be IEC 61850 certified
- Must achieve mandated recovery times
- Must achieve zero data loss — every command makes it through
- Ring topology possible
- Redundant star topology possible

To start with, hardware vendors must submit their products to testing agencies for evaluation against the IEC 61850 standard in a form of simulated service to achieve certification. Without this certification, the product should not be considered for substation automation applications. Typically, devices are tested individually to confirm basic functionality and also in conjunction with other related devices to confirm interoperability. Networking traffic will also be evaluated.

Table 1 shows the fundamental requirements of the IEC 61850 standard as mandated recovery times for various system communication events.

Note that some of the recovery times are zero, which is also known as 'bumpless', 'zero data loss' or 'zero packet loss'. In practice, the typical method of achieving zero data loss in a networked system is to introduce redundancy such that the communication packet is sent along two different paths so that it will always make it through, even if there is any single failure.

Common Ethernet protocols are neither deterministic nor do they guarantee that a packet will ever actually make it to the destination. There are some other more advanced protocols to address recovery time and redundancy, such as Rapid Spanning Tree Protocol (RSTP), but they are nowhere near fast enough for the most demanding IEC 61850 requirements.

Communication Event	Service	Recovery Time (Application)	Recovery Time (Communication Link)
SCADA to IED (client-server)	IEC 61850-8-1	800 ms	400 ms
Interlock (IED to IED)	IEC 61850-8-1	12 ms	4 ms
Reverse Blocking (IED to IED)	IEC 61850-8-1	12 ms	4 ms
Protection Trip (excluding bus bar)	IEC 61850-8-1	8 ms	4 ms
Bus Bar protection	IEC 61850-9-2 (station bus)	<1 ms	Zero
Sample Values	IEC 61850-9-2 (process bus)	<2 consecutive samples	Zero

Table 1: IEC 61850 recovery times – applications and communications (Source: IEC)

> PERHAPS THE MOST COMPELLING REASON TO SELECT HARDWARE-BASED REDUNDANCY IS THAT ALL ELEMENTS WILL UNMISTAKABLY BE CERTIFIED AS COMPLIANT WITH A COMMON STANDARD, LEADING TO A TOTAL SOLUTION.

High performance Ethernet

So how it is that common Ethernet media can be considered and leveraged for substation automation? As noted earlier, IEC 61850 in turn refers to IEC 62439-3 to introduce high-performance redundancy protocols acceptable for meeting the recovery time requirements. HSR and PRP are specifically defined methods of achieving suitable redundancy, capable of meeting the zero recovery time requirement since their architecture ensures no packet is lost. They share some similarities, but also have their own pros and cons.

HSR network uses a ring topology and requires no dedicated switches. Instead, each intelligent device has at least two ports and acts as a switch so each data packet frame received on a given port is retransmitted (forwarded) out the other port. The basic concept is that if the ring is healthy, each destination node should receive two identical frames from a source node, with minimal time delay between the two. Normally the second frame is discarded, but if it is never received it indicates trouble on one of the paths. Even in the case of one break in the ring, operation continues normally.

The PRP approach is a parallel star. Every network path consists of two connections, effectively creating two networks completely in parallel. Every frame is sent from each source to each destination down both paths. Again, the destination device normally receives both frames and discards the second, but any time only one frame is received it indicates trouble on the other path. As with HSR, operation continues normally even in the event of any one failure.

As communication technology continues to focus on Ethernet, and as the electrical power industry complies with IEC 61850, applications will naturally standardise to implementing HSR and PRP. HSR has some limitations on node quantity and bandwidth, and requires specialised node hardware, but avoids the need for additional switches. PRP allows more common network methods but doubles the number of switches and field cables.

Protection, Automation & Control World (PACW.com) concludes "that a system based only on fibre cables can replace a conventional system. The availability of faster CPUs and multiple communications ports enables this approach as an alternate for a conventional system. In the near future protocol-based systems will bypass the conventional way of using miles of copper cables, not only in speed, but also in reliability".[3]

Each installation must be evaluated to identify if one or both solutions are optimal. The following application examples illustrate the strengths of each topology.

Application example: switchgear with protective relays

The present generation of switchgear is more likely than not to be specified with advanced intelligent devices for metering, control and protection. Legacy switchgear is commonly upgraded with smart devices, so the entire installation is intelligent and compliant.

In the example of Figure 3, the various smart devices — such as protection relays, control units and metering units — are installed within the switchgear and interconnected with standard Ethernet fibre-optic media in an HSR ring configuration. The fibre-optic connections are high speed, electrically isolated and immune to electrical noise.

In a traditional configuration, many of these devices would need hardwired interconnections to achieve their protective functions. However, with a HSR ring established, it is possible to perform these peer-to-peer connections using the IEC 61850 Generic Object Oriented Substation Event (GOOSE) control model. GOOSE messaging is extremely high speed, and communications will continue reliably even in the event of any one cable or device failure.

Note that there are two locations in Figure 3 where industrial computers are indicated. In this case, the equipment consists of a power automation computer with a gigabit Ethernet adapter card, with both components certified as IEC 61850 compliant.

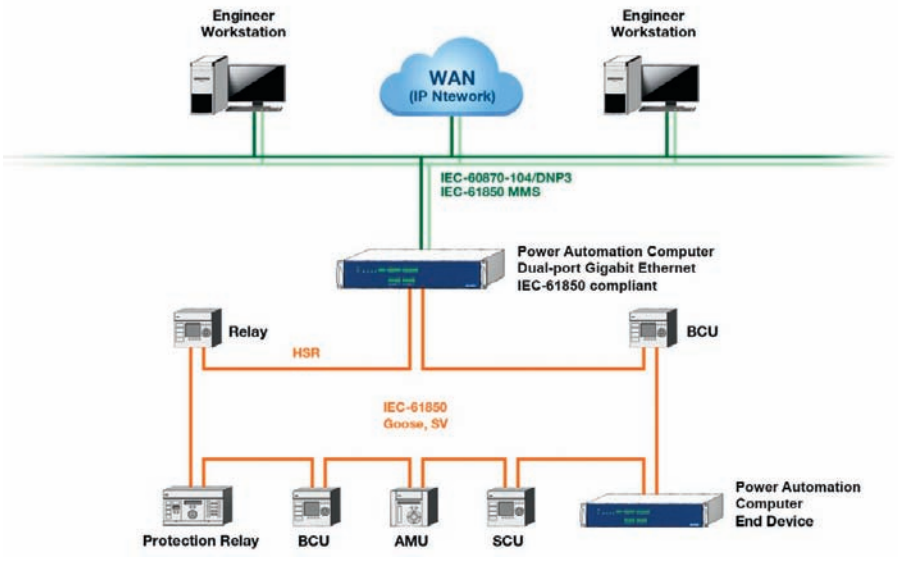


Figure 3: Example of switchgear on a HSR network.

© Aania/Dollar Photo Club

The computer on the bottom right is inserted in the HSR ring and acts as an end device application platform, just as any other relay or intelligent device. It could be used to provide local data gathering or more advanced control functionality. The computer at the top of the ring is acting as a RedBox or gateway for the WAN workstations to access devices on the HSR ring, so that a SCADA system could have connectivity with the HSR ring.

HSR rings are very suitable for installation within switchgear and present the most economical redundancy method, since additional dedicated switches are not required.

Application example: substation automation

For substation automation, the reliable operation of protection relays is crucial. In the example of Figure 4, multiple protection relays are in turn connected to measurement and control units. To achieve complete reliability, a PRP architecture with redundant optical fibres is implemented.

The top level device on this monitoring and control network once again is a power automation computer with a dual-port gigabit Ethernet adapter card. The dual ports on this card provide connections to the two completely independent but parallel networks. Even in the event of any failure on a network path — whether it is cabling, the switch or control power — the communication will continue normally through the other path.

As is evident in Figure 4, there are some additional costs involved with a second switch and dual fibre runs along every path. However, this architecture allows each network to operate at full performance with no slowdowns imposed by the redundancy scheme.

Conclusion

Critical energy infrastructure, such as electrical substations and switchgear used for power transmission and distribution, serves a demanding role in society. It is crucial that automation methods applied to these systems offer the highest level of performance.

In particular, many of the intelligent electrical devices used in energy infrastructure systems offer advanced communications capabilities over and above their basic protective features. Furthermore, industrial Ethernet has made great advances in all types of automation. However, more is involved than simply patching switchgear devices into an Ethernet switch.

The relevant IEC standards require that the most critical communication events experience zero data loss, and define two network topologies that can readily achieve this requirement. HSR rings are economical to implement, while PRP parallel networks require more switches and media but offer better performance. When implemented properly, even high-speed protection and control can be performed over Ethernet, which reduces installation complexity. Hardware-based products are available to provide an easily implemented solution for many different topologies, without negatively impacting intelligent device performance in any way. When correctly specified and implemented, these hardware-based network redundancy products will provide years of trouble-free service.

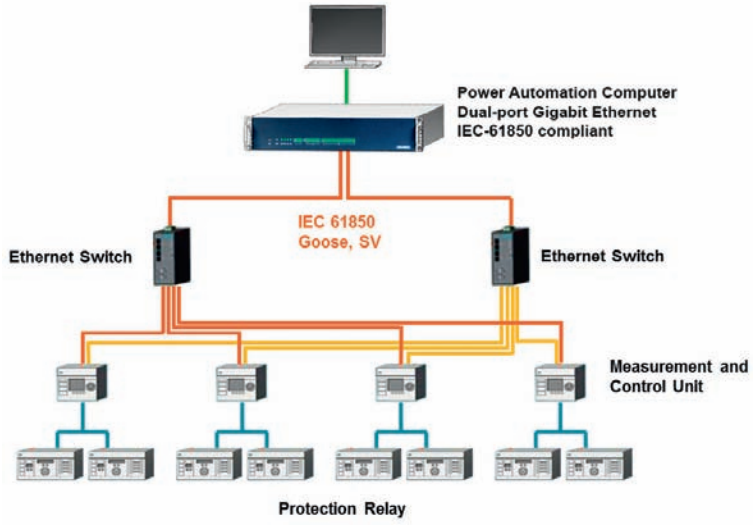


Figure 4: Example of substation network redundancy with PRP.

References

1. Self H, Guglielmo A 2013, *IEC 61850 - Why all the Hype?*, ELP.com, ‹http://www.elp.com/articles/powergrid_international/print/volume-18/issue-01/features/iec-61850-why-hype.html›
2. Wolf G 2016, *The Smart Substation*, TDWorld.com, ‹http://www.tdworld.com/grid-opt-smart-grid/smart-substation›
3. Becker F, Nohe S, Echeverria A 2015, *Designing Non-Deterministic PAC Systems to Meet Deterministic Requirements*, PACW.org, ‹https://www.pacw.org/issue/june_2015_issue/deterministic_system/designing_nondeterministic_pac_systems_to_meet_deterministic_requirements/complete_article/1.html›

Advantech Australia Pty Ltd
www.advantech.net.au

GOOD HOUSEKEEPING IS ESSENTIAL FOR SAFETY AND PRODUCTIVITY

Heavy duty degreasing and cleaning solutions

Parts washing | cleaning in workshops | Full systems and cleaning solvents

- Cellar and floor
- Air conditioning
- Electrical equipment And motor cleaning
- Machine & equipment cleaning
- Mobile equipment or vehicle/fleet washing
- Confined spaces and removing heavy duty greasy dirt

CHEMSEARCH, CHEM-AQUA, CERTIFIED & MANTEK ARE DIVISIONS OF NCH CORPORATION

NCH

Tel: 1800 753 143 | www.nchaustralia.com

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

UNIVERSAL M12 DISTRIBUTOR BOXES

With the universal M12 distributor boxes from Phoenix Contact, actuator connectors, such as for solenoid valves, can be connected quickly and easily.

Phoenix Contact Pty Ltd

http://bit.ly/2vwHxPA

2D LASER SCANNER

With a 360° measuring angle, the R2000 Detection 2D laser scanner is able to detect objects as small as 1 mm that move into its field of detection.

Pepperl+Fuchs (Aust) Pty Ltd

http://bit.ly/2u3xNwS

NVME SERVERS AND STORAGE SOLUTIONS

Advantech NVMe servers and storage solutions in 1U to 4U form-factors fulfil today's industrial server and storage requirements for Industry 4.0.

Advantech Australia Pty Ltd

http://bit.ly/2uxnNOO

PROGRAMMABLE SAFETY LIGHT CURTAINS

The Safegate type 4 range of programmable safety light curtains are suitable for applications requiring a high level of integration of the muting functions.

Treotham Automation Pty Ltd

http://bit.ly/2vcJIc2

The ST100 Series
Thermal Mass Gas Flow Meter

The most versatile thermal mass gas flow meter… now and in the future.

- Calibrations for more than 200 different gases
- 4 - 20 mA, HART, FOUNDATION™ fieldbus, PROFIBUS, Modbus
- Temperature service to 454 °C [850 °F]
- Pipe sizes from 25 mm to 2500 mm [1″ to 99″]
- 100:1 up to 1000:1 turndown
- 4-function: flow rate, total flow, temperature and pressure
- Best-in-class digital / graphical display
- Global agency approvals for Ex locations

FCI® FLUID COMPONENTS INTERNATIONAL LLC

www.FluidComponents.com

AMS

www.ams-ic.com.au

AMS Instrumentation & Calibration Pty Ltd
Unit 20, 51 Kalman Drive, Boronia VIC 3155, Australia
Tel: 03 9017 8225, Fax: 03 9729 9604

© Copyright 2014 Fluid Components International, LLC. All rights reserved.

Malt house retrofits 100 new drives

In the selection and configuration of drives for the food and beverage industry, food safety is the most obvious major concern. Various other issues must also be addressed with common challenges including adverse environmental conditions that must be kept under control from the outset. NORD Drivesystems has configured clean and resilient systems based on efficient smooth-surface motors for a Czech malt house.

Following successful pre-commissioning at the MOPOS plant, the machines were installed in a major malt house not far from Prague.

Traditionally, beer brewers used to prepare their own malt, but now specialised malt houses often handle this job for them. The processes in these facilities are largely automated and carried out with state-of-the-art equipment. One large, modern malt house can be found in Nymburk, near Prague.

In the first phase of processing, grain is steeped in water until it is ready to germinate. Next, the grain is placed in a so-called Saladin box, where it sprouts leaves and roots. Enzymes are formed and enriched. They convert the starch into malt sugar. All the while, the grain is regularly raked and aired. After about five days, the green malt is transferred to a drying kiln.

Before the advent of automation, turning the barley and clearing the malting floor were strenuous physical tasks that took many hours to complete. Modern malt houses have long ago switched to large mechanical turners, which enable production volumes of tens of thousands of tons per year. When the Nymburk malt house required a full-scale retrofit of these machines, they turned to Moravské potravinárskě strojírny (MOPOS), a Czech OEM for the food industry with a particular focus on malt house and bakery machinery.

Eight turners, each over 7 m wide and weighing over 7.5 tons, were refurbished. A total of 120 drives had to be replaced with new, state-of-the-art systems. Each turner includes a main drive which moves the machine on rails that span the length of the Saladin box — over 53 m. These boxes are about 2 m deep. In addition, there are 14 individually driven vertical screws per turner. These rake the germinating grain once or twice per day as needed to keep it cool and aerated. Finally, a scraper mounted on the machine serves to discharge the green malt.

In this project, as the single source of drive solutions, NORD supplied 112 geared motors for the screw agitators as well as eight main drives with drive electronics for speed control. The drive manufacturer's Czech subsidiary, NORD-Poháněcí technika, s. r. o., worked closely with its long-time customer MOPOS to configure these systems to suit the application.

The ambient conditions in the malt house are tough. The atmosphere is saturated with 100% humidity. Moreover, water vapour reacting with carbon dioxide also leads to the permanent presence of weak carbonic acid (H_2CO_3). Given these very tough operating conditions, MOPOS selected smooth-surface motors. In contrast to conventional motor types, the casings of these motors have no cooling fins, which eliminates typical dirt traps and surfaces prone to attract condensation moisture. The standard versions of these systems already provide IP66 ingress protection. Their terminal boxes are filled with solid resin. Both the rotors and stators are treated with a special, moisture-resistant lacquer.

However, this design requires careful thermal management, especially since the drives in the MOPOS machine run in continuous operation. The smooth-surface motors on the screw agitators feature a temperature sensor and a cooling fan. This allows for smaller sized motors without a risk of overheating. The motor on the main drive is non-ventilated and therefore solely cooled by surface heat dissipation. These motors are controlled by frequency inverters to be run at different speeds at various stages of the process.

Like all AC vector drives manufactured by NORD, the SK 500E units on the main drives use field-oriented vector control and partial load detection. Due to the harsh environmental conditions, the inverters are installed in a control cabinet.

Robust BLOCK series parallel-shaft gearboxes were selected for the main drives. These multistage gearboxes feature a high gear ratio to enable slow and gentle agitation of the grain. The parallel-shaft gearboxes on the agitators are filled with a fully synthetic oil certified for the food industry. They feature stainless steel output shafts to ensure corrosion resistance as well as high resistance against cleaning chemicals used in the facility. All drives were supplied with a special coating adapted to the wet environment in malt houses.

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

E-T-A EBU - Electronic Breaker Unit for AC 230 V

Power safety for UPS operation

The mechatronic circuit breaker type EBU provides selective overcurrent protection in AC 230 V UPS systems. The unit consists of an MCB approved for short circuit interruptions up to 10 kA. The second element is an add-on electronic circuitry for measuring and evaluation tasks. The product is available with the typical MCB ratings 4 A, 6 A, 10 A and 16 A with B and C characteristics and is directly operated at the output of the corresponding UPS.

Benefits

- Enhanced system availability through effective protection
- Reduction of overall costs by a 1/3 more efficient rating
- Easy planning with a variable overcurrent protection
- Adjustable UPS current rating
- Adjustable load current rating
- LED status indication

Visit our home page for more information:
www.e-t-a.com.au

E-T-A®
ENGINEERING TECHNOLOGY

E-T-A ElectroTechnical Applications Pty Ltd
Unit 14/4 Birmingham Ave • Villawood NSW 2163
Phone: +61 2 9726 3011 • Fax: +61 2 9726 3021
Email: info@e-t-a.com.au • www.e-t-a.com.au

FUNCTIONAL SAFETY FOR MACHINE CONTROLS

Gary Milburn, Product Manager, Industrial Safety Systems, SICK Pty Ltd

When implementing technical protective measures, each risk reduction measure will be associated with a safety function or combination of safety functions. In order for these safety functions to be designed and installed to a degree of reliability commensurate with the risk level of the associated hazard(s), the concepts of functional safety must be applied.

Functional safety is a part of the process used to design, test and prove that the safety-relevant components and circuits of a machine's control system meet the intended reliability and risk reduction capability as determined by a risk assessment. As part of the overall risk reduction strategy for industrial machinery, it is typical to apply safeguards employing one or more safety functions to achieve some measure of risk reduction. Parts of machinery control systems that are assigned to provide safety functions are called 'safety-related parts of control systems' (SRP/CS). These can consist of hardware or software and can either be separate from the machine control system or an integral part of it. In addition to providing safety functions, SRP/CS can also provide operational functions, such as initiation of machine motion under safe conditions.

'Functional safety' is the term used to refer to the portions of the safety of the machine and the machine control system that depend on the correct functioning of the SRP/CS. To best implement functional safety, safety functions must first be defined. Once identified, the required safety level must also be determined and

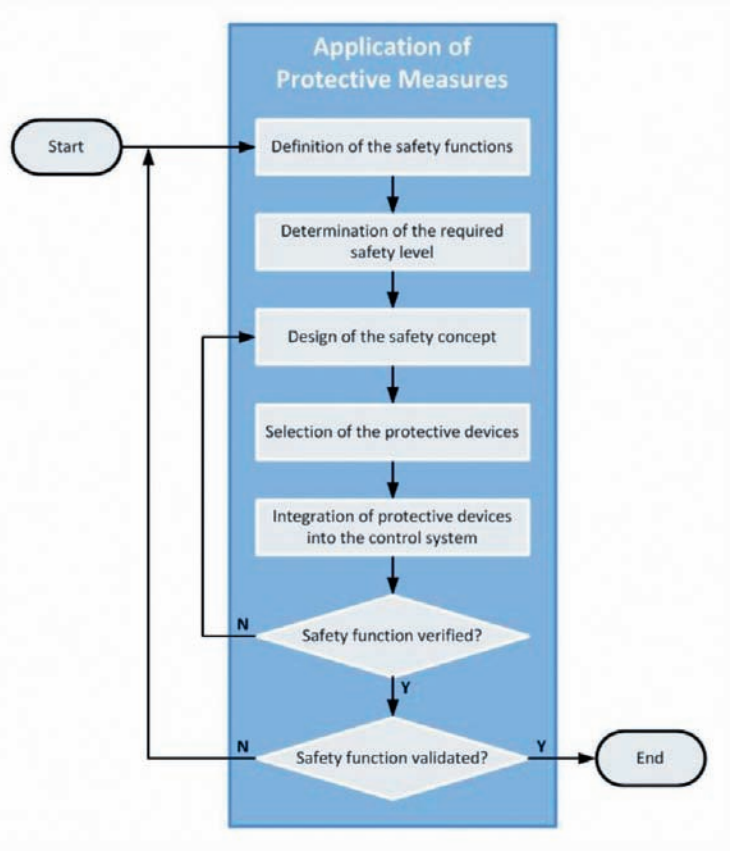


Figure 1: Application of protective measures.

then implemented with the correct components necessary to achieve acceptable risk reduction. To confirm that the minimum requirements have been met (if not exceeded), subsequent verification must be performed and documented.

To look at it from another aspect, functional safety is an engineering approach to quantify the performance level of the SRP/CS to a level commensurate with the associated risk for a given technical protective measure. This includes the verification and validation aspects of the safety functions that have direct interaction with the machine control system, as represented in Figure 1.

Safety functions

Safety functions define how risks are reduced by engineering controls, and must be defined for each hazard that has not been eliminated through design measures. At its core, a 'safety function' is any element of the protective system whose failure leads to an immediate increase of risk. The risk assessment process will have established the minimum requirements for the reliability of safety functions, including mechanical, electrical, hydraulic and pneumatic control system integrity. This level of reliability and integrity of the control portion of a safety function is referred to as 'functional safety'.

In order to accurately design, implement and validate safety functions to achieve the required level of risk reduction, it is necessary to provide a precise description of each safety function. The type and number of components required for the function are derived from the definition of the safety function. Many different safety functions are possible, and some applications may require more than one function in order to adequately reduce risk. Likewise, it is also possible for a single protective measure (safeguarding component) to play a part in more than one safety function simultaneously.

It is worth noting that not all safety functions have functional safety requirements, as is the case for the use of fixed barriers to permanently prevent access or to retain hazards. Permanent separation of individuals from hazards is clearly a safety function, as is evident by the number of machines on the market with permanently fixed guards or shields in place. While these components of the overall safety system have specific requirements pertaining to proper design and use, these elements do not have

SAFETY TECHNOLOGY CONTINUES TO ADVANCE BEYOND SIMPLE ELECTRICAL AND ELECTROMECHANICAL COMPONENTS (SUCH AS INTERLOCKING DEVICES AND RELAYS) TOWARD MORE COMPLEX ELECTRICAL SYSTEMS USING ELECTRONICS AND SOFTWARE-BASED COMPONENTS.

functional safety considerations because there is no interface to the SRP/CS. The level of risk reduction provided by these measures can be reliably maintained through proper installation, inspection and maintenance protocols.

Why apply functional safety?

Safety technology continues to advance beyond simple electrical and electromechanical components (such as interlocking devices and relays) toward more complex electrical systems using electronics and software-based components. With more basic elements, their behaviour in the event of a component failure can be determined to a high degree of certainty because each component can be completely defined. The failure modes of more complex systems, on the other hand, are more difficult to define and in some cases can only be estimated.

Many industrial controls engineers were just beginning to grasp the idea of circuit architecture, referred to as 'categories', under EN 954-1 or previous versions of AS 4024.1. The introduction of functional safety does not diminish the importance of the circuit design, but rather builds on the concept to account for the greater number of possible failure modes inherent with more complex control systems. Essentially, the benefit of functional safety is to provide a means to 'give credit' for additional design aspects, over and above the circuit architecture. Older standards didn't address these design measures, such as oversizing contactors, selecting more robust and reliable components for use in the circuit, providing higher levels of diagnostics, or addressing common cause failures through the process or implementation.

Essentially, the same reliability concerns exist when designing and evaluating SRP/CS — whether the control system is associated with simpler components or more complex elements. In order to consistently determine the overall reliability of these systems, various safety standards have been developed to outline the key elements. These elements must be considered to determine the overall reliability of the safety-critical control functions.

Standards that address these elements include:

- EN ISO 13849-1 – Safety of machinery – Safety-related parts of control systems
- IEC 62061 – Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
- IEC 61508 – Functional safety of electrical/electronic/programmable electronic safety-related systems
- IEC 61511 – Functional safety – Safety instrumented systems for the process industry sector
- AS/NZS 4024.1 – Safety of Machinery

The primary principle behind these standards is that the overall reliability of a safety function can be qualitatively estimated. In terms of safety, the most important concern is to determine the probability that the system will fail to a dangerous condition. In terms of the standards, the reliability of the SRP/CS is estimated as the probability of a dangerous failure per hour (PFHd).

There are currently two primary methodologies to determine the likelihood of a dangerous failure: performance level (PL), as outlined in EN ISO 13849-1, and safety integrity level (SIL), as addressed in IEC 62061. Figure 2 illustrates these methodologies in terms of probability of failures per hour, to a dangerous condition.

What are the elements of functional safety?

The SRP/CS is the part of a control system that responds to safety-related input signals and generates safety-related output signals. These are parts of machinery control systems that are assigned to provide safety functions. The combined elements start at the point where the safety-related input signals are initiated (for example, obstruction of an optical beam of the safety light curtain) and end at the output of the power control elements (for example, the main contacts of a contactor). In some cases, the final element (such as the motor) is not included. It is also important to note that individual components of the safety system may play a role in multiple safety functions, with each safety function possibly

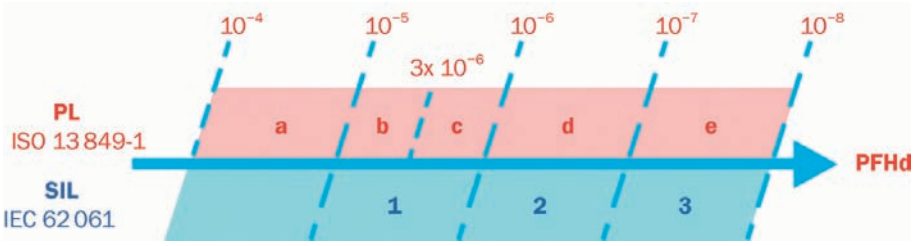


Figure 2: Scale of functional safety levels.

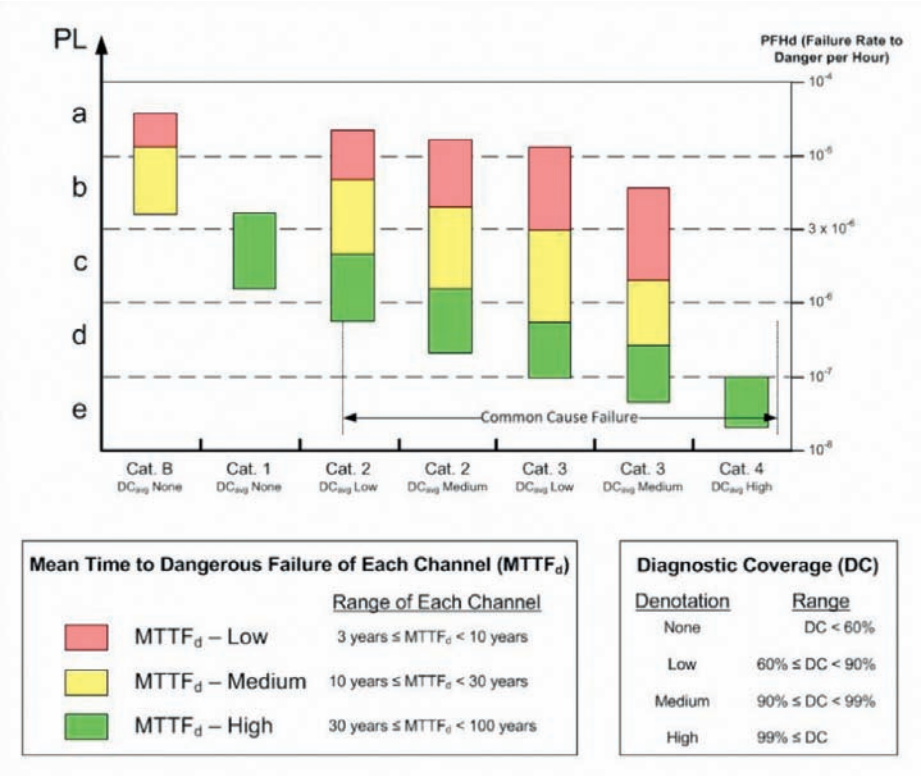


Figure 3: Determination of the performance level of a subsystem (from EN ISO 13849-1:2006).

requiring different levels of functional safety — again emphasising the importance of precisely describing each safety function.

Primary considerations of functional safety

The central pillars supporting the functional safety concept are exhaustively outlined in a number of sources, including the standards listed previously. As an overview, the primary considerations for determining the performance level for a subsystem are:

1. **Structure** and behaviour of the safety function under fault conditions (category): This is the same circuit architecture concerns addressed previously in EN 954-1 and older versions of AS 4024.1, utilising the same category ratings (B, 1, 2, 3 and 4).
2. **Reliability** of individual components defined by mean time to a dangerous failure (MTTFd) values: This value represents a theoretical parameter expressing the probability of a dangerous failure of a component (not the entire subsystem) within the service life of that component.
3. **Diagnostic** coverage (DC): The level of safety can be increased if fault detection is implemented in the subsystem. The diagnostic coverage (DC) is a measure of capability to detect dangerous faults.
4. **Common cause failure** (CCF): External influencing factors (eg, voltage level, overtemperature) can render identical components unusable regardless of how rarely they fail or how well they are tested. These common cause failures must always be prevented.
5. **Process**: The process for the correct implementation of safety-relevant topics is a management task and includes appropriate quality management, including thorough testing and counter-checking, as well as version and change history documentation.

Achieving functional safety

Through the combination of the considerations above, the PL achieved can be probabilistically determined to be a specific level. Figure 3 represents how the combination of component selection (MTTFd), diagnostic coverage (DC) and circuit architecture (category) combine together to achieve various PL outcomes, with consideration for CCF.

Validation of functional safety

As with any risk reduction measure, it is essential to verify that the PL achieved is at least as high as the PL required (PLr). This can be easily represented as $PL \geq PLr$.

The confirmation that adequate PL has been achieved is covered in the overall process applied to the design of SRP/CS. The primary features include:

- Organisation and competence
- Rules governing design (eg, specification templates, coding guidelines)
- Test concept and test criteria
- Documentation and configuration management

All life cycle activities of safety-related embedded or application software must primarily consider the avoidance of faults introduced during the software life cycle. The main objective is to have readable, understandable, testable and maintainable software. The EN ISO 13849-1 standard outlines a V-model as shown in Figure 4, which has proven particularly effective in practice for software design.

In common language (outside of safety standards), there is little difference between the terms 'verification' and 'validation'. In essence, the goal is to test and check that the overall reliability of

each subsystem of the SRP/CS is adequate for the associated risk, and that accurate documentation is collected for future revalidation throughout the entire life cycle of the machine.

Confirmation of functional safety

Over the past 10–15 years, industry has been progressively adopting the concepts of evaluating risks based on a systematic methodology and reducing identified risks through the application of multiple layers of protective measures from an orderly list of options based on their effectiveness. The next step to further advance safety is the concept of confirming that the established goals have been achieved. As such, after risk reduction measures have been implemented, their effectiveness must be confirmed.

When dealing with simple SRP/CS composed solely of electrical and electromechanical components, the confirmation is based on review of the circuit design. However, when the SRP/CS utilises more complex subsystems using software-based components, the confirmation must account for the other four pillars of functional safety as discussed above.

The process developed in Europe for conducting the necessary confirmation takes a mathematical approach to determine the reliability of the SRP/CS in terms of probability of a dangerous failure per hour (PFHd). The Institute for Occupational Safety and Health (IFA) in Germany has developed a tool to perform the mathematical calculations to apply the concepts of EN ISO 13849-1. This tool, called Safety Integrity Software Tool for the Evaluation of Machine Applications (SISTEMA), is available for free online.

SISTEMA accounts for the fact that safety-related parts of a control system are engineered from subsystems, blocks and elements using components for industrial use which can generally be purchased commercially. When calculating the PLr of a system, the system designer must enter various values and information. Component manufacturers typically provide this data in data sheets or in catalogues, but many also make the information available to SISTEMA users in the form of libraries. This collaboration within the safety market allows designers to import the necessary data from a library directly into a SISTEMA project quickly and accurately.

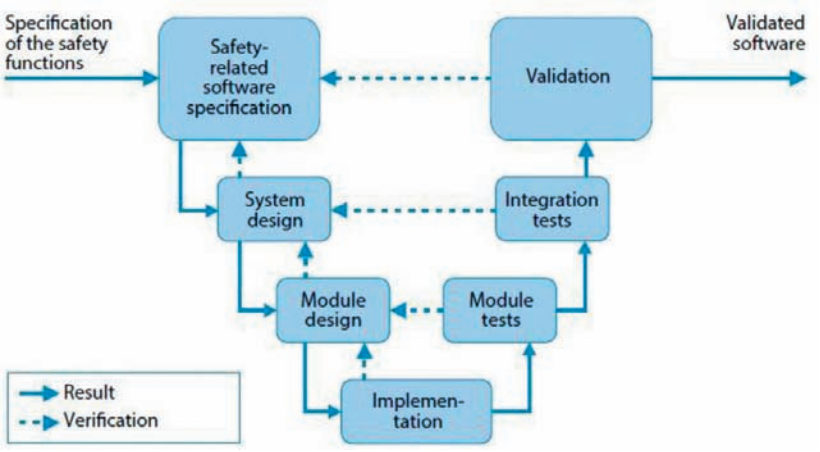


Figure 4: V-Model for software validation.

Conclusion

Achieving an acceptable or tolerable level of residual risk is possible through application of the hazard control hierarchy. However, to confirm that the desired degree of risk reduction is achieved, one must test and check that all safety functions are performing to the desired level of reliability. When the safety functions are directly interacting with the machine control systems, these portions of the control become SRP/CS and in turn must be validated. Functional safety is an approach based on probabilistic evaluation of component data to validate the overall reliability of those safety functions as a necessary step to determine that minimum performance requirements have been achieved.

If the ideas of functional safety appear complex and intimidating, rest assured that you do not stand alone. As is the case with most new philosophies, change is often difficult to implement and even harder to accept. Do not hesitate to request assistance from outside resources to provide support as necessary.

SICK Pty Ltd
www.sick.com.au

The 5-inch diagonal color display with a resolution of 800 × 480 pixels offers direct navigation via a capacitive touchscreen.

Folders and applications provide quick access to bay screens, metering and monitoring data, reports, settings, and more.

The home pushbutton allows users to easily return to the default home screen.

Visualize What You're Protecting

Introducing the New Touchscreen for the SEL-751 Feeder Protection Relay

The SEL-751 just got a whole lot easier to use. The 5-inch, full-color touchscreen displays your power system in one intuitive interface. Your settings, bay screens, and other data are just a few touches away from the home screen, and the full keyboard makes it easy to adjust settings and enter passwords. And with an IP54 rating and extensive validation testing, you can be confident the touchscreen will hold up in its surroundings.

To find out more about how the SEL-751 touchscreen makes it faster, easier, and simpler to visualize what you're protecting, visit **www.selinc.com/751LD**.

Phone: +613.9485.0700 | Email: selmelb@selinc.com

RFID INTERFACE

To meet the ever-shrinking dimensional needs of devices on the factory floor, Turck has developed its compact TBEN-S-RFID interface with an IP67 rating.

The multiprotocol devices bring data from RFID read/write heads in the HF frequency band to the controller, via Profinet, EtherNet/IP or Modbus TCP. The block modules are suitable for retrofitting RFID applications because of their ability to connect actuators and sensors to RFID read/write heads simultaneously. Additionally, due to their high degree of protection, cabinets are unnecessary and keep the wiring effort at a minimum, saving users time and money.

The ultracompact TBEN-S-RFID module eliminates complex PLC integration with its conventionally mapped RFID data, and can easily read and write 8 kb HF tags. In addition to two RFID ports, the TBEN-S features four configurable digital I/O points for external devices. It also offers efficient performance, despite its compact size with a width of only 32 mm. The power supply and network connection are implemented via M8 connectors.

Turck Australia Pty Ltd
www.turck.com.au

TORSION-RESISTANT ETHERNET CABLE

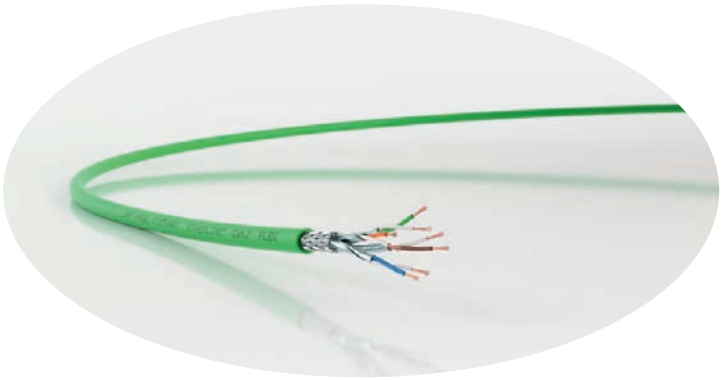
Lapp Group has added two high-speed industrial Ethernet cables to its ETHERLINE range, including a torsion-resistant and Profinet-compatible Cat. 7 cable.

Both cables achieve transfer speeds of 10 Gbps in a frequency range of up to 600 MHz. This makes machinery and robotics applications suitable where large volumes of data from sensors or high-resolution cameras are common. Both cables have a robust and halogen-free PUR sheath; however, they differ with respect to their internal structures and other properties.

The ETHERLINE TORSION Cat.7 can be twisted by 180° in both directions along a length of 1 m, at least 5 million times. The easy-to-assemble cable does not have any filler, with the cores only held in place with a polyethylene cross separator.

ETHERLINE Flex Cat.7 is suitable for well-stocked control cabinets where space is tight. Due to narrow core cross-sections, the flexible cable has an outer diameter of 6.4 mm and a bending radius of four times the outer diameter. It can be laid next to cables with voltages up to 1000 V, or without mechanical protection such as separators.

Treotham Automation Pty Ltd
www.treotham.com.au



VARIABLE AREA FLOWMETER

The Krohne H250 M40 variable area flowmeter is now available with HART 7.4 communication.

HART 7 compliance and interoperability have been validated by FieldComm Group and the device has been issued with a 'HART Registered' certificate. The H250 M40 can therefore now provide NE107 diagnostic messages, and compliance with the requirements of NAMUR has been proven as part of a supplementary type test according to NAMUR recommendation NE95.

The flowmeter is suitable for use in all process industries for the measurement of liquids and gases. The latest communication option adds to its modular design: with the purely mechanical version as a base, electronic (communication) modules can be added or replaced or retrofitted to match applications from analog flow measurement without auxiliary power to digital integration into a fieldbus system.

KROHNE Australia Pty Ltd
www.krohne.com.au

Switch to a gas partner with dedicated welding, laser and flame cutting gases

ARCAL™
Welding Gas

Reliable and simple, yet high-performing range of 4 main gases and many special mixes that can handle any welding job.

LASAL™
Laser Gas

Our full range of gases are designed with the ultimate performance of your laser in mind, and our assist gases are available in convenient packages designed to ensure peak cutting performance.

FLAMAL™
Flame Cutting Gas

With over 100 years of experience producing gas supply modes, Air Liquide FLAMAL™ gases are designed to optimize your processes no matter what flame process you use. In addition, there is the added safety of our unique cylinder tops.

Gas that works for you™

Air Liquide
creative oxygen

www.airliquide.com.au

FIVE WAYS INTEGRATED AUTOMATION MAKES PLANTS SAFER

Siemens Ltd.

Once considered to be a dangerous practice, integrated safety is now becoming accepted for the benefits it offers.

© Stock.Adobe.com/au/Gennady Kurinov

By upgrading their automation technology, manufacturing plants are able to integrate safety functionality into all standard components for improved system performance and productivity. Today's most advanced integrated automation technology helps plants exceed global safety compliance requirements quickly and cost-effectively.

In today's competitive global environment, manufacturing plants are under constant pressure to contribute to their companies' profitability and growth. In their efforts to boost productivity and efficiency, facilities are deploying integrated, intelligent safety solutions as a lever for continuous improvement and operational excellence.

Within the past decade, advancements in automation technology have made it easier for plants to reliably protect their workers, machines and the environment while improving productivity, reducing costs and complying with pertinent safety and environmental regulations. The highest-performing automation systems integrate safety functionality into all the standard components and enable simpler, faster and more cost-effective implementation of safe and productive machines.

Many controllers — particularly older ones — lack safety integration capabilities. Facilities must take the strategic opportunity to upgrade to modern automation technology that not only improves the overall performance of their systems but also exceeds global functional safety requirements.

Functional safety is the detection of a potentially dangerous condition, resulting in the activation of a device or mechanism to prevent or mitigate the effects of the hazardous event. The objective of functional safety is to reduce risk to a tolerable level, with the overarching goals of avoiding accidents and damage when faults occur and maximising safety for people, equipment and the environment.

Below are five ways that today's most advanced integrated automation technology makes plants safer.

1. Integrated safety functionality

In the past, plant engineers had to hardwire e-stops, gate interlocks, light curtains and other monitoring and safety shutdown equipment as 'bolt-on' accessories to a separate safety system. With today's most innovative automation technology, however, safety features are seamlessly integrated into all of the components. All programming — whether it's for safety or standard hardware — is done within the same software package, so safety planning is standardised throughout the system.

In addition to making plants safer, integrated safety reduces total cost of ownership and places less strain on engineering and maintenance personnel. It also enables greater system availability — due to improved diagnostics and troubleshooting — and greater operational flexibility, as plants can reconfigure their floor layouts and machine placements more easily.

2. Compliance with safety standards

Unlike older or underperforming systems, today's modern, high-performing automation components maximise process safety by meeting the latest international standards for fault-tolerant applications. These standards, including IEC 61508, ANSI/ISA-84, IEC 62061, EN ISO 13849-1 and IEC 61511, cover the planning, documentation and assessment of all activities required to manage safety throughout the entire life of a system.

IEC 61508, for example, is an international standard for the functional safety of automation components that are designed to detect potentially dangerous conditions and initiate corrective or

preventive action. The standard establishes criteria for a safety integrity level (SIL), which describes a safety function's probability of a dangerous failure per hour.

3. Transmission of safety-related data

With advancements in automation technology and the emergence of networked safety, it is no longer necessary to run two separate fieldbuses for safety and non-safety data. Plants can use a standard fieldbus to transmit safety-relevant data, which reduces wiring complexity, system costs and training demands while improving diagnostic capabilities and freeing up space in the control cabinet.

The emergence of PROFIsafe — an integrated safety profile developed by the global consortium Profibus & Profinet International (PI) — extends the standard communications protocol to address special requirements necessary to conform to standards such as IEC 61508. For example, PROFIsafe adds elements such as message numbering and data consistency checks to rule out typical network messaging faults, enabling networked safety devices to meet the reliability requirements of SIL 3 as prescribed by IEC 61508.

4. Deeper visibility into problems

Advanced diagnostic capabilities provide deeper, real-time visibility into system performance and behaviour, enabling plants to be more proactive when addressing potential problems. With integrated safety, it is no longer necessary to constantly interrogate the system to determine if e-stops and other safety I/O devices are functioning properly. Today's PLC systems conduct those validation tests automatically and report the results to the controller. Since the controller doesn't have to initiate and send the commands across the network to conduct validation tests, the process consumes less code and less bandwidth, while making the entire system more efficient and less vulnerable to programming errors.

With safety solutions integrated directly into standard control architectures, plants can leverage automation technology to address two separate issues: functional safety and system availability. Integrated safety helps to minimise accidents and downtime by enabling operators to diagnose hazardous conditions more intelligently and quickly.

5. Remote diagnostic capabilities

Today, modular components such as PLCs, HMIs, drives and network switches offer integrated diagnostic functions which make system monitoring, troubleshooting and maintenance easier and safer than ever before. With the integration of wireless technology, plant personnel can view the status information of all components from a networked computer or mobile device. The system can send automatic alerts to the mobile devices of responsible parties who can securely log in to the system, if necessary, to assess and correct the situation.

> WITH ADVANCEMENTS IN AUTOMATION TECHNOLOGY AND THE EMERGENCE OF NETWORKED SAFETY, IT IS NO LONGER NECESSARY TO RUN TWO SEPARATE FIELDBUSES FOR SAFETY AND NON-SAFETY DATA.

With real-time remote diagnostic capabilities, operators and maintenance technicians are empowered to detect, report and clear faults quickly and safely. Technicians, for example, can troubleshoot issues inside motor control cabinets from a safe distance, minimising the need to wear the specialised personal protective equipment at all times that may be necessary to shield them from arc flash hazards.

Conclusion

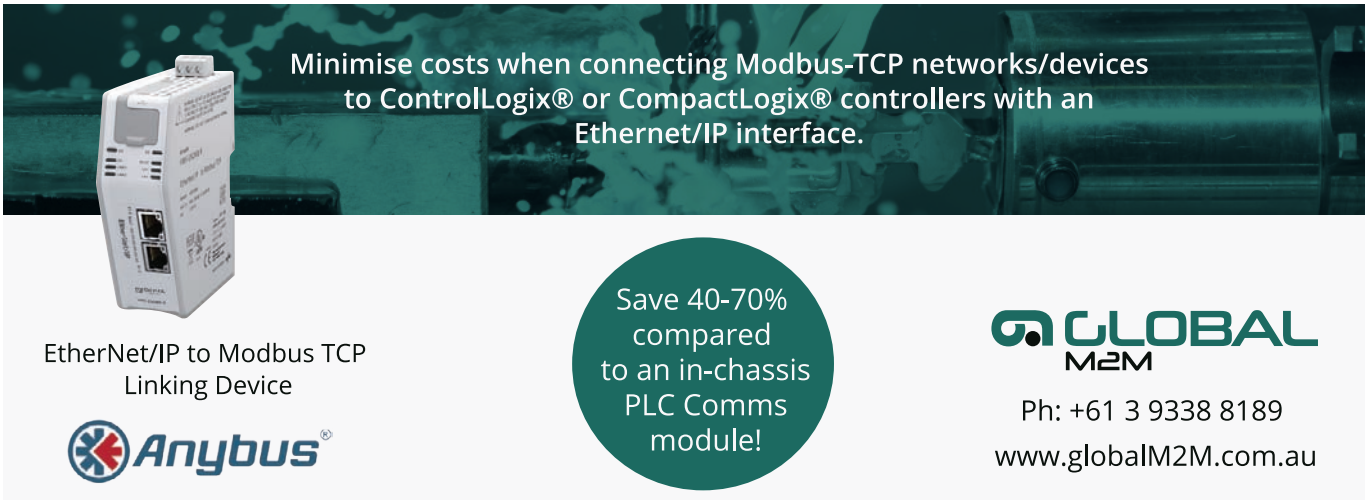
Through today's most advanced automation systems — which integrate safety functionality into standard control architecture — manufacturers are leveraging safety to boost productivity (by increasing system availability), reduce costs and build competitive advantage.

Such advanced automation systems offer a number of safety-related benefits to manufacturing plants, including:

- one controller, bus and engineering framework for standard and failsafe automation
- uniform diagnostic functions for standard and safety hardware
- improved engineering efficiency due to the integration of safety technology into the standard automation software
- the ability to transmit safety-related data via a standard fieldbus, which minimises wiring complexity, reduces system costs and simplifies safety architectures
- process safety and compliance with international standards such as IEC 61508, IEC 62061 and EN ISO 13849-1.

Once perceived as a burdensome cost of doing business, safety has evolved into a strategic activity that can improve a facility's productivity, efficiency, flexibility, quality, profitability and safety.

Siemens Ltd
www.siemens.com.au



Maximum precision, Minimum footprint

Non-contact laser displacement sensor complete with control system integration.

- Range: 10mm to 500mm
- Measuring rate: up to 4kHz
- Integrated controller
- Auto target compensation
- Ideal for serial and OEM applications
- Easy to install in restricted spaces

Metal Processing

Food & Beverage

Oil & Gas

Full range: www.bestech.com.au/pt

BESTECH
Sensors & Teaching Equipment

Global Technology, Local Support

enquiry@bestech.com.au | 03 9540 5100

VALVES FOR FOOD, BEVERAGE, CHEMICAL AND PHARMACEUTICAL PRODUCTION & PROCESSING

Niezgodka ARMATUREN

ALL STAINLESS STEEL CONSTRUCTION

AUSTRALIAN AGENT & TECHNICAL SUPPORT

P&SS PRESSURE & SAFETY SYSTEMS 50 GOLDEN JUBILEE 1966-2016

Tel: (03) 9699 7355

www.pressureandsafetysystems.com.au

9334P&SS-WNFT

PLC SIMULATION SOFTWARE

Yokogawa has developed Virtual-M3, a simulation software tool for the Yokogawa FA-M3V range-free multicontroller. With the simulation software, a virtual debugging environment can be established on a PC to debug application control programs for the FA-M3V without having to use an actual multicontroller and I/O devices.

Normally, the debugging of such control programs requires the use of a PLC, target devices and a PC, and is a time-consuming process. Virtual-M3 is designed to establish a virtual debugging environment on a PC and perform the same sort of simulations that in the past have required the use of the actual hardware.

Virtual-M3 constructs a debugging environment that consists of a virtual CPU module and virtual I/O modules. The former simulates the behaviour of the CPU module on an actual FA-M3V unit and the latter reproduces the behaviour of the I/O modules on the FA-M3V and the target devices. There is no need to shut down the actual equipment to debug their control programs or conduct failure analyses.

Using a step operation function, Virtual-M3 can perform debugging operations that are impossible using conventional debugging techniques that require the actual hardware. These operations include running repeated tests on selected program segments; the execution of command, circuit and scan operations one step at a time; and the skipping or restarting of programs.

Yokogawa also offers the WideField3 program development tool for writing, debugging and managing FA-M3V applications. WideField3 now supports Virtual-M3 and Windows 10.

Yokogawa Australia Pty Ltd
www.yokogawa.com/au

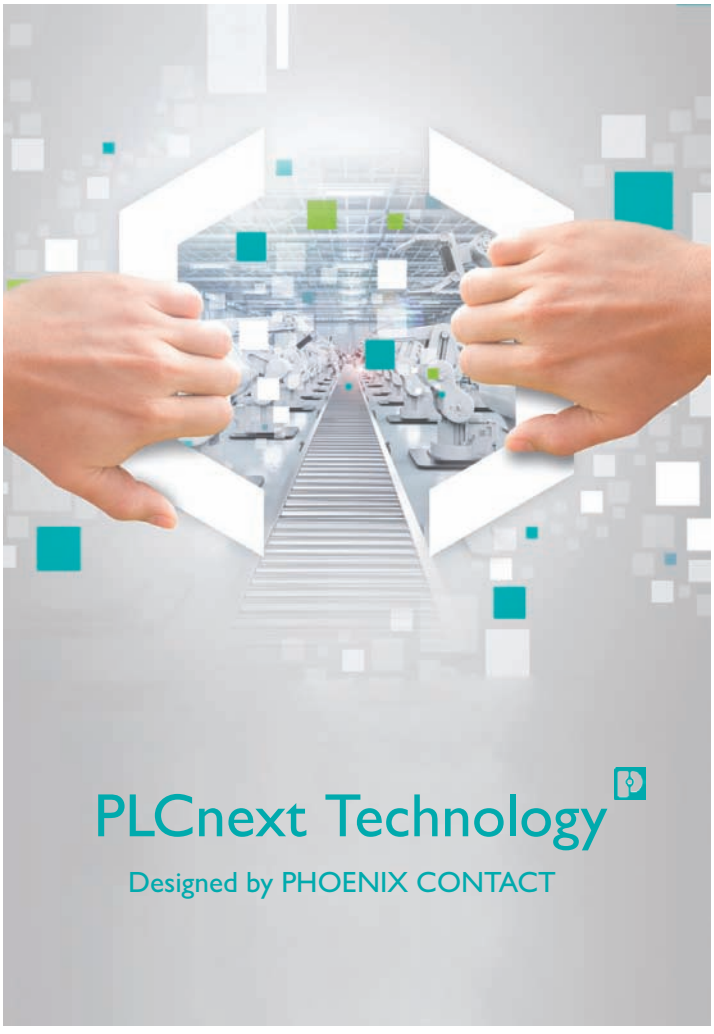
ETHERNET DAQ CHASSIS WITH TSN

NI has released the cDAQ-9185 and cDAQ-9189 multislot Ethernet chassis, introducing time-based synchronisation built on the latest Ethernet standards and furthering NI's efforts in Time Sensitive Networking (TSN) and rugged CompactDAQ hardware for distributed measurements.

The nature of physical systems test is rapidly changing as measurement systems migrate from the control room to closer to the device under test. While this shortens installation time, reduces the cost of sensor wiring and improves measurement accuracy, it creates challenges with synchronisation and systems management, especially using today's industrial networking technologies. The cDAQ-9185 and cDAQ-9189 provide tight time synchronisation with TSN to simplify and improve the scalability of synchronised, distributed systems.

The 4- and 8-slot chassis make possible precise synchronised timing over the network, which eliminates the need for lengthy, physical timing cables and ensures tightly synchronised measurements for accurate analysis, and are capable of simple daisy chaining through an integrated network switch for quick set-up and expansion in distributed applications. They are also designed to offer reliable operation in harsh environments with -40 to 70°C operating temperature range, shock resistance up to 50g and vibration resistance up to 5g. Software abstraction through the NI-DAQmx driver automatically synchronises multiple chassis for simple programming.

National Instruments Aust Pty Ltd
www.ni.com



PLCnext Technology

NEW future-proof open control platform

PLCnext Technology forms the basis of the new, open control platform from Phoenix Contact.

Easily work in parallel with established software tools – Visual Studio, Eclipse, Matlab Simulink, and PC Worx Engineer – as well as create programming code both in IEC 61131-3 and C/C++ and C#.

Additional functions from third-party manufacturers or the open source community can be added to Phoenix Contact's automation system, merging into one complete system.

The AXC F 2152 Axiocontrol controller is the first controller available for the new open platform

For additional information call **1300 786 411** or visit **phoenixcontact.com.au/PLCnext**

PHOENIX CONTACT
INSPIRING INNOVATIONS

CALIBRATOR FOR PRESSURE INSTRUMENTATION

The Druck DPI 612 Flex provides flexible pressure ranging by virtue of 31 high-accuracy interchangeable pressure modules and can deliver an accuracy of 0.005% FS. Three models are available to generate from 95% vacuum up to 1000 bar or 15,000 psi. Pressure generation to 100 bar/1500 psi can be performed without gas bottles or pressure regulators. The instrument also sources and measures mA (step and ramp), mV and V and can provide 24 V loop power.

The Druck DPI 612 Flex series has been designed from the start to be simple to use. The interchangeable pressure modules are a simple hand fit requiring no tools, cables or set-up and can be hot-swapped in the field. The screen-driven dashboard allows quick application selection and the task menu provides a library of popular configurations for pressure test and calibration. The touch screen is quicker and simpler to use than complex keypads with complex special function keys. The case material and precision moulding ensure that the Druck DPI 612 is both rugged and weatherproof.

Despite being simple to use, the DPI 612 Flex is a powerful instrument. It has full documenting capabilities to automate calibration procedures, including PASS/FAIL indication and error calculation. It connects with either GE's own calibration software or other common commercial calibration software packages so that the results can be easily fed into plant management software.

Thermo Fisher Scientific
www.thermofisher.com.au

MODULAR TOWER LIGHTS

Tower lights are commonly used on equipment in industrial manufacturing and process control environments to provide visual and audible indicators of a machine state or process event to machine operators, technicians, production managers and factory personnel.

The QT70 series tower light is 70 mm in diameter and allows for customisation to specific needs using modular components such as the lens, buzzer (buzzer module position can be freely chosen), Ethernet cable, USB cable and mounting brackets. Additional tools are not required for assembly.

The product consists of LED modules, a base module, a sounder module and a pole module. The modular LED components colour combinations are red, amber, green, blue and white, and can be arranged to the user's desired position.

Users can select from a variety of pole lengths to fit the needs of the application needs: 100, 250, 400 or 800 mm. The ambient operating temperature range is -30 to +50°C and the protection rating is IP54.

Leuze electronic Pty Ltd
www.leuze.com.au

MODULAR VALVE ISLANDS

The Bürkert AirLINE (Type 8652) and AirLINE Field (Type 8653) valve islands are designed for applications in the pharmaceutical, cosmetics and food and beverage industries as well as for water treatment applications. They offer users adjustable monitoring and diagnostic functions that improve system availability and process reliability, while at the same time enabling preventive maintenance.

An integrated display shows detailed on-site information such as the current switching statuses of the pilot and process valves, issues a message if preset pressure limit values are exceeded and displays errors such as cable breaks in plain text. During development, particular attention was also devoted to the compact design. The valve island 8652 is smaller than its predecessor and therefore fits into compact control cabinets that can be placed close to the process valves.

The valve island communicates via common industrial Ethernet protocols or Profibus DP. In sealed ring topologies and Profinet I/O communication, the Media Redundancy Protocol (MRP) for highly available networks ensures that even a switch or cable break can be compensated for.

Each valve is hot-swap capable, which means it can be replaced during live operation without shutting down the system. As an additional safety function, check valves are used in the exhaust channel. These prevent the unwanted activation of valves by pressure peaks and the resulting mixing of media. Consequently, stable operation is also ensured on the pneumatic side.

Burkert Fluid Control Systems
www.burkert.com.au

Pilz Services. Our Engineers don't just consult, they implement safety solutions as well.

PILZ
THE SPIRIT OF SAFETY

Pilz Services are a global leader in Machinery Safety. Our safety professionals provide local services with global support in all matters of machine and functional safety across a wide variety of industry sectors. From Risk Assessment and Safe Designs through to customised solutions and validations.

Profit from our high level of knowledge of the local AS/NZS 4024 standards combined with our access to the latest global safety trends. We reduce risk, implement technical machinery safety and take responsibility with the certification services we provide.

Talk to us today about the new Robot Standards

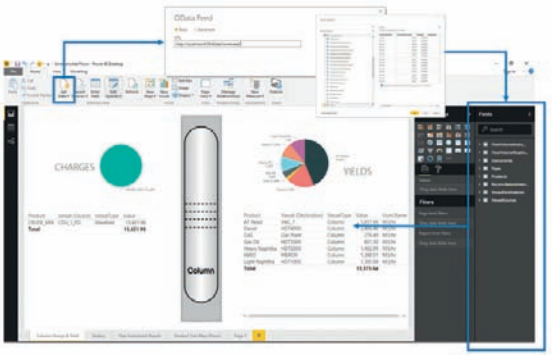
Further information about our local Pilz Services: www.machinesafe.com.au

Melbourne • Sydney • Brisbane • Auckland
Ph: 1300 723 334 Ph: 03 9560 0621 Fax: 03 9574 9035 www.pilz.com.au safety@pilz.com.au

OPTIMISATION SOFTWARE

Aspen Technology has launched aspenONE Version 10 software. The latest asset performance management, engineering, manufacturing and supply chain software release supports the company's evolution from process optimisation to asset optimisation.

The aspenONE Version 10 software release includes aspenONE Asset Performance Management (APM), a complete suite for site, process and equipment performance management. The integrated suite of APM analytics provides prescriptive guidance to address multiple levels of asset performance. Site-wide risk analysis with Aspen Fidelis Reliability software helps identify asset availability and utilisation risks through reliability modelling and simulation. Process analytics with Aspen Asset Analytics software assesses the root causes of process disruptions, predicts future occurrences and prescribes actions to avoid them. Included as well, Aspen ProMV software improves process reliability and asset uptime using advanced multivariate process analytics for continuous and batch monitoring.



The latest version of aspenONE Engineering software enables asset design optimisation across capital, energy, controllability, environmental impact, safety and yield, empowering collaborative workflows that drive sustained profitability. Aspen Plus extends modelling from continuous to batch and semibatch processes to help companies accelerate product development and optimise production to compete more effectively. The web-based Aspen Basic Engineering streamlines data integration in FEED preparation and improves collaboration across globally distributed teams, while faster calibration of model-to-plant data in Aspen Plus and Aspen HYSYS software increase yields.

Building on the PIMS-AO engine, the Aspen Unified PIMS features a modern web-based architecture with scalable high-performance computing that enables better collaboration and improved insights into model performance.

Aspen Technology Australia Pty Ltd
www.aspentech.com

PRESSURE RELEASE VALVES

To meet the ISO13849-1 standard, SMC has introduced its range of VP544/744-X555/585 dual residual pressure release valves. The valves feature an integrated soft start-up function that gradually builds the pressure of the pneumatic system, delivering performance consistency and improved safety.

The valves have two stations, so if one fails to operate, residual pressure is released by the remaining valve to maintain the safety function. Further features include a selectable throttle and fixed orifice that allow the pressure to be easily adjusted. In addition, the valves come with IP65 enclosure protection, safety limit switches to ensure that the main valve position is automatically checked and the ability to connect to modular FRL units, offering flexibility and versatility to allow the valves to be used across a broad range of applications.

Safety valves are also integrated with the free SISTEMA software tool, which helps to reduce risk by feeding information through rapidly so that operators can react quickly.

SMC Australia | New Zealand
www.smcworld.com

MOBILE IIOT DCS SOLUTION

Emerson has launched DeltaV Mobile, a platform that leverages IIoT technologies to empower the manufacturing engineer with access to real-time data, trends and insights to make better-informed critical operations decisions.

Part of Emerson's Plantweb digital ecosystem, DeltaV Mobile fuses smartphone technology with process control data to make operational intelligence available 24/7 for its customers — which include oil and gas operations, refineries, chemical plants and life sciences facilities — for improved safety and operational performance.

By integrating seamlessly and securely with the DeltaV distributed control system, DeltaV Mobile delivers critical contextual data. With added context, users can make better decisions around operational events that could affect bottom-line business results. Incorporating Emerson's Plantweb Secure First Mile technology, the product provides safe, remote access to important plant data without impacting critical production systems.

An Industrial IoT-ready infrastructure, the platform enables on-site teams to quickly and securely connect with off-site experts, extending organisation-wide expertise and collaboration beyond the plant. Intuitive mobile views and customisable filtering ensure that users see clear and relevant data and alerts about the safety and performance of facilities. It easily provides alarms, trends and data available on DeltaV operator workstations to iOS and Android mobile devices, as well as alarm alerts via push, SMS or email notification.

Emerson Automation Solutions

www.emersonprocess.com.au

PROGRAMMABLE LIMIT ALARM TRIP

The Moore Industries SPA² standalone alarm trip now offers updated alarm options that allow the user to set up more specific alarm functions. It provides high or low limit process alarms while monitoring industrial processes and warns of unwanted process conditions, providing emergency shutdown or simply executing on/off control. The Band Alarm feature combines the high and the low trip alarms into one alarm to warn of a process that has left its normal operating conditions. Alternatively, the Band Alarm may be configured with a single set point and deviation setting.

The Stuck Input Alarm monitors the input with respect to time and trips when that input hasn't changed by a user-selected rate (delta) over a user-selected time period (delta time). The rate-of-change (ROC) alarm has been updated and now includes alarming on a process variable that is rising, falling or moving in either direction too fast. The fault alarm now includes input saturation to identify when the input signal exceeds 110% of calibrated input range, an out-of-range alarm and a broken wire alarm. The Copy Alarm setting allows the user to duplicate the exact setting of any other alarm. The product provides users the ability to set up the alarms using onboard controls or the company's PC-based configuration software.

The device has the ability to accept input signals from transmitters, temperature sensors, resistance and potentiometer devices, and direct millivolt sources. It features 20-bit input resolution; long-term stability (five years); and a metal, RFI-resistant, DIN-mount housing.

Moore Industries Pacific Inc
www.miinet.com

TR electronic

Leuze electronic
the sensor people

Highly integrated and intelligent *sensor technology*.

Programmable Absolute / Incremental Rotary Encoders,
SIL 3 Rated Encoders, Draw-Wire Encoders and Linear Transducers

TR-Electronic supported by Leuze electronic Pty Ltd in Australia

www.tr-electronic.com
sales@leuze.com.au

1300 538 933

SMART SENSOR BUSINESS

HIGH-TEMPERATURE THERMOCOUPLE

The TC84 high-temperature thermocouple from WIKA features high safety and a long service life. It is available in ATEX and and IECEx certified versions.

Typical applications for the TC84 are gasification reactors with process temperatures up to 1700°C and pressure loads up to 65 bar for sulfur recovery units. The precious metal thermocouple is shielded from damaging process influences through two protection tubes — through a ceramic external tube and an internal tube made from monocrystalline sapphire glass, which effectively delays the poisoning of the thermocouple. In the event of any failure, the dual sealing system of the safety chamber prevents the escape of toxic media.

The construction of the thermocouple also follows economical principles. A TC84, damaged following extreme loading, can be repaired through the exchange of the wetted parts; another purchase is therefore not required. The sapphire protection tube also eliminates the need for purging with inert gas to protect the thermocouple.

WIKA Australia

www.wika.com.au

BENCH-MOUNTED THERMAL IMAGER

FLIR is extending IR applications into markets which have not traditionally used thermal imaging, such as test and measurement, and moisture applications.

The ETS320 is a bench-mounted thermal imaging device designed to allow fast and accurate bench testing of electronic components and circuit boards. Traditionally, infrared bench testing of electrical components has been difficult and clumsy; however, the purpose-built FLIR ETS320 is designed to make it quick, accurate and cost effective.

The ETS320 offers 320 x 240 resolution (76,800 pixels), a vibrant 3″ LCD display, a 45° field of view and simple usability. It records standard radiometric JPEGs and comes with FLIR Tools+ reporting software helping to enable professional report writing.

FLIR Systems Australia Pty Ltd

www.flir.com.au

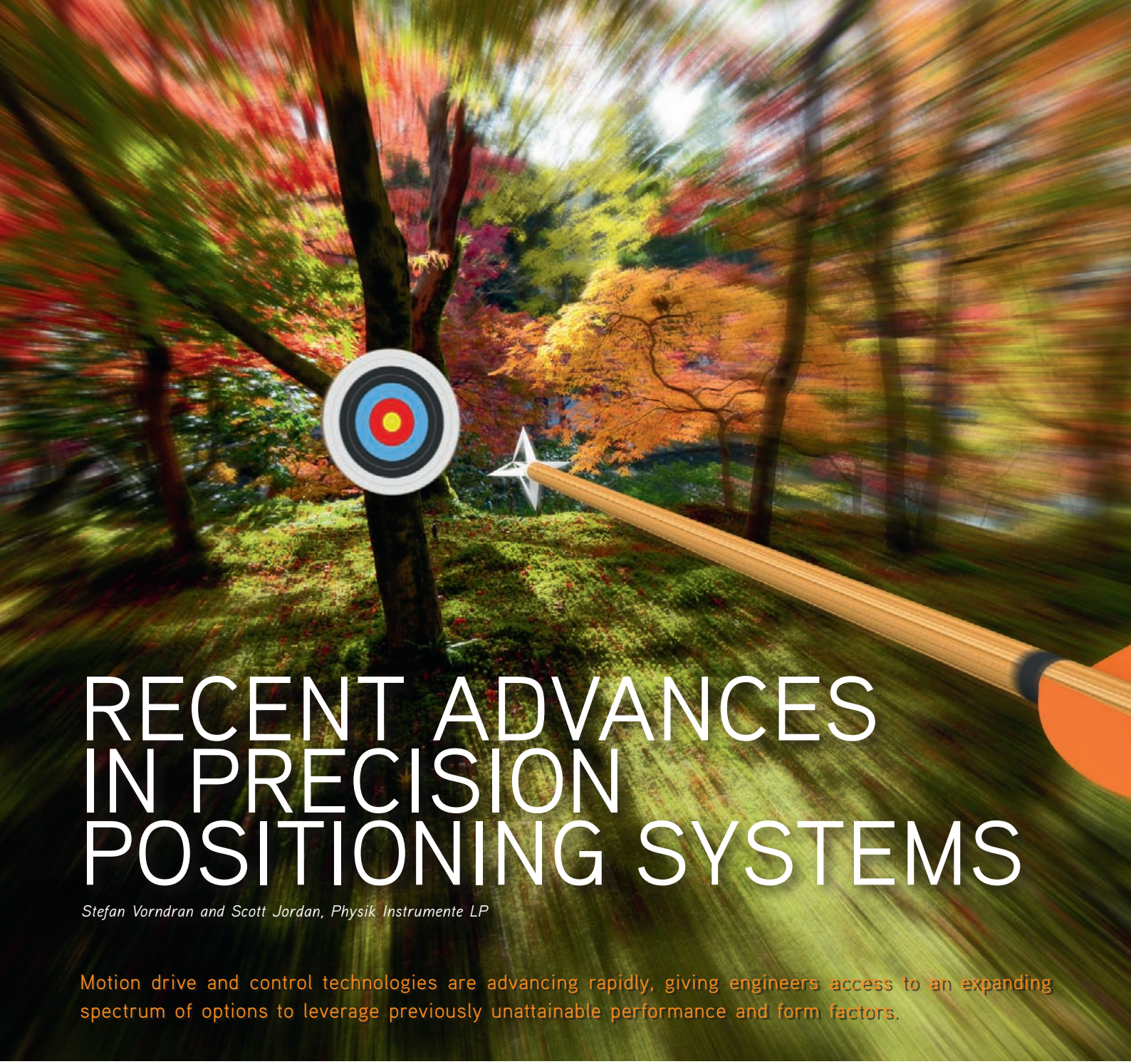
TURCK
Your Global Automation Partner

WARNING
Not suitable for repairing crummy sensors
(or your reputation).

Rugged, reliable industrial automation products from Turck are built to perform in the toughest conditions, and our engineered solutions are customised to meet your application challenges. Cheap knock-offs can't compare. **Turck works!**

***uprox®3* Inductive Proximity Sensors**
Developed to combine compact sensor design with the longest switching distance to all metals of all inductive proximity sensors on the market.

Call 1300 132 566 or visit www.turck.com.au



RECENT ADVANCES IN PRECISION POSITIONING SYSTEMS

Stefan Vorndran and Scott Jordan, Physik Instrumente LP

Motion drive and control technologies are advancing rapidly, giving engineers access to an expanding spectrum of options to leverage previously unattainable performance and form factors.

Rapidly evolving production processes have driven needs for motion control systems that provide higher accuracy, speed, resolution and repeatability. The motion industry has responded with an expanding palette of technologies including new types of mechanisms, novel position and force feedback technologies, and groundbreaking electromechanical actuation technologies. Together, these are enabling broadly revolutionary new mechanisms and form factors that, in turn, propel fresh ideas for manufacturing. Applications include mission-critical deployments in automation, laser processing, optical inspection, photonics alignment, semiconductor metrology, and medical device and micromachining applications.

Today's broadening spectrum of industrial and research applications has yielded a similarly wide variety of motion technologies — more than a single article can review comprehensively. But it means that designers and motion control engineers in scores of industries have access to precision motorised positioning systems that fit or even enable their applications. These systems provide very few limitations on travel, precision, repeatability and speed.

Motorised linear actuators

A linear actuator is a high-precision positioning device that creates motion in one degree of freedom and typically does not include a guiding system for the payload. For this article we are interested in electrically driven units, though of course micrometer-driven are common, along with screw-driven, pneumatic and hydraulic variants for lower-precision applications.

Piezoelectric actuators

These actuators can achieve extremely fine positioning resolution and there are several types.

Piezo stack actuators

These are layered structures of specialised ceramic interleaved with metallic electrodes. The piezoceramic has the unique property of expanding in a controllable manner with the application of an electric field. These actuators provide short travel ranges (about 1% of their length), subnanometre precision, high forces and sub-millisecond response. These are the mainstay of today's advanced


© Stock.Adobe.com/au/Kagenmi

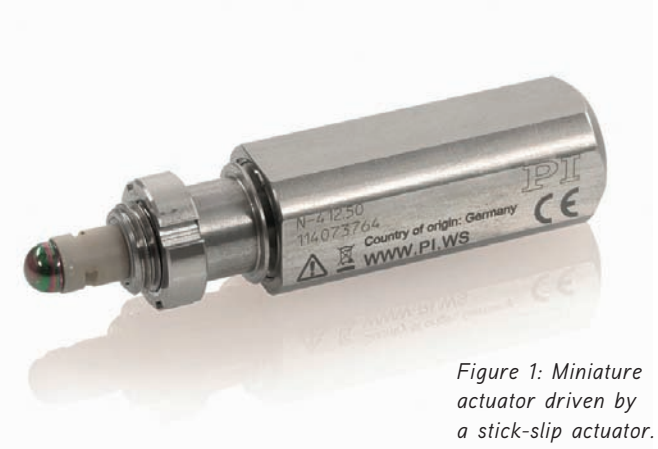


Figure 1: Miniature actuator driven by a stick-slip actuator.

nanotech applications, both in laboratory research and in industrial applications, such as semiconductor manufacturing and genomic sequencing. Piezo stack actuators are inherently non-magnetic, solid state and vacuum-friendly, with no wear processes.

Ultrasonic piezo motors

Ultrasonic piezo motors are monolithic piezoceramic structures that are stimulated at their resonant frequency, typically above 100 kHz, causing them to flutter on a submicron scale. A friction tip formed or bonded at a resonant node conveys this fluttering oscillation to a workpiece that rides in bearings — the workpiece thereby experiences a force that drives it one direction or the other. These motors can achieve many millimetres of travel and extraordinary speeds in a very small package. Another key attribute is these motors' automatic self-locking behaviour at rest and even when unpowered, preventing drift and dither of the driven stage. Ultrasonic piezo motors can provide an application-enabling alternative to classical motors when small dimensions, high speed and unrivalled energy efficiency are important. Like piezo stack actuators, they are non-magnetic and vacuum-compatible.

Inertia drives

These use tiny piezoceramic elements that are actuated in a sawtooth pattern, driving a shaft or other actuated element via a friction coupling. The sloped portion of the sawtooth actuation is what provides the motion; the rapid retraction breaks the stiction of the coupling and the actuated element does not retract with the piezoceramic element. Artful design can achieve silent, virtually stepless operation and long travels, together with precision in the nanoscale range and self-locking for high stability when stationary.

Walking piezo motors

These use four or more piezoceramic fingers which actuate in a stepping sequence to drive a workpiece in a desired direction. Between steps, subnanoscale actuation can be achieved. High power-off holding forces and essentially unlimited travel characterise these designs and the usual non-magnetic and vacuum-friendly attributes apply. These have proven to be enablers in sensitive optical positioning applications where carefully established positions must be maintained with nanometre stability, without power for months or years.

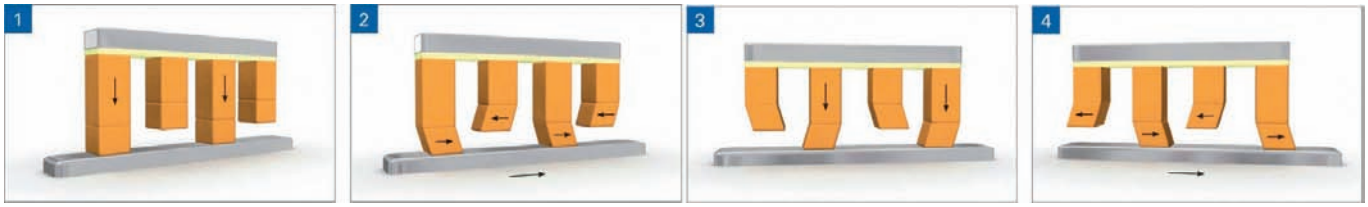


Figure 2: Operating principle of a piezo-walk linear motor.

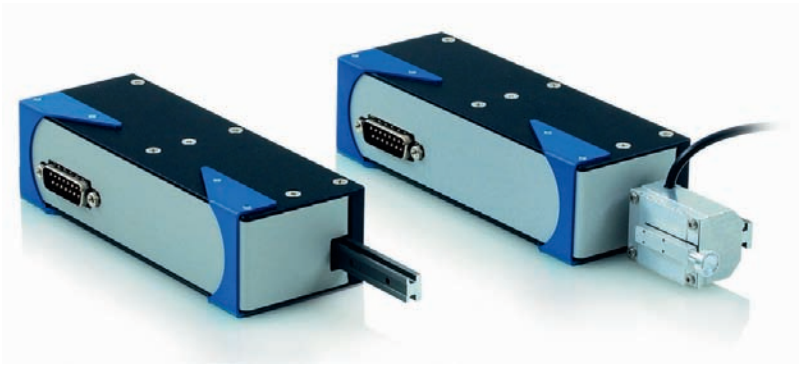


Figure 3: Voice-coil linear motor high-speed actuator with integrated high-resolution position and force sensors for automation applications.

Figure 4: Miniature linear positioning stage with high-speed ultrasonic ceramic linear motor and linear encoder feedback.

Electromechanical actuators

These are typically based on linear shafts driven by rotational motors via lead nuts or ball nuts. The rotary motion of the motor is converted to linear displacement and the actuators have a generally cylindrical format.

The motors used in these actuators are typically either stepper motors or DC servomotors. Stepper motors actuate a toothed rotor within a toothed, surrounding stator. By configuring the magnetic windings of the stator so that groups of its teeth can be specifically magnetised, the rotor is caused to rotate in steps. It will hold position at these full-step positions without power, and partial steps can be achieved by partially energising the windings. Consequently, a driving mode that yields mini- or micro-steps can be implemented, multiplying the stepping resolution of the motor.

DC servomotors are conceptually simple and, with the addition of a position feedback encoder, provide precise positioning with exceptional responsiveness. Brushless DC motors, with electronic commutation rather than commutation through carbon brushes, provide enhanced lifetime, especially in high-dynamic applications.

In both cases the motors can be operated open- or closed-loop, meaning with or without position feedback. A stepper motor can be actuated through any specified number of steps in either direction and offers a high probability of achieving them, though certainty can only be achieved through the addition of a position encoder. Rotary encoders keep track of the position of the rotating motor; linear encoders directly encode the output position of the driven linear shaft, eliminating backlash and other errors that might otherwise accumulate in the drivetrain where a rotary encoder cannot observe them. Linear actuators with linear encoders are uncommon but offer unbeatable bidirectional repeatability for sensitive applications.

Linear motor actuators

By attaching a linear DC motor to a linear guide and an output shaft, direct linear actuation at very high speeds can be achieved. Linear DC motors can have a multitude of north/south magnetic pairs, depending on how much travel is needed, serving the role of the stator in a rotary motor. Gliding along them to generate force is a three-phase coil assembly. The phases are commutated electronically to generate smooth motion in the desired direction, ensuring long life.

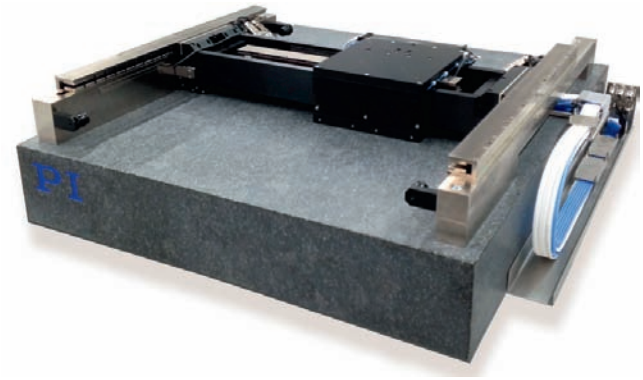
A related type of linear actuator is driven by a voice-coil motor — a nested pair of cylindrical electromagnetic coils which attract or repel each other along their mutual axis. These provide travel in the order of 25 mm and provide extraordinary speeds and accelerations for small loads. Such mechanisms are very long lived and can offer impressive step/settle times owing to their high responsiveness, and their direct actuation of the motion shaft in its low-friction bearings offers exquisite force control when an optional tip-force sensor is incorporated.

Bigger is not always better

The need for miniaturisation in the semiconductor and medical device industry also drives the requirements for smaller motion systems. Smaller also means lower mass and the potential for higher acceleration and throughput, especially when combined with today's most advanced actuation technologies.

Linear positioning stages with piezo motors are a new generation of piezoceramic linear motor that allow for the construction of matchbox-to-thumbnail-sized linear stages with nanometre resolutions and millisecond step and settle times. The direct drive avoids mechanical components such as gears and lead screws, making for reliable and high-resolution drives down to a few nanometres.

AIR BEARING STAGES REPLACE MECHANICAL BEARINGS WITH A FRICTIONLESS AIR FILM AND MAXIMISE THROUGHPUT WHILE PROVIDING THE ULTIMATE LEVEL OF PRECISION, ESPECIALLY FOR MULTI-AXIS MOTION.



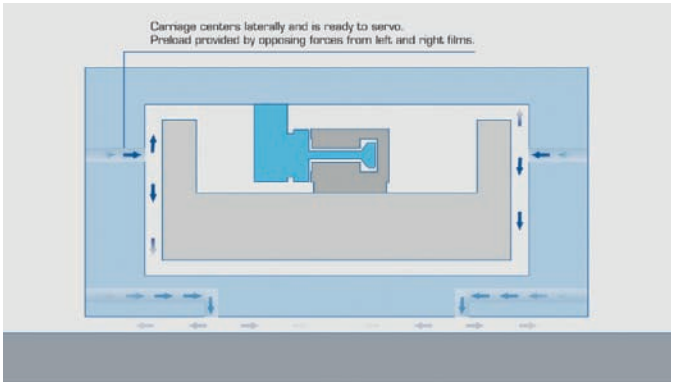


Figure 5: Planar air bearing XY positioning stage (left) and air bearing working principle (above).

Depending on the drive principle, high velocity, high forces or high resolution are achieved.

Long travel for industrial applications

On the other hand, industrial automation processes such as flat panel testing and laser processing require very long travels past one metre with high speed and low runout errors. Air bearing stages with linear motors have emerged as the gold standard for these applications.

Air bearing linear and planar XY stages

Air bearing stages replace mechanical bearings with a frictionless air film and maximise throughput while providing the ultimate level of precision, especially for multi-axis motion. Planar designs use one reference base plane on which magnetically or vacuum preloaded pucks are floating for both the X and Y axes. H-bridge, three-motor designs provide the highest precision, and can be further improved with active yaw control when equipped with three linear encoders and advanced motion controllers. The benefit is vastly improved orthogonality and straightness. Air bearing stages are usually driven by magnetic linear or torque motors that provide smooth motion without cogging effects.

High-speed stages with direct drive

Linear and torque motors can also be combined with mechanical bearings. This combination is often used in industrial applications when the smoothness and straightness/flatness of motion is not quite as critical as with air bearings. Linear motors provide an excellent combination of reliability, precision and speed. Their high dynamics ensure high throughputs for automated tasks in testing systems, for example in the semiconductor industry. They also increase efficiency, for example, in electronics production lines or laser processing.

High-resolution linear encoder feedback

Unlike motion systems that are run by rotary stepper and servomotors and lower-precision rotary encoders, linear motors require linear positional feedback systems. A linear encoder is a digital position transducer that directly measures linear motion where it occurs — as opposed to a rotary encoder mounted at the end of a drivetrain. The linear encoder reads the actual position as close to the point of interest as possible; therefore, the resulting accuracy and repeatability of the payload is higher.

Linear encoders contain a linear track and a read head. The linear track can range in length from a few millimetres to a few metres. Most encoders are based on an optical grating; however, lower-cost magnetic encoders are still available. While resolution in the subnanometre range is common, accuracy is typically limited to 1 µm/100 mm. However, this can be improved significantly with modern controllers if calibrated and compensated for with look-up tables or polynomial error correction. Incremental linear encoders are still prevalent, due to their interfacing simplicity and higher possible resolution down to the picometre range if used with electronic interpolators, but absolute position encoders are catching up, with nanometre-resolution models becoming much more affordable.

Rotation stages

Rotation stages consist of a platform that rotates relative to a base. The platform and base are joined by some form of bearing which restricts motion of the platform to rotation about a single axis.

A variety of motors and drive principles can be employed, from stepper motor-driven worm gear designs to direct-drive, closed-loop torque motors. Low-profile piezo motor stages provide self-locking capabilities with zero jitter and drift and requiring no holding current at rest.

A LINEAR ENCODER IS A DIGITAL POSITION TRANSDUCER THAT DIRECTLY MEASURES LINEAR MOTION WHERE IT OCCURS — AS OPPOSED TO A ROTARY ENCODER MOUNTED AT THE END OF A DRIVETRAIN.

Precision motorised rotation stages are used in applications such as fibre-optic alignment, semiconductor inspection, biomedical applications and X-ray crystallography.

Air bearing rotation stages

These use a thin film of pressurised air to provide an exceedingly low-friction load-bearing interface between surfaces. The two surfaces do not touch and therefore air bearings avoid the traditional bearing-related problems of friction, wear, particulates and lubricant handling — offering distinct advantages in precision positioning and in high-speed applications where the elimination of backlash and static friction are critical.

Typically used for the highest precision and smoothness of motion, air bearing rotation stages deliver ultralow runout and wobble, as well as extremely high resolution and repeatability. Pitch, yaw and roll in the order of 1 arcsecond are feasible. The absence of friction eliminates backlash and gives the air bearing stage ultrahigh repeatability. The durability of air bearings is unlimited if they are calculated, designed and operated correctly.

6-DOF parallel kinematic systems

In order to achieve precision at the micron and submicron level in multi-axis motion applications, hexapod parallel positioners have become popular in the last two decades. Hexapods effectively reduce the footprint and moving mass of a traditional serial kinematic stacked-stage positioning system while increasing stiffness and responsiveness. This together with the arbitrary, user-defined centre of rotation and a large, clear aperture make them the positioning system of choice in mission-critical applications including laser processing, photonics alignment and micromachining in medical devices.

Figure 6: Principle of a torque motor-driven rotary stage.

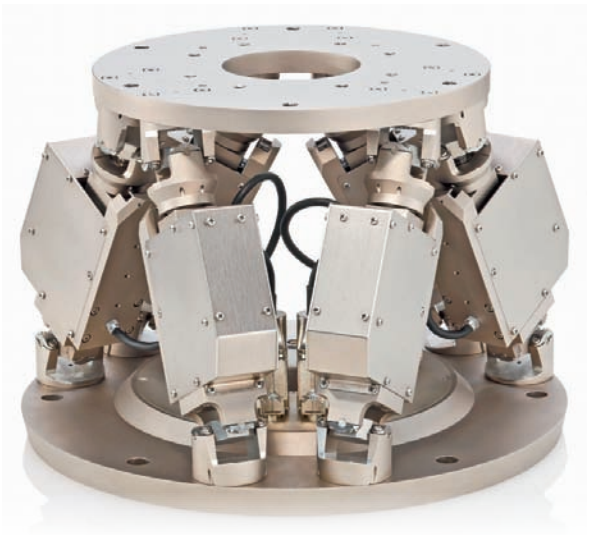


Figure 7: Vacuum-compatible hexapod 6-axis positioning system.

Hexapods, by definition, are six-legged, parallel-kinematic mechanism (PKM) motion systems. In their most common form, consisting of two platforms, a fixed-base platform and a second movable platform are connected and supported by six independent legs (struts or links) that expand and contract in parallel.

Coordinated motion of all struts enables the movable platform, and devices mounted on it, to move in any direction, operating in 3D relative to the base platform. The secondary platform is capable of moving in three linear directions — lateral (X) and longitudinal (Y), vertically (Z) and the three angular directions (pitch, roll and yaw) — by the legs. Because hexapods have all six degrees of freedom, they can perform manipulations that encompass total freedom of motion in a relatively compact space, with high stiffness and (when properly designed) without moving/sweeping cables that can break and foul.

Advanced designs include servomotor-driven systems for moving large optics or mirrors, piezo-based units for nanometre-precision control of processes, and non-magnetic and vacuum-compatible versions.

Recent hexapod designs provide extremely high stiffness and rigidity of their components and all moving parts, such as bearings, joints and drive screws. This characteristic results in high natural frequencies which makes these new hexapods capable of extreme accuracy, and an ideal tool for precision machining, photonics and optics alignment, metrology and medical applications.

Warsash Scientific Pty Ltd
www.warsash.com.au

- **Reduce installation time & cost**
- **Avoid leaking connections and rework**

STAUFF Portable Cutting Ring Assembly Machine

STAUFF presents its portable assembly machine for controlled assembly of DIN2353 metric cutting rings!

STAUFF Portable Assembly Machine is suitable for the pressure-controlled installation of cutting rings at tube ends up to an external diameter of 42 mm, and can carry out up to 200 installations per battery charge.

Hydraulic and Lubrication system installers and service technicians will have the greatest possible flexibility to enable installation of cutting ring tube connections on-site e.g. on mobile construction equipment.

Features:

- The SPR-PRC-H-M is delivered as a set consisting of the portable assembly machine, complete set of tools 6L/S – 42L, spare battery and charger. (Size 14 mm (S) tool not included, supplied on request)
- Supplied in a compact robust transportation case
- Adjustable assembly parameters for individual diameters integrated in the machine
- Light weight (7kg) compact ergonomic design
- Powerful 18V lithium-ion battery

Benefits:

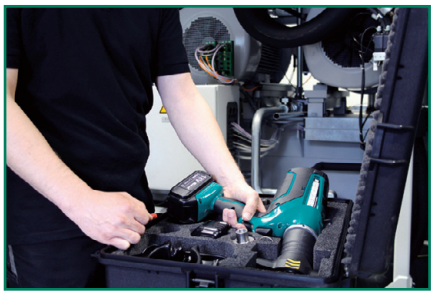
- Complete set of tooling available for the installation of all steel cutting rings in the light series (L) to metric tube ends with a diameter of 6 to 42 mm, and in the heavy series (S) 6 to 38 mm
- Changing of tools require only a few seconds
- By altering the setting parameters, tube connections of different sizes and series can be installed fast and efficiently
- Pre-assembly machine operation ensures safety and reliability, achieving a quality assembly
- Assembly times reduced compared to manual assembly
- Preparation times reduced

Quote SPR-PRC-Ad to receive 10% OFF the purchase of STAUFF's Portable Assembly Machine!

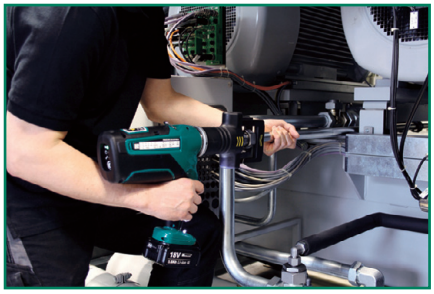
Offer expires 30.09.17

Contact your local STAUFF office for more information.

Compact storage in a robust transportation case



Compact and Portable; the new mobile installation machine in the STAUFF press range works without an external power supply.



Approximately 200 installations per battery charge can be achieved depending on tube size.

www.stauff.com

INFRARED CAMERA

The Fluke TiS55 infrared camera is designed for the quick identification of potential electrical, automotive, mechanical, HVAC/R and product development issues. It is available to rent from TechRentals.

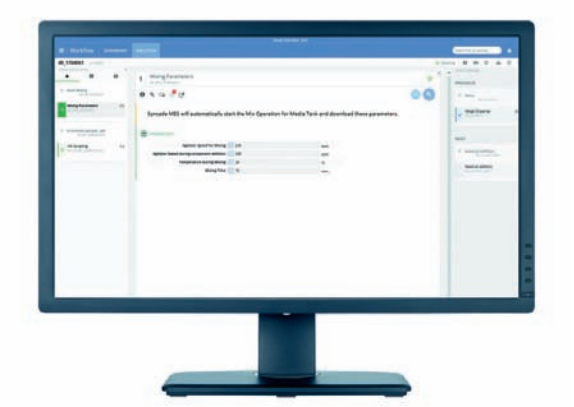
IR-Fusion Blending interlaces detail from the 5 MP visible light camera directly over infrared images (in real time) for enhanced clarity. Picture-in-picture (PIP) mode is also an option, allowing for multiple analysis tools when locating problems.

Built for industrial use, the TiS55 has a resolution of 220 x 165, a 9 Hz refresh rate and a sighting laser. The internal 4 GB memory card can be expanded with an SD card. The unit is also equipped with replaceable smart batteries that will provide more than 4 h operating time. Data management is simplified with Fluke SmartView IR Analysis Reporting Software.

The camera has a measuring temperature range of -20 to +450°C and thermal sensitivity (NETD) of 80 mK. It is compatible with the Fluke Connect mobile app.

TechRentals

www.techrentals.com.au



MES FOR LIFE SCIENCE APPLICATIONS

Emerson Automation Solutions has released its Syncade Workflow version 4.9 manufacturing execution system (MES) application to help life science manufacturers reduce time to market and streamline batch records and compliance. Workflow version 4.9 includes a fast and dynamic user environment, including embedded step-by-step guidance that gives operators the tools needed to execute recipes accurately.

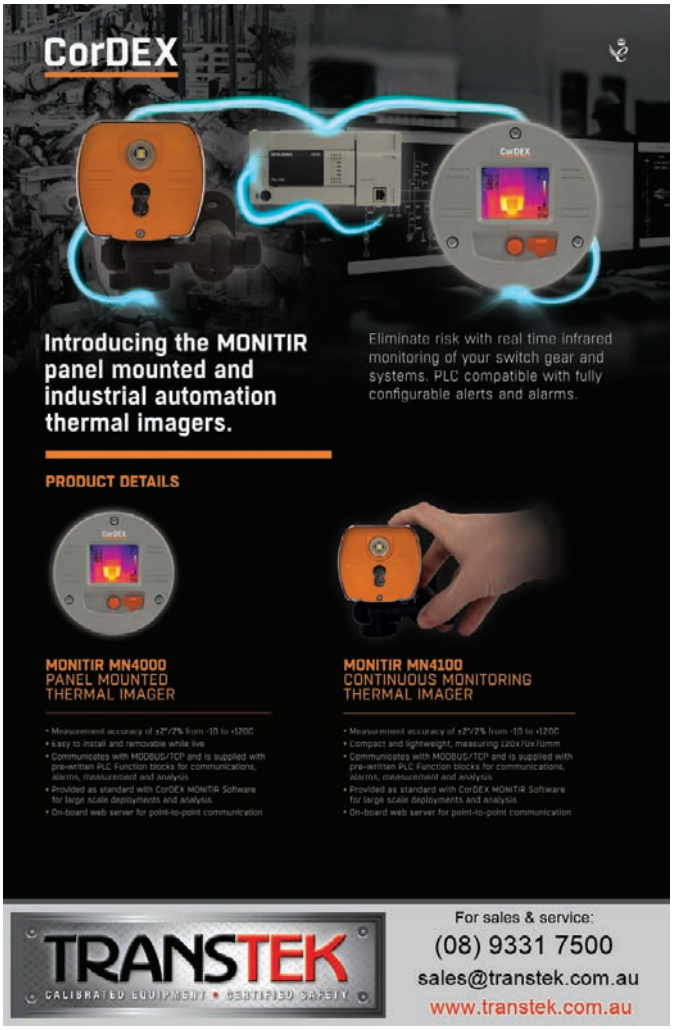
Workflow provides operators with one-touch access to critical information such as equipment readiness and previews of upcoming recipe steps. In addition, operators can collaborate by logging questions or comments in the Workflow application.

The updated version makes regulatory compliance easy because Syncade Workflow v4.9 prevents operators from deviating from a validated process. Electronic signatures enable recipe compliance by tracking and documenting approved activities.

The latest release adds a web-based application and offers flexible access via tablets and computers, as well as fast data transfer and user input response. In addition, because Workflow is a thin-client application, installation on workstations is eliminated and application maintenance is reduced.

Emerson Automation Solutions

www.emersonprocess.com.au



ACTIVATED CARBON ADSORBERS

The ACT series activated carbon adsorbers from Kaeser are able to deliver a continuous supply of compressed air that is technically oil-free as well as odour- and taste-neutral. Installed downstream of compressed air drying and pre-filtration components, they attain Class 1 residual oil content as per ISO 8573-1, making them suitable for applications in the optical, surface technology, electronics, foodstuffs and pharmaceutical sectors.

In order to meet the ISO 8573-1 Class 1 compressed air purity class requirements, compressed air should have a residual oil content of no higher than 0.01 mg/m^3. Class 1 compressed air is therefore significantly cleaner than typical ambient air. For this reason, compressed air treatment is essential irrespective of the compression method that is used to produce it.

The ACT series utilises a high-quality and generously sized activated carbon filling. Optimised for gas purification, this special type of activated carbon is fine-pored and possesses a high retention capacity. Specially designed stainless steel flow diffusers ensure even flow distribution throughout the activated carbon bed so that compressed air purity is assured for up to 12,000 full load hours, or a maximum of five years.

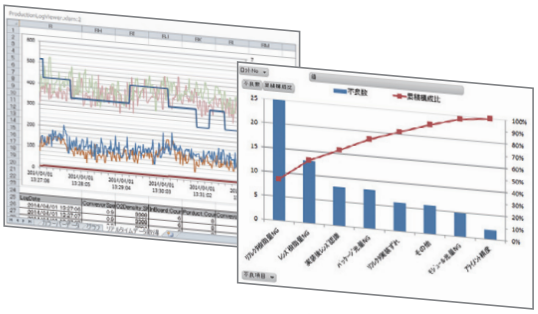
Generously dimensioned flow diameters, together with the stainless steel flow diffusers, ensure even flow distribution with a low pressure loss no higher than 0.1 bar. As a result, the compressor discharge pressure of upstream compressors, as well as the energy costs for compressed air production, can be kept as low as possible.

Kaeser Compressors Australia
www.kaeser.com.au

Our controllers talk IoT and Big Data

OMRON

- Direct connection to SQL databases
- No gateway or extra software needed
- Real-time data collection, for analysis
- Reliable traceability, with spooling



Customer Service Centre
1300 766 766
omron.com.au

BLUETOOTH PROTECTIVE EARMUFFS

Honeywell Industrial Safety has announced a protective headset designed to allow workers to stay connected while continuing to protect hearing on noisy job sites.

The Honeywell Howard Leight Sync Wireless protective earmuffs integrate Bluetooth wireless technology, allowing workers to talk on the phone, connect with co-workers, get instructions and perform tasks without sacrificing hearing protection in noisy or dangerously loud environments. The headsets can block out up to 80% of background noise.

The headsets connect wirelessly via Bluetooth to most smartphones and features a boom microphone that enables workers to answer calls and carry on clear phone conversations while keeping the phone safely in a pocket. The wireless format eliminates the need for cords or cabling that can pose trip, slip or hand hazards.

Features of the headset include Bluetooth 4.1 for improved connectivity and reliability of data transfer and use with 4G mobile phones, a rechargeable battery supporting 16 h of use and an ergonomic design for simple operation, with volume control buttons and flashing coloured lights to indicate different settings.

Volume management technology limits output volume from portable audio devices to 82 dB, while airflow control technology provides optimal noise reduction across all frequencies to SLC_{80} 31 dB.

Honeywell Safety Products Australia Pty Ltd
www.honeywellsafety.com

CELLULAR ROUTERS WITH MQTT

The Red Lion RAM router range now implements MQ Telemetry Transport (MQTT). MQTT is a machine-to-machine (M2M) IIoT protocol designed for lightweight data transmission.

MQTT cloud-based connections are simplified to work seamlessly with leading IIoT cloud providers. Once connected, users simply drag and drop required data to secure custom web-based dashboards. The protocol and the RAM allow data to be sent to a cloud, while ensuring simplicity for those receiving it.

Users have the freedom to select how and when a variable is to be updated and control the amount pushed across the cellular connection. Red Lion's RAM products offer multiple serial and Ethernet ports with an optional I/O, Wi-Fi and an active GPS to securely monitor and control remote devices over 4G LTE cellular networks. In addition, it provides data visibility, control and real-time notifications for field-deployed equipment and processes.

Control Logic Pty Ltd
www.control-logic.com.au

INDUSTRIAL DISPLAYS

The IECI ARCDIS industrial flat-panel display series has been upgraded to include digital video HDMI and DisplayPort inputs.

The ARCDIS series industrial displays feature 7″ to 21.5″ TFT LCD panels with LED backlighting. They have an IP65 front panel and feature a resistive touch or an optional projected capacitive touch screen with a 170° horizontal and a 160° vertical viewing angle.

The series now includes input connections for VGA, DVI, HDMI and DisplayPort video. Either USB or optional serial connectors are provided for touch-screen control and a 3-pin terminal block is provided for DC input power. The displays requires a 9–36 VDC input supply. An optional 240 VAC power pack is also available.

The series features an attractive silver aluminium diecast housing with VESA 75 x 75 or 100 x 100 mounting holes. With a depth of only 65 mm, the displays require minimal space and can be unobtrusively wall- or arm-mounted. Panel mounting clips are also provided. Rear-panel OSD controls are provided for easy access to all display settings.

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

THERMAL IMAGING CAMERAS

The FLIR E75, E85 and E95 thermal imaging cameras are updated models with improvements in resolution, temperature ranges and measurement capabilities. The lenses are interchangeable and the touch screen is larger and brighter.

The FLIR Exx-Series cameras have received an increase in resolution. The lowest resolution is 320 x 240 for the E75 (76,800 pixels), the FLIR E85 is 384 x 288 (110,592 pixels) and the FLIR E95 offers a 464 x 348 (161,472 pixels) image. Sensitivity (NETD) is the same on all three imagers, rated at 0.04°C for the standard 24° lens. Sensitivity gets better for the 42° wide-angle lens (0.03°C). Temperature ranges vary by model, but all three have sufficiently large ranges for most applications. The E95 will measure temperatures up to 1500°C.

The series also now includes laser-guided auto-focus. In case of a complicated target area with multiple focal points, a manual focus ring can be used. The E85 and E95 can also use the laser distance meter for calculating area: the user can draw a box on the touch screen and the E85 and E95 can calculate the area contained.

Previously an accessory lens required factory calibration. The series now includes a chip on the lens that carries calibration data from the factory so that a built-in calibration program can make adjustments accordingly. One lens can be shared between multiple cameras and lenses are no longer tied to a single camera.

Russell Fraser Sales Pty Ltd
www.rfsales.com.au

IICA Institute of Instrumentation Control and Automation

TECHNOLOGY EXPOS

MELBOURNE (VIC)
Wednesday 9 August

TOOWOOMBA (QLD)
Wednesday 23 August

DEVONPORT (TAS)
Wednesday 13 September

PERTH (WA)
Thursday 12 October

SYDNEY (NSW)
Wednesday 25 October

WARRNAMBOOL (VIC)
Wednesday 1 November

ADELAIDE (SA)
Wednesday 15 November

FREE ENTRY
Register at
www.iica.org.au

NEW PRODUCTS

ROBOT SEVENTH-AXIS SYSTEM

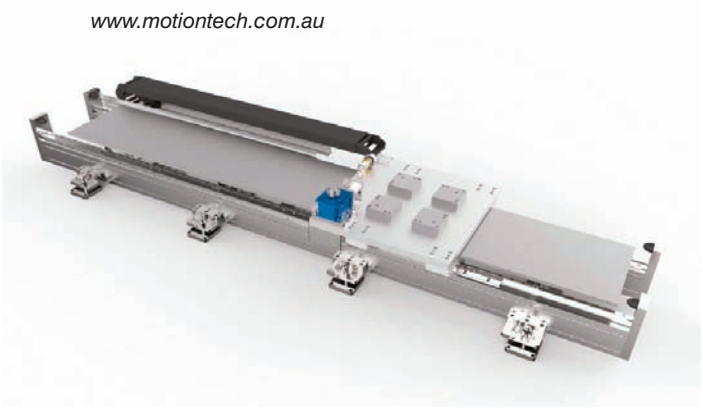
To extend the reach and versatility of modern robots, a motorised linear stage is often needed. Rollon Italy has developed a standardised seventh-axis system from its linear product range. Mounts are available for height-adjustable floor-, wall- and ceiling-mount applications. Larger sizes can be fitted with a walkover plate and energy chains are standard on all sizes.

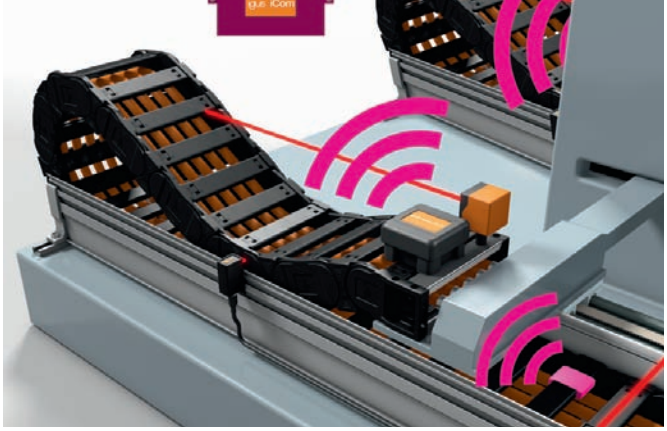
Available in strokes up to 46 m and with a total load capacity up to 2000 kg, the range features precision aluminium extrusions, rack and pinion drives and mounting pads to suit common robots such as Fanuc, Mitsubishi, ABB, Kuka and Nachil. The systems are supplied servomotor-ready to suit a wide range of manufacturers.

Designed around speeds up to 4 m/s, acceleration up to 4 m/s/s and repeatability of ±0.05 mm, the systems are suitable for robot OEMs and end users alike. The range can also be factory customised as needed.

Motion Technologies Pty Ltd

www.motiontech.com.au





E-CHAIN MONITORING RANGE

igus has released an improved range of isense e-chain monitoring products.

The isense EC.RC (e-chain run control) system monitors the operating status of e-chains, especially in guide troughs used on long travel applications. Sensors measure and check the position of the energy chain; in this way, the machine is prevented from continuing to operate when mechanical faults occur. This means that total loss of the chain or an electrical shutdown (for example, due to cable damage) are prevented.

The EC.M module is mounted on the moving end of the chain and automatically records its status, ie, acceleration, speed, temperature and completed cycles. The distance travelled and the remaining service life of the system can be derived from this. igus has also improved the CF.Q module, with which the data of the intelligent chainflex cables are gathered. Due to continuous measurement of the electrical properties, ambient temperature and the number of cycles, a possible failure of the cable is predicted in advance.

The icom communication module, which gathers and transfers all the values of these systems, has been improved and now communicates mostly wirelessly, making it easier to integrate into existing production, with only a single icom module needed for several systems. In addition, users can now connect other manufacturers' data-generating units which monitor status to the icom module.

Treotham Automation Pty Ltd

www.treotham.com.au

DATA ACQUISITION INSTRUMENTS

Dewesoft recently upgraded its R8 instruments, making them mechanically stronger. The instruments are typically used in high-channel-count applications and offer a compact solution by combining up to 64 SIRIUS Dual Core channels (or 128 HD channels) and the SBOX in a single chassis. The individual SIRIUS slices are removable, allowing for multiple configurations and thus enabling the freedom for future projects.

Flexible SIRIUS amplifiers can interface with virtually any kind of signal, including quarter-, half- or full-bridge strain gauges, accelerometers, pressure sensors, potentiometers and high-voltage sources. They also offer a low input-to-EtherCAT bus delay (<100 μs) when accessed by a third-party EtherCAT master through the back panel EtherCAT port, with a minimum cycle time of 200 μs. Even lower delay and cycle times are possible.

The SIRIUS slices can also be run in dual mode: full data rate over USB to Dewesoft (not real time, for analysis purposes) and real-time data (for control purposes) to third-party master through the backside EtherCAT port at the same time.

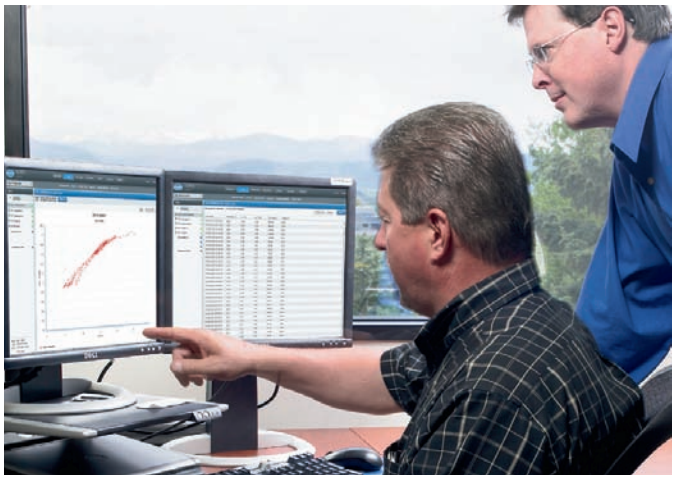
Metromatics Pty Ltd

www.metromatics.com.au

Software improves shift changes at wastewater plant

The City of Columbia, South Carolina, operates an activated sludge wastewater treatment plant which treats on average 130 ML of its rated capacity of 225 ML per day. Back in 2012, the City made the decision to update its OPS SQL software to a Hach WIMS (water information management system). Not only was the old software sitting idle, it was also out of date. The reasons for updating and implementing the software were many but can be summarised with the two primary goals: to collect the data into a central database that is easily accessible and to create a dashboard from which the rotating operations teams or management could quickly understand what was happening.

Previously, the plant personnel who were just arriving on the job would meet with those who were finishing their shift for a status report and to discuss any pressing issues. Yet the meetings were often more obligatory than useful, largely because of the limited data available to share.



"Information from the previous shift was written in a notebook each day, but those were only single data points, which obviously made it difficult to get any sense of data trends," recalled Sarah Hickman, laboratory manager. "Someone would read off the information at shift change, but it was hard to pay attention. It was easy for the operators to get distracted by their phones since the data was not very useful as presented."

The shift changes were a symptom of a larger problem at the plant. While considerable data and information was being generated on a regular basis throughout the plant, there was no integrated system to easily track, aggregate and communicate that data in ways that could provide useful insights to monitor and improve operations.

"There was data everywhere. We were using Excel, but Excel is Excel. We needed some type of solution to store and organise that data to help us make better and more timely operational decisions," added David Wiman, operations supervisor. "The operators needed to understand how the treatment process data was trending when they arrived at work. Understanding this helped them to learn the operational big picture objectives and how decisions made in one treatment process could directly affect other treatment processes."

Hach WIMS is a real-time digital system that seamlessly integrates the collection, aggregation and tracking of data, while also generating customised reports and presenting information and insights in easy-to-access customisable dashboards.

In Columbia, the first sign that WIMS would prove to be a big win for the plant emerged in those shift-change meetings. Instead of someone simply rattling off numbers from a worksheet, the WIMS dashboard could be projected onto a screen, presenting a dynamic view of a range of relevant and up-to-date data.

"The day we started using WIMS during shift change, everyone put down their phones and really got into the information on the screen," Hickman recalled. "They started asking questions and making suggestions. It was much more engaging. I thought that initial curiosity might wear off, but it hasn't. Those meetings are so valuable now, and everyone is focused on improving our performance because they can see how they can make an impact."

Particularly valuable has been the ability to clearly show data trends over varying time periods. By getting a holistic view of the data and trends, the team can more easily identify where there might be a challenge or an issue emerging that needs to be addressed.

WIMS is also allowing for more efficient use of chemicals by clearly identifying trends and showing a more holistic view of overall plant operations through various data points that are presented on the dashboards. For instance, previously the plant sometimes overused chlorine as a safeguard against levels dropping too low. Because real-time data was often lacking, more chemicals were used than needed to assure that the plant stayed in compliance. In early 2014, the City installed online instruments that were tied to its SCADA system, which provided reliable real-time data. Now the steady monitoring allows for more targeted use of chemicals, which improves efficiency and will lead to cost savings.

Another key benefit has been the capability for customised dashboards offered by WIMS. Different users from throughout the plant can create dashboards that include only the information that is relevant for them. WIMS can also automatically generate and email on-demand customised reports that show data trends and selected information.

"Everyone can have their own dashboard and their own scheduled reports sent at specified intervals," Hickman said. "I want to see how the lab is performing for quality control, while our director has a dashboard that provides high-level data such as daily flows for the last 12 months.

"WIMS has proven to be a great tool for improving operations. Now with a few clicks, we can get the information we need to make decisions and make sure everything is running smoothly."

Hach Pacific Pty Ltd
www.au.hach.com

THIEF HATCH

Emerson Automation Solutions has introduced the Enardo ES-665 spring-loaded thief hatch for use on low-pressure storage tanks in oil and gas and other industries. Storage tanks can emit vapours to the environment, which has resulted in tighter regulations and the need for improved emissions control from storage tank devices.

To address this challenge, the ES-665 has been engineered with increased sealing forces, as well as with a tight and consistent fit of the sealing surfaces. The resulting emissions performance of the thief hatch is 0.10 SCFH (standard cubic feet/hour) at 90% of set-point (based on testing at ambient conditions in accordance with API 2000 and competitive published data). The Enardo ES-665 also helps conserve tank contents.

The product provides tank access as well as pressure and vacuum relief to accommodate tank pressure changes that occur under normal conditions. It also limits hatch emissions when pressure or vacuum relief is not required.

In addition to its ultratight emissions performance, the unit includes an available centre assembly for improved performance of previously installed models, multiple relief settings and material options for application flexibility, and a latching and lockable lid for added security and safety.

Emerson Automation Solutions

www.emersonprocess.com.au

VIDEOSCOPE

The GE Mentor Visual iQ Inspect videoscope allows the user to make informed decisions about critical assets and improve overall inspection productivity. It is available to rent from TechRentals.

Users can capture both video and still images using a high-intensity LED light and advanced processing for enhanced image brightness. The product is easy to operate as it features an ergonomic joystick and hard keys for use.

Powered by rechargeable lithium-ion batteries, the device eliminates the need for a charging cradle as the batteries have an in-built charging circuit. They are also compliant with air travel regulations.

The unit features a 5x digital zoom SUPER HAD CCD video camera with a 440,000 pixel count. It is capable of comparison measurements and has a 6.5″ active matrix XGA colour LCD display. TechRentals also offers a set-up and download service for the product.

TechRentals

www.techrentals.com.au

SECURITY APPLIANCE FIRMWARE

Phoenix Contact has released firmware 8.4 for the mGuard security appliances, extending the functional scope of the devices to include functions such as Modbus/TCP inspection and DNS name-based firewalling.

With the Modbus/TCP inspector function, a deep packet inspection capability for Modbus/TCP, connections using this widespread industrial protocol can be protected with precision. Access rights can now not only be set at the level of the IP addresses and ports, but also at the level of the function codes and registers used within the Modbus protocol. This enables users to specify, for example, which Modbus devices have read-only or read-write permission. Register-specific access rights can also be defined.

With DNS name-based firewalling, firewall access rights can be defined not only in relation to IP addresses but also in relation to DNS names. This simplifies configuration in the case of applications with frequently changing IP addresses.

The mGuard 8.4 firmware version is available to download from the download area of the mGuard product pages.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

Industrial Controls . . . we are able to offer the most practical industrial automation products at the industry's lowest prices.

Asia Pacific Region

WEG - CWB Contactors

For safety-related control functions, its contacts are designed and tested as positively driven contacts according to IEC/EN 60947-5-1 and as mirror contacts according to IEC/EN 60947-4-1. Where a mirror contact is an auxiliary contact (NC, normally closed), it cannot be closed simultaneously with a main contact (NO, normally open) and, as a result, special safety relays are no longer required.The CWB contactors are compact with a width of 45mm and cover up to 38A (AC3). As such, users can optimise space in the cabinet and simplify their solution. Prices start at $32.00 (CWB9-11-30C03)

Motor management system – Smart Relay

Designed for use with motors ranging from 0.25A to 5000A, the SRW01 is a reliable motor management system with state-of-the-art technology and flexible network communication capabilities.

The WEG SRW01 prevents unplanned downtime with its comprehensive protection and monitoring functions. Major protection features include overload, thermistor monitoring, phase loss, over/under current and earth leakage, while the monitoring capabilities check the status of digital inputs and outputs, current for each phase, voltage, power factory, run hours and the number of starts of the system. These online monitoring options, combined with failure diagnosis and statistic collection, effectively reduce the frequency of downtimes and generally provide greater transparency of the motor management system by providing a record of fault incidents to be logged for future statistical analysis.

The SRW01's USB port provides an easy and convenient way of monitoring, configuring and programming the relay using a PC for custom programming and monitoring. Thousands of SRW01 smart relays are already operating in several parts of the world to protect motors of high value and preventing extended downtime.

Direct Automation has a history in industrial products spanning 50-plus years. Today, the company is well advanced in e-commerce and direct sales and support of industrial control products,

Industrial Computers

12", 15", 19" LCD with Touch screen

Touch Panel PC - NP

This flat panel PC is ideal for installation where water, dust, or variable range of temperature will be factors as it is IP65 front rated to endure demanding factory conditions Fanless computer and low power consumption128GB SSD, 4GB RAM, 3 Serial, 2 Ethernet, 5/6 USB ports Windows 7 Professional

Rack PC-NUIR

NU1R provides system stability with fanless design and low power consumption. This fanless panel pc will maintain highly reliable day-in and day-out performance for a long product life.. It is also adapts for green IT system since it is strong in heat and vibration, and low energy consumption. 1U Rack Slim size
Rack Mount or Table top fanless computer 128GB SSD, 4GB RAM, 3 Serial, 2 Ethernet, 6 USB ports Windows 7 Professional

C-more Micro-Graphic Panels: HMI touch panels

HMIs provide operators with visual displays of system data for easy monitoring and control of automated systems. C-more Micro text and touch panels are packed with features yet priced for the tightest of budgets.

With screens from 3 inch to as large as 10 inches, C-more Micro panels can easily display text, graphics, and bitmaps to effectively communicate critical data to the operator.

C-MORE Micro 6-INCH TOUCH PANEL
EA3-T4CL (colour TFT) **$479**

C-more: The HMI that offers incredible Features

C-MORE 6-INCH TOUCH PANEL
EA9-T6CL-R (colour TFT) **$799**

C-MORE 7-INCH TOUCH PANEL
EA9-T7CL (colour TFT) **$995**

C-MORE 12-INCH TOUCH PANEL
EA9-T12CL (colour TFT) **$2940**

C-MORE 15-INCH TOUCH PANEL
EA9-T15CL (colour TFT) **$3250**

C-more HMI touch panels combine vivid graphical displays of system data with touch-screen control. Create vibrant, informative screens with touchable objects and replace the pushbuttons, switches, meters, and other peripheral devices typically used in automated systems.

C-more panels come in several sizes and are programmed with low-cost, user-friendly software.

C-More can also connect to multiple devices and different brands of PLCs simultaneously! C-more can act as an interpreter or "protocol bridge", passing PLC tag values back and forth between separate PLC protocols.

DIRECTAUTOMATION
Industrial Controls

Backed by superior technical service & highly efficient business operation.

Australia Wide: 1-800-633040
New Zealand: 0-800-6330405
Asia Pacific: 61-7-55353217
E: sales@directautomation.com.au

For Sales and Service Call toll free 1800-633-040

DirectAutomation is committed to bringing you the best automation products at prices that won't break your budget.

www.directautomation.com.au

Call toll free 1800-633-040
Direct - Online Superstore

* **Please Note:** All Pricing is in Aust$ & does not include GST, All prices and specifications are subject to change without notice.

AS I SEE IT

WHERE ARE ALL THE FIELDBUS SITES?

According to Wikipedia, "The Fieldbus Foundation is an organization dedicated to a single international, inter-operable fieldbus standard. It was established in September 1994". Wikipedia also defines Profibus as "a standard for fieldbus communication in automation technology ... first promoted in 1989".

So let's consider that Foundation Fieldbus products have been available for more than 20 years and Profibus products for over 25 years respectively.

First off, I wish to qualify my comments by acknowledging that my background is in a relatively small process instrumentation vendor. The larger vendors in the field may have different experiences in relation to this issue. Having said that, AMS supplies a range of products from a number of internationally recognised leaders in their field.

It is our experience that only a very small fraction of equipment supplied by AMS has either fieldbus capability. It's not that these configurations aren't available, it's more that they're very rarely requested. The vast majority of products we sell still have an analog output. A reasonable number will have HART protocol.

We all know the technical advantages of the fieldbus technologies, so why has the uptake been so long in coming? Multidrop capability reduces wiring and associated infrastructure. Multiple variables from field instruments can be interfaced with the control system to allow trend analysis and process optimisation, amongst other benefits. Self-diagnostics allow for preventive maintenance to reduce downtime and improve plant safety: in the event of failure, maintenance personnel can be notified and remedial action taken quickly. The I/O subsystem is effectively built into the instrument, further reducing required control system hardware. With all these benefits, why aren't more plants running fieldbus technology? 20 years seems like a long time for the technology to not filter through to widespread use.

Around 10 years ago, we hired a service technician who had just immigrated to Australia after years of living and working in Southern Africa. He was a very capable technician and, shortly after his arrival, expressed surprise at the lack of fieldbus technology installed in Australia. He'd been working in sugar mills in Africa which were far more modern in terms of their installed instrumentation and control systems than typically seen here. He went on to state that fieldbus technology was widely deployed throughout industrial sites in Botswana. With all due respect to Botswana, which has experienced significant economic growth since gaining independence, I would not have thought they would be ahead of Australia on that front.

There seems to be an "if it ain't broke, don't fix it" mentality throughout the country. Sure, spending capital on process upgrades has an opportunity cost for other business activities, but just because it isn't broken, that doesn't mean it couldn't be done better. When your process is producing your product which generates your income, how many higher priorities are there?

Fieldbus systems could have been more user-friendly in the early days and there were some projects which experienced teething issues. Against that, there is more expertise available now among the user base and the systems have improved. Isn't it time more brownfield sites starting rolling out this technology too?

After studying electrical engineering and accountancy, Tom Kuiper joined AMS. Over 15 years later he is the National Sales Manager. As AMS sell a broad range of process equipment, he's been exposed to a wide of applications and industries.

wfmedia
connecting industry

Westwick-Farrow Media
A.B.N. 22 152 305 336

www.wfmedia.com.au

Head Office
Cnr. Fox Valley Road & Kiogle Street,
(Locked Bag 1289)
Wahroonga NSW 2076
AUSTRALIA
ph: +61 2 9487 2700 fx: +61 2 9489 1265

Editor
Glenn Johnson
wnipt@wfmedia.com.au

Publishing Director/MD
Geoff Hird

Art Director/Production Manager
Julie Wright

Art/Production
Linda Klobusiak, Wendy Blume

Circulation Manager
Sue Lavery
circulation@wfmedia.com.au

Copy Control
Mitchie Mullins
copy@wfmedia.com.au

Advertising Sales
Industrial Group Sales Manager
Nicola Fender-Fox – 0414 703 780
nfender-fox@wfmedia.com.au

Nic Stear – 0432 637 817
nstear@wfmedia.com.au

Sandra Romanin – 0414 558 464
sromanin@wfmedia.com.au

Tim Thompson – 0421 623 958
tthompson@wfmedia.com.au

Subscriptions
For unregistered readers price on application.
If you have any queries regarding our privacy policy please email
privacy@wfmedia.com.au

Audited Media Association of Australia
cab

September 2016 total CAB audited circulation (Aust + NZ)
5,598 readers (73% personally requested)

Contact the editor

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

All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them.

Information indicating that products are made in Australia or New Zealand is supplied by the source company. Westwick Farrow P/L does not quantify the amount of local content or the accuracy of the statement made by the source.

FREE

to industry and business professionals

The magazine you are reading is just **one of thirteen** published by Westwick-Farrow Media.

To receive your **free subscription** (magazine and eNewsletter), visit the link below.

wfmedia
connecting industry

www.WFMedia.com.au/subscribe

UNMATCHED PERFORMANCE

Benefit from Single-Source Components

COMBINING ENGINEERING, HMI AND CONTROLLER INTO A HIGH-QUALITY SOLUTION

PERFORM DEMANDING CONTROL TASKS AND MODERN VISUALIZATION FROM *E!COCKPIT* (BASED ON CODESYS 3)

INDUSTRY-LEADING ENGINEERING, APPEALING DESIGN AND EXCEPTIONAL PERFORMANCE

CODESYS

e!COCKPIT
INVITATION TO DISCOVER

- Integrated engineering: One software for every task
- A smart design that invites you to discover
- Modern software
- Based on CODESYS 3 technology
- Graphical network configuration

PFC100 Controller

- Compact and powerful
- Integrated Webserver
- Can be combined with high-level language based on linuxs
- Linux® real-time operating system
- SSH and SSL/TLS provide high levels of security

e!DISPLAY 7300T

- Diagonal screen dimensions: 4.3", 5.7", 7.0", 10.1"
- Easy to use – set brightness directly on the display
- Energy-saving sensors ensure safety
- Installed in a snap – thoughtfully designed for mounting flexibility

WAGO Pty Ltd, 2 - 4 Overseas Drive Noble Park North, Victoria, 3174, Australia
Email: sales.anz@wago.com Phone: (03) 8791 6300 Fax: (03) 9701 0177