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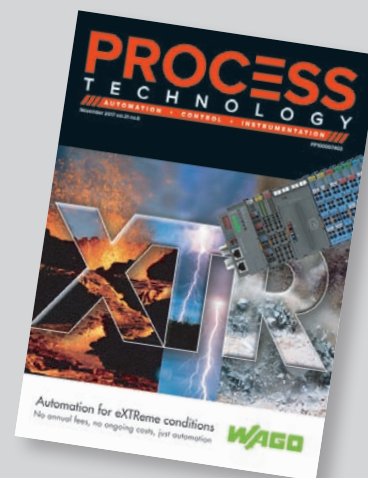
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NOVEMBER 2017

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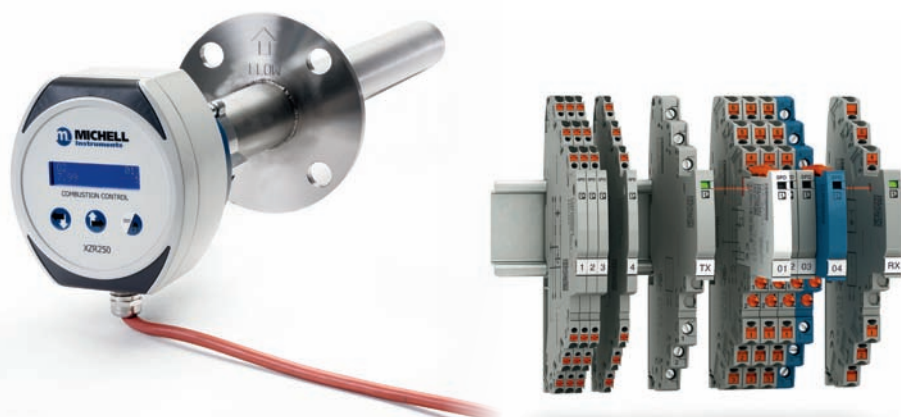
ON THE COVER



Intrinsically safe in extreme conditions, WAGO's XTR modules are permissible for use in an ambient temperature range of -40°C to +70°C — enabling the controller to be used in any climatic zone without having to provide additional protection with cooling or heating systems. The module's immunity to interference and electromagnetic interference even permits it to be used in medium voltage systems, while its extreme vibration and shock resistance allows it to be used in rail vehicles and in marine diesel engines.

I/O systems, interface modules, power supply protection and surge protection systems from WAGO are used wherever the demand for high performance and 100% safety and reliability are required. WAGO is committed to designing products that can make complex problems seamless, with our world standard solutions. WAGO's product-orientated philosophy means no annual fee and no ongoing costs. WAGO users also benefit from local engineering and technical support with complimentary phone and email support when users need it. With the success of WAGO's original Remote I/O Fieldbus System 750, the 750 Series has continued to expand with its range of programmable controllers, universal remote I/O couplers and over 500 compatible I/O module cards: WAGO's automation range will fit the needs of any system design. The compact profile and high density of the 750 Series along with various mounting possibilities and passive cooling technology reduces spaces requirements and increases design potential.

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HUMAN FACTORS AND THEIR IMPACT ON PLANT SAFETY

Luis Duran, Hampus Schäring and Jeton Partini, Industrial Automation, Control Technologies, ABB

Operators in modern plants are tasked with numerous activities, making it difficult for them to handle abnormal process conditions. Research has demonstrated how an intelligent and ergonomic workspace can both mitigate risk and increase productivity.



The introduction of mission-critical computing systems and automated tasks in manufacturing processes has resulted in increased safety and productivity during normal operation. But what happens when abnormal situations arise? The answer is, of course, that a human must step in.

Human factors and safety culture

The human factor need to be at the centre of any safety discussion for many reasons, one of which is that human error is often the cause of incidents and accidents in the first place — despite the strict safety culture prevalent in most firms. The consequences of such incidents range from minor injury to headline-making catastrophe. If an organisation wants to ensure a successful safety culture, it must have a clear and explicit risk management strategy.

Understanding and managing risk

To understand and manage risk, plant operators should first carry out a hazard and risk assessment to identify the overall safety requirements. After that, they should focus on proactive measures to ensure, if possible, that a failure does not occur and that negative consequences are minimised if one does. Learning from experience can be an ideal starting point:

- What should be done differently after a certain experience to prevent reoccurrence?
- What can be done to learn more from this experience?
- What should be done differently after a reoccurrence of this experience?

It is important that, rather than be a chore, the company safety culture should provide an opportunity for individuals and organisations to learn from, and be motivated by, positive change. Employees can thus aspire to a safer and more productive way of working.

Technology as part of the solution

Anticipating failure, engineering best practice allocates risk reduction across different and

independent protection layers in the form of multiple independent functions or systems. One such system is a safety instrumented system (SIS), which is based on a concept involving different layers of protection.

Layers of protection

A process control system provides a 'layer' that not only assists in the productivity of the process but also helps plant operators keep the process within safe operational boundaries. Today, most process control systems will alert the operator to abnormal conditions and support him by providing real-time access to critical information.

When events develop too rapidly for effective operator intervention, other protection layers, such as an automatic SIS, spring into action to return process conditions to normal.

Design for Safety is supported by a series of standards — such as IEC 61508 and IEC 61511 — that aim to establish, and in some cases mandate, the best practices for design, documentation reviews, validation and verification of a safety project.

If any of these layers (technology or human) fail to prevent the hazard, there are other layers intended to mitigate consequences, such as fire and gas systems or emergency response procedures, which are not discussed here.

However, the reality is that all these technologies are designed and implemented by human beings and, as a result, will not be perfect or 100% safe.

Integration of control and safety systems delivers consistency for the operator

Integrated control and safety systems provide the enabling technology to drive effective operations and minimise some of the sources of human error. Some benefits of this approach are:

- Common failure modes can be designed out before the system is released into operation.
- The system can be made secure to prevent unauthorised access to critical facilities.
- Integrated testing occurs in a pre-deployment test lab and can be carried out by experts with in-depth domain knowledge of the multiple technologies involved.



HUMAN ERROR CAN BE ADDRESSED BY MATCHING THE CONTROL ROOM OPERATOR'S PSYCHOSOCIAL WORKING ENVIRONMENT WITH HIS PHYSICAL WORKING ENVIRONMENT.

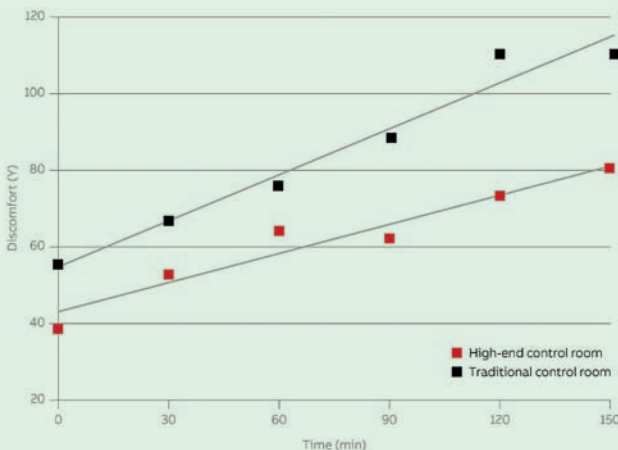


Figure 1: Perceived discomfort in the traditional control room and the high-end control room.

Human-centred design

Various sources indicate that around 70% of reported incidents in the oil and gas industry worldwide are attributable to human error and account for over 90% of the financial loss to the industry. This human error challenge can be addressed by matching the control room operator's psychosocial working environment with their physical working environment. This type of human factor engineering and the use of ergonomic solutions can reduce financial losses.

Designing a control room or control centre working environment for humans is challenging yet fundamental. One of the

most important quests is to reduce human error by matching physical and psychosocial elements in the design. The UK Health and Safety Executive (HSE) formulates the problem thus:

"Physical match includes the design of the whole workplace and working environment. Mental match involves the individual's information and decision-making requirements, as well as their perception of the tasks and risks. Mismatches between job requirements and people's capabilities provide the potential for human error."¹

There are plenty of guidelines and standards that tackle the design process of

a control centre or control room — the offshore industry has established ISO 11064 as the main standard worldwide, for example.

Developing the control centre and control room working environment

Despite the prevalence and cost of human error, control centre and control room design has tended to focus on physical aspects and the process itself, to the detriment of the human angle. Further, with the increasing trend for operators to move from local control rooms to control centres comes a higher operator workload and attendant increased stress level. Increased stress can lead to depression, anxiety and burnout.

Poor ergonomics, poor lighting and high noise levels that directly cause physical ill health can exacerbate this fundamentally bad situation.

The alignment of psychosocial and physical elements automatically improves health and wellbeing in the control room or centre. Organisations should develop stress management and counselling policies to identify and eradicate work practices that cause the most job dissatisfaction. Of course, humans differ very much in cognitive processes and ability to solve problems — for instance, some operators can be skilled in multitasking, some in understanding the complexity of a workload, others in data analysis and yet others in effective leadership. Nevertheless, there is one main value they share: health. Health improvement awareness among operators is one of the main factors behind the development of further solutions for the early recognition of adverse stress levels and the early warning of deteriorating health status.

Human-centred design is made all the more imperative by the demographic pressure exerted by an ageing workforce. To prevent knowledge being lost, young people must be attracted to a career in the industrial world. This can only be done by offering them a workplace in which they are content.

A holistic approach

Improving only the physical part or the psychosocial part of the control room environment is not a holistic approach — both aspects must be improved in a mutually compatible way. This effect was illustrated by research conducted in conjunction with Chalmers University, Sweden, in which a traditional control room was compared with a high-end control room. The perceived





Figure 2: A fully flexible operator workplace helps create a human-centric workspace and thus increases efficiency.

discomfort increased over time in both, but the increase was lower in the high-end control room. Thus, a more holistic physical and psychosocial environment was provided (Figure 1).

Ways to increase efficiency

One way to influence performance is through varying lighting levels — a high level of illumination increases motivation and reduces errors and accidents. Lighting also has a direct impact on health and wellbeing since research has shown that the human circadian rhythm is directly related to ambient light levels, resulting in a human-centred lighting platform for operators in a control room. One application of the research so far has been to allow the operator to freely adjust their task area lighting by using cold or warm light (Figure 2). The range of illuminance is between 900 to 1800 lux, which exceeds the minimum 500 lux recommended by ISO 11064.

Another way to increase operator efficiency is to simplify the variety of

communications possibilities: an operator does not become more efficient by using many different communication tools at the same time. Instead of a clutter of equipment for VHF/UHF radio, telephony, mobile phone, intercom, public address system, etc, all communication can be moved to just one device.

Finally, controlling noise levels by working with directed sound is another way to improve the operator's workplace experience. Sound showers are especially beneficial, as they allow telecommunication, alarms, etc to take place without disturbing others.

Putting people first

Planning for human error is a critical part of control room design. Designers of systems have to be very careful, as they can induce human error if they have not identified all operational eventualities and provided a suitable control process or system response to them. These latent failures can lurk unseen until a specific

operational constellation appears and an incident occurs. In such situations, the operator is often unprepared and unable to respond appropriately.

As industries continue to invest in new facilities or modernise existing ones, they could profit from directing some of the investments toward reducing the propensity for human error. This can be done by the adoption of human-centred design best practices. Consideration of the human elements of the control room will lead to additional benefits and a safer and more productive environment. 'Putting people first' is a sound business strategy.

ABB Australia Pty Ltd
www.abbaustralia.com.au

Reference

1. Health and Safety Executive 1999, *Reducing error and influencing behaviour*, <<http://www.hse.gov.uk/pUbns/priced/hsg48.pdf>>.

This article is based on a piece previously published in ABB Review.

HOT PRODUCTS

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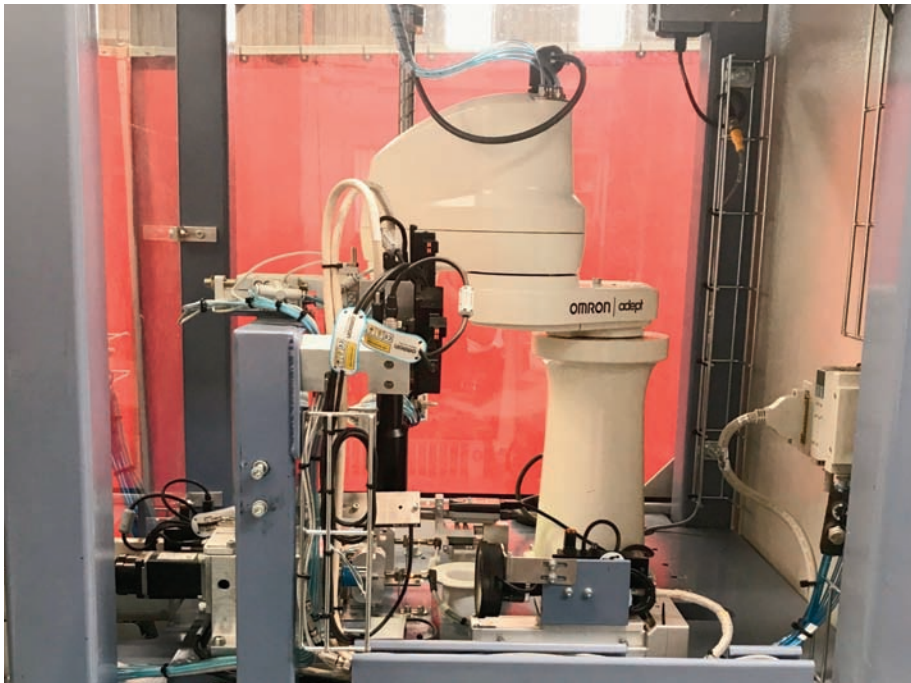
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Looking Forward **VEGA**



Plastic part inspection with a 5 s cycle time



With today's increased consumer demand, the manufacturing market has become more competitive than ever in trying to produce safer and more efficient products. Defective parts will be rejected by the end customer, so performing robust inspection becomes a must. Identifying process defects within plastic parts can be very challenging, and can only be achieved through deploying high-speed, precise machine vision systems.

Applied Robotics, based in Sydney, has been building automation machine systems for over 35 years with over 1000 system installations worldwide. Founded by Dr Paul Wong in the 1980s, the company is now a leading supplier of innovative automation and robotics systems.

Applied Robotics, as a system integrator for Omron, has been using Omron products for many of its applications. Recently, the company has been using Omron's One Total Solution for a QC machine. The team at Omron's Sydney office has collaborated on the project, which entails the detection of defects in a small moulded plastic component and the discarding of all faulty items. The products include Omron's FH high-precision vision system, an Adept eCobra 350 SCARA robot, 1S servos and drives, NY IPC with HMI, NJ machine automation controller with database connectivity and Omron's uninterruptible power supply.

The FH Vision system features a compact camera that can capture high-sensitivity and high-resolution images at very high speeds, without complex programming. Using Omron's Shape Search III algorithm, this system measures and detects faults in the plastic

workpiece. Each image is immediately processed and the results data displayed and logged for traceability. For this project four cameras are utilised to make hundreds of measurements in a cycle time of less than 5 s per part. Omron's NYP industrial PC was used to provide visualisation, data handling, measuring and control, combining the functionality of box IPC and industrial monitor.

The eCobra 350 SCARA robot makes this machine highly autonomous. It provides high-performance transfer and handling of the small plastic parts with user-friendly interface software. It includes an Adept SmartController motion controller with an 8 kHz servo update rate to improve path following and control.

This integrated solution is said to be the industry's first QC machine that improves reliability through continuous operation. It has little human intervention and a fast QC inspection time of only 5 s per part. This

reliability and speed would have not been possible with human eyes.

"This project has seen some great ingenuity used, through the combined efforts of the Applied Robotics and Omron Engineering teams. It helps keep Australian manufacturing at the forefront in today's competitive world by utilising up-to-date automation technology," said Greg Field, managing director of Omron Australia and New Zealand.

Overall, the system improves efficiency of detection and gathering QC data stored in a database on the fly, which is not possible with a human process. The team will continue to improve the overall performance of the machine through testing.

"We are very pleased with Omron products and also the service from the Omron support team and engineers," said Dr Wong. "The wide Omron product range makes them an ideal single source for the components of a multifunctional machine: basically a one-stop shop for the vision system, the OCR cameras, the robot, the PLC, the PC, the servo systems and the safety controller.

"As these machines will be shipped to clients all over the world, including the USA, Europe and Japan, utilising Omron solutions means that we can simply 'plug in' to Omron's established service and support system worldwide. Overall, we are very happy with the outcome of the project and, as always, we are here to develop and commercialise leading-edge robotic systems worldwide."

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HONEYCOMB STRAIN RELIEF FOR CABLES

Cable tie wraps play a predominant role in strain relief today. Every individual cable is fixed to an e-chain. Cable tie wraps are used quickly and can often only be used once.

The honeycomb strain relief system from igus is designed so that cables and hoses can simply and gently pressed into the honeycomb. It is then closed, at which point the outer walls of the honeycomb cavities are pushed gently but extremely tightly around the cables. In this way, the structure adapts to the cable diameters.

The honeycomb can be mounted in seconds, saving the user about 80% assembly time in comparison to using cable tie wrap or other strain relief solutions. The system saves space and protects the cables in the e-chain. It is also much more flexible, as the system is easy to open in order to insert new cables or to replace them.

The universal strain relief system is available in two versions. The horizontal strain relief CFU.H can be installed in layers. It allows the insertion of different cables in one layer. It is screwed from above in front of the mounting bracket and can also be used for long travels at the fixed end. The vertical version CFU.V can be simply hooked on in front of the mounting bracket. Different cables are simply inserted into the vertical rows. The system is tightly closed with a clip lock and thus protects the cables against mechanical stress.

Treotham Automation Pty Ltd

www.treotham.com.au



MANAGED ETHERNET SWITCH

The O-Ring IGPS-9080 series is a managed redundant ring switch with eight 10/100/1000BaseT(X) PSE ports.

The switch supports the O-Ring Ethernet Redundancy protocol with a recovery time of less than 30 ms and up to 250 nodes. The IGPS-9080 series is compatible with MSTP (RSTP/STP), Open-Ring, O-Chain and MRP (Media Redundancy Protocol) to protect mission-critical applications from network interruptions. The series can be conveniently managed by Open-Vision, and a web-based interface, Telnet and console (CLI) configuration. It includes support for IPV4 and IPV6 and Modbus TCP.

Power consumption is reduced by at least 50% through IEEE 802.3az Energy-Efficient Ethernet to consume less power during periods of low data activity.

With an operating temperature range of -40 to 70°C, the IGPS-9080 series supports Power over Ethernet (PoE) and allows up to 30 W/port.

Control Logic Pty Ltd

www.control-logic.com.au

PROCESS ANALYSERS

The Metrohm 202X process analyser range comes in three basic configurations, covering several application needs. The 2026 Titrolyzer is suitable for titrimetric, ion selective or pH measurements. The 2029 Process Photometer performs photometric absorption measurements in the visible light range. A 7" full-colour touch screen shows trend graphs and allows easy access to data. The process analysers are especially suitable for analysis in chemical, petrochemical, semiconductor, food and beverage, potable water and environmental applications.

Metrohm Process Analytics can offer process analysers that are configured for each specific application challenge. Sample dilution, extra reagents or another sample stream can be added with the addition of peristaltic pumps in the modular wet part.

Strict separation of wet part and electronics ensures safe operation in harsh environments. The electronics part is housed within non-corrosive, polyester-coated stainless steel.

Information including results, remote control and status information can be communicated through discrete I/O (both analog and digital), Modbus TCP or RTU (RS485) communication. Remote control is possible through VNC and results can also export to USB.

MEP Instruments Pty Ltd

www.mep.net.au



SURGE PROTECTION

A wide variety of signals are transmitted using measurement and control technology, requiring an increasingly large packing density. The TERMITRAB complete range provides surge protection starting at an overall width of 3.5 mm, representing a space saving of up to 50% in comparison with 7 mm installations. This means that the protective devices can protect up to 572 signals against surge voltages on just 1 m of DIN rail. This is made possible by Push-in connection technology and the use of particularly flat components.

The protective devices with an overall width of 6 mm also offer a large range of circuit versions and product features.

TERMITRAB complete provides visual and electrical signalling right at the protective device. The integrated disconnect feature ensures that the surge protection solution behaves safely in the event of an overload. It signals the status on each individual protective device mechanically and visually without auxiliary power. Optional transmit and receive signalling modules monitor the status of up to 40 neighbouring surge protective devices by means of a photoelectric beam. Installation is simplified as a

result: no additional wiring or programming is required for the protection modules. The remote signalling sets have Push-in or screw connection. In the event of a thermal overload, the remote signalling modules notify the control room, for example, of the status in the form of a group message via a floating contact.

The product range contains products that may be installed in Ex areas up to Zone 1 with IECEX and ATEX approval.



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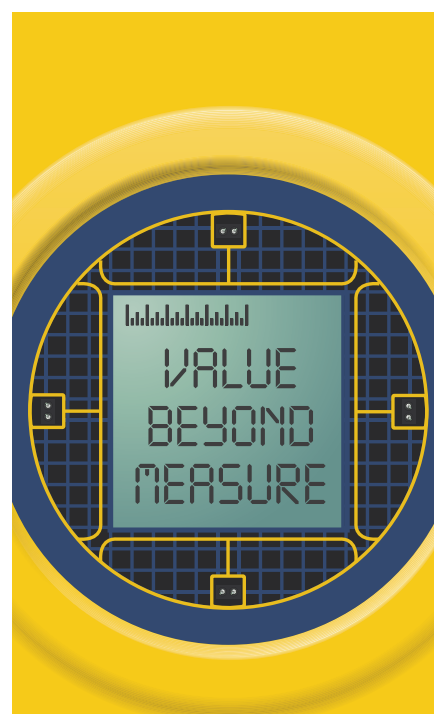
ELECTROSTATIC FIELD METER

The Simco-Ion FMX-004 is a compact electrostatic field meter used for locating and measuring static charges. With LED guides to ensure accurate and repeatable measurements, it measures both positive and negative polarity charges up to ± 30 kV at a distance of 25 mm. It is available to rent from TechRentals.

Results are simultaneously shown numerically and in bar graph format on the multi-coloured display that also displays battery charge status and polarity. The circuitry of the FMX-004 has been designed to make measurements in areas using air ionisation.

With a lightweight and portable design (170 g), three-button operation, digital bar graph display, an audible alarm, automatic power-off and a 30 h battery life, the FMX-004 is convenient and easy to use.

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NEW PRODUCTS



POWER SUPPLIES

The PROtop series power supplies from Weidmüller have been designed to the demanding requirements found in industry. Featuring dynamic current limiting technology, the PROtop power supply can trigger DC circuit breakers with a top boost of up to 600%, and can deliver peak overload reserves from milliseconds to seconds ensuring motor starting loads are supported.

Introduced in this series is a built-in O-Ring MOSFET redundancy capability. This allows for N+1 redundancy without requiring any external diode modules, reducing wiring complexity and saving cabinet space. Efficiencies up to 94.5% reduce power losses, which minimises heat dissipation in the cabinet and allows for a more compact design.

With a maximum operating temperature of 75°C and an MTBF of greater than 1,000,000 h, a long life cycle of greater than 10 years can be expected.

Weidmüller Pty Ltd

www.weidmuller.com.au

PRESSURE SENSORS

Due to the increasing demand for compact measuring instruments, WIKA has expanded the application range of its model M-10 pressure sensor. The slim instrument is now available with low pressure ranges (0–6 and 0–10 bar).

With a spanner width of only 19 mm, the instrument can be matched to almost any application with limited mounting space. The robust thin-film sensor is designed for pressures up to 1000 bar and operates with an accuracy of $\leq \pm 0.5\%$ of span. As the model M-11, the pressure sensor is also available with a flush diaphragm and pressure ranges ≥ 0 –25 bar. This is mainly suitable for applications with highly viscous, contaminated or crystallising media.

In order to meet the needs of OEM customers as well, WIKA has optimised the production of both pressure sensor models. The M-10 and M-11 can thus be supplied in high lot numbers.

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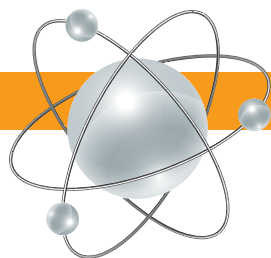


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TR1917



Pump that can move molten metal offers new energy conversion and storage technologies

Research conducted at the Georgia Institute of Technology has demonstrated the possibility of pumping molten metal at over 1400°C using ceramic pump components, opening up new possibilities in high-temperature heat transfer and storage — a critical factor in efficient energy conversion.

A ceramic-based mechanical pump able to operate at record temperatures of more than 1400°C can transfer high-temperature liquids such as molten tin or silicon.

The research was supported by the Advanced Research Projects Agency-Energy (ARPA-E) and reported in the journal *Nature*. The pump was developed by researchers from Georgia Tech with collaborators from Purdue University and Stanford University.

“Until now, we’ve had a ceiling for the highest temperatures at which we could move heat and store it, so this demonstration really enables energy advances, especially in renewables,” said Asegun Henry, an assistant professor in Georgia Tech’s Woodruff School of Mechanical Engineering. “The hotter we can operate, the more efficiently we can store and utilise thermal energy. This work will provide a step change in the infrastructure because now we can use some of the highest temperature materials to transfer heat. These materials are also the hardest materials on Earth.”

Thermal energy, fundamental to power generation and many industrial processes, is most valuable at high temperatures. Liquid metals such as molten tin and molten silicon could be useful in thermal storage and transfer, but until now engineers didn’t have pumps and pipes that could withstand such extreme temperatures.

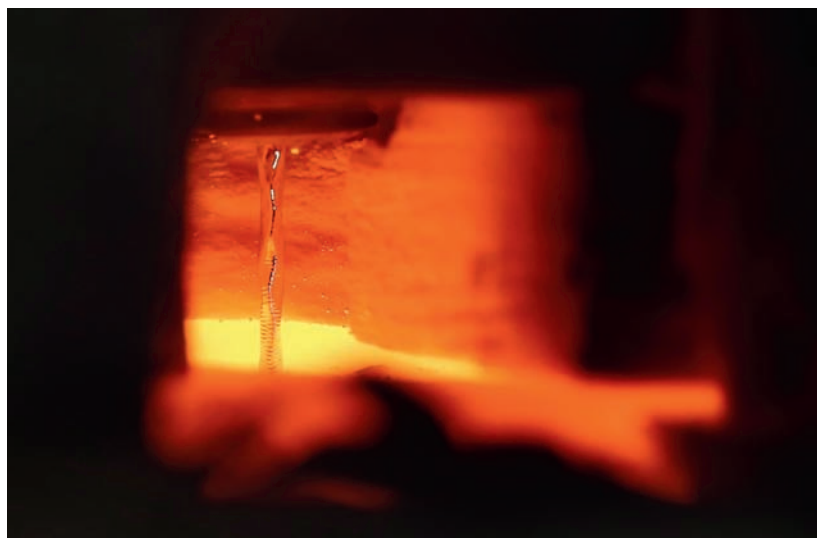
Ceramic materials can withstand the heat, but they are brittle — and many researchers felt they couldn’t be used in mechanical applications like pumps. But Henry and graduate student Caleb Amy decided to challenge that assumption by trying to make a ceramic pump.

The researchers used an external gear pump, which uses rotating gear teeth to suck in the liquid tin and push it out of an outlet. The gears were custom-manufactured by a commercial supplier and modified in Henry’s lab in the Carbon Neutral Energy Solutions (CNES) Laboratory at Georgia Tech.

“What is new in the past few decades is our ability to fabricate different ceramic materials into large chunks of material that can be machined,” Henry explained. “The material is still brittle and you have to be careful with the engineering, but we’ve now shown that it can work.”

Addressing another challenge, the researchers used graphite to form the seals in the pump, piping and joints. Seals are normally made from flexible polymers, but they cannot withstand high temperatures. Henry and Amy used the special properties of graphite — flexibility and strength — to make the seals. The pump operates in a nitrogen environment to prevent oxidation at the extreme temperatures.

The pump operated for 72 hours continuously at a few hundred revolutions per minute at an average temperature of 1473 K — with brief operation up to 1773 K in other experimental runs. Because the researchers used a relatively soft ceramic known as Shapal for ease of machining, the pump sustained wear. But Henry says other ceramics with greater hardness will overcome that issue, and the team is already working on a new pump made with silicon carbide.



Liquid metal flowing at 1400°C in a laboratory at Georgia Tech. Even though all the surrounding materials are glowing, the tin remains reflective and the ripples from the pool of tin below are visible via reflections from the stream. Image credit: Caleb Amy.

Among the most interesting applications for the high-temperature pump would be low-cost grid storage for surplus energy produced by renewables — one of the greatest challenges to the penetration of renewables on the grid. Electricity produced by solar or wind sources could be used to heat molten silicon, creating thermal storage that could be used when needed to produce electricity.

“It appears likely that storing energy in the form of heat could be cheaper than any other form of energy storage that exists,” Henry said. “This would allow us to create a new type of battery. You would put electricity in when you have an excess, and get electricity back out when you need it.”

The Georgia Tech researchers are also looking at their molten metal pump as part of a system to produce hydrogen from methane without generating carbon dioxide. Because liquid tin doesn’t react with hydrocarbons, bubbling methane into liquid tin would crack the molecule to produce hydrogen and solid carbon — without generating carbon dioxide, a greenhouse gas.

The ceramic pump uses gears just 36 mm in diameter, but Henry says scaling it up for industrial processing wouldn’t require dramatically larger components. For example, by increasing the pump dimensions by only four or five times and operating the pump near its maximum rated speed, the total heat that could be transferred would increase by a factor of a thousand, from 10 kW to 100 MW, which would be consistent with utility-scale power plants.

For storage, molten silicon — with still higher temperatures — may be more useful because of its lower cost. The pump could operate at much higher temperatures than those demonstrated so far, even past 2000°C.

LONG-TERM PRESSURE LOGGING SOLUTION

The FieldLab Weatherproof Outdoor Enclosure offers a digital solution for logging data in the field in the harshest of conditions. The FieldLab comes in ranges up to 70 MPa or 10,000 psi and has a data logging capability of 2 million data points. The weatherproof enclosure is IP66 rated and the solar panel and pole mount option allows the unit to be installed permanently.

Users can have pressure data stored on board the product in a weatherproof enclosure. The frequency of data logging can be selected using the FieldLab Desktop software. The FieldLab can therefore be deployed in the field to collect pressure data for three months or more, depending on logging interval.

The product is suitable for remote locations where setting up a SCADA, satellite or mobile-based network may not make sense. It can be quickly deployed for monitoring low water pressure in water distribution, hydrostatic testing or monitoring pressure anywhere, for any period — from a day to a few months — to determine the cause of a problem.

Transtek Pty Ltd
www.transtek.com.au



RADAR LEVEL TRANSMITTERS

Krohne has added six 24 and 80 GHz transmitters to the OPTIWAVE series of FMCW radar level transmitters, designed for liquid and solid applications in a wide range of industries. Each device has a particular target area of application. All devices feature 2-wire, 4–20 mA HART 7 communication and come with a wide choice of process connections.

OPTIWAVE 3500 is an 80 GHz FMCW radar aimed at hygienic liquid applications in the food, beverage and pharmaceutical markets, and has a narrow beam angle and small dead zone. OPTIWAVE 5400 is a 24 GHz FMCW radar for liquids in basic process applications in the chemical, oil and gas and power industries, while the OPTIWAVE 7400 is a 24 GHz FMCW radar designed for liquids in harsh environments, such as tanks with agitators containing corrosives, or in non-Ex applications up to 700°C. The OPTIWAVE 7500 is an 80 GHz FMCW radar covering the same industries as OPTIWAVE 7400 up to 150°C, 40 barg.

For solids applications, the OPTIWAVE 6400 is a 24 GHz FMCW radar for solids from granulates to rocks in industries such as minerals and mining, chemical, agriculture or power generation. The DROP antenna minimises scaling and is unaffected by the angle of repose, thus eliminating the need for antenna-aiming kits or purging systems.

OPTIWAVE 6500 is an 80 GHz FMCW radar for powders and dusty atmospheres, suitable for the same industries as OPTIWAVE 6400.

KROHNE Australia Pty Ltd
www.krohne.com.au

PANEL PCs

Phoenix Contact Valueline box and panel PCs now include a performance class for high-end applications. Equipped with the Intel Core i7 (Skylake) processors and comprehensive functions, and featuring an attractive design, the VL2 9000 product range offers a tailor-made IPC solution for applications with high requirements.



The VL2 9000 generation is a durable solution for using industrial computers directly on-site. All key components are equipped with maintenance-friendly access points. The device can be extended by means of a PCI/PCIe slot. Data security is increased due to two mass storage devices and RAID support. The Intel Core i7-6822EQ processor is now available for applications with high-performance requirements. The user can also choose between different display sizes from 15.6 to 21.5".

The range is characterised by high flexibility and system availability.

Phoenix Contact Pty Ltd
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CONNECTING THE IIoT

Implementing an IIoT solution is not without its challenges, so before beginning it is necessary to understand some of the basic IoT infrastructure concepts.

The world economy will greatly change in the next decade as new internet-enabled applications are rolled out. Some of these applications are likely to be disruptive and innovative as well as have a large economic impact. This will affect many industries and sectors, as already seen in consumer sectors like hotels (Airbnb) and taxis (Uber).

This trend is also noticeable in the manufacturing industry — for example, Germany's Industry 4.0 initiative. Within Industry 4.0 or the Industrial IoT (IIoT), the focus is on integration and better use of existing technologies. In this sense, industry, machines, products and people are all digitally connected. Manufacturers will be producing bespoke products in quantities of one. Intelligent software in the cloud will connect enterprise IT systems with the operational world, machines, devices and sensors to control and optimise production flow.

Because of the decrease in the cost of connectivity, the adoption

of IIoT capabilities by processing devices and sensors has grown tremendously. Sensor data can be captured and pre-processed close to the machines by a smart edge device. The edge device can send the data in real time to the virtual world (IT cloud platform) where it can be stored, monitored and analysed or trigger an action.

The value of the IIoT is not in the connectivity of the devices, but in what a company unlocks from the stream of data the smart devices supply. Cloud computing platforms and their services help provide this insight.

Many significant challenges need to be taken into account when implementing an IoT solution: challenges such as standardisation, interoperability, 'big data' handling, security and privacy. It is important to be aware of these challenges and pay special attention to security. Security is a crucial component for any IoT application, and IIoT devices should enforce a strong security policy and be updated regularly with



SaaS	Software as a Service	Provides a full business service. The service provider runs and manages the complete platform. Examples: Gmail, Salesforce.com
PaaS	Platform as a Service	Provides a platform. You need to build and deploy your own cloud application, leveraging the runtime and services the vendor provides. Examples: IBM Bluemix, Microsoft Azure, AWS IoT
IaaS	Infrastructure as a Service	Provides the basic building blocks such as server hardware, storage, and network capabilities. You may need to install the OS and applications. Examples: Amazon EC2 (a virtual machine that Amazon provides to you), IBM SoftLayer

Table 1: Cloud computing service levels.

played as hybrids, where parts are on-premises and other services are in the cloud.

IoT application protocols

Communication protocols are responsible for the network connectivity to the server. Protocols like Wi-Fi, Ethernet, cellular and LoRaWAN are all communication protocols that provide this level of connectivity. Application protocols sit on top of them to communicate application-specific messages.

Multiple standards handle the communication between devices and the cloud. As application requirements differ, specific IoT protocols have been developed and therefore some confusion is understandable. Protocols may even have multiple implementations and IoT platforms may have proprietary IoT solutions. To provide a universal solution, devices, applications and platforms need to be interoperable.

At a high level, there are three main use cases for the application protocols: device to device (D2D or M2M), device to server (D2S) and server to server (S2S) communication. Different IoT application protocols have different levels of real-time behaviour and other characteristics. Table 2 provides an overview.

The most common protocols are MQTT, AMQP and DDS.

MQTT

Message Queueing Telemetry Transport (MQTT) is an IoT connectivity protocol. MQTT is used in applications with thousands of sensors, including power usage monitoring and oil pipeline monitoring. MQTT is efficient in terms of bandwidth, battery and resources, and uses a publish/subscribe model. The IoT devices publish data to an MQTT broker over TCP as a topic. An authorised client can subscribe to any topic and receive the value from the broker as they arrive from the publisher.

The publisher (device) does not need to know about any of the subscribers, which makes the management easier at the device level. The broker can support multiple concurrent connections from many devices. A topic is a simple string that can have hierarchical levels and also supports wildcards. An example of a topic is GothamCity-Plant/Building1/Pump7/Power. The message data is transmitted in JSON format and may be specific to the cloud platform's IoT service.

the latest security patches. All cloud computing platforms securely send and receive data, use strong authentication and authorisation methods, and use encryption. The majority also have audit capabilities.

Cloud computing

Cloud computing refers to a flexible way of delivering hardware, software or data resources via the network on a user's request. This is the opposite to the use of a software application on a local computer. Table 1 shows three service levels of cloud computing that are commonly encountered: software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS).

Clouds can be deployed as public (all services run in a secure environment hosted in the cloud, where servers may be shared with others) or private, which is available only to the user's organisation and may exist on- or off-premises. In addition, clouds can be de-

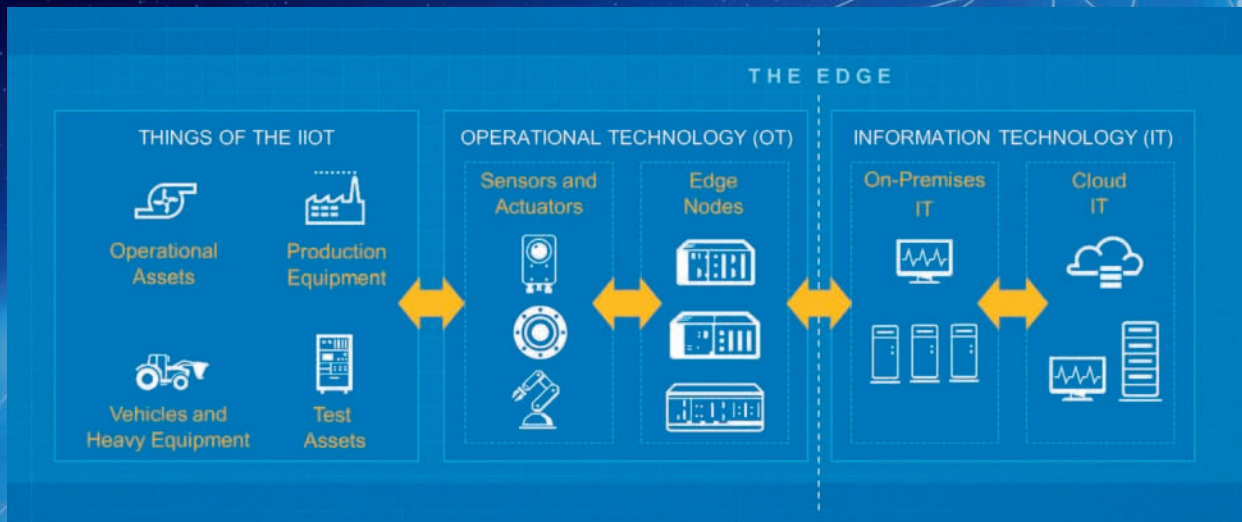


Figure 1: Common architecture of the Industrial IoT: intelligent edge nodes connect sensors, actuators and devices to IT systems.

MQTT can be implemented using standard HTTP calls and supports three quality-of-service levels:

- QoS 0: At most once
- QoS 1: At least once
- QoS 2: Exactly once

To debug MQTT communications, a MQTT client can be installed on a local computer. A popular free MQTT client is MQTTfx, available at mqttfx.org.

Several MQTT brokers are available on the internet for testing communications. One of the most popular is mosquitto. To test the communication, you can publish topics to test.mosquitto.org. The mosquitto broker is open source and can also be used in-house for sandbox testing or production use of MQTT communication.

AMQP

Advanced Message Queuing Protocol (AMQP) is an open message protocol that can send transactional messages between servers, and from devices to servers and vice versa. Advantages of AMQP are interoperability and reliable communication (data is received reliably exactly once at the receiving end). AMQP uses a broker to receive data from a client. The client (or publisher) then publishes the message to the broker, where it is processed and routed to a queue. From the queue, the message is sent to any client that has subscribed to this data.

AMQP focuses on tracking all messages and ensuring each is delivered as intended, even if a device is temporarily offline. Devices that generate large amounts of data can stream to AMQP servers, which is then consumed by receivers to perform monitoring and analytics. An example application for AMQP is the analysis of automotive driving behaviour at a data centre. Some cloud development platforms support device connectivity to AMQP or AMQP over WebSocket. Popular open-source AMQP brokers are RabbitMQ, ActiveMQ and Kafka.

DDS

The main use case for Data Distribution Service (DDS) is to distribute data directly to other devices, although it can also distribute data to enterprise systems and mobile devices. Applications are found in wind farms, automotive testing, asset tracking, defence and big physics. Devices often need each other's data in close to real time (measured in milliseconds). All of this needs to happen reliably, and usually with large data streams. DDS offers a detailed quality of service control,

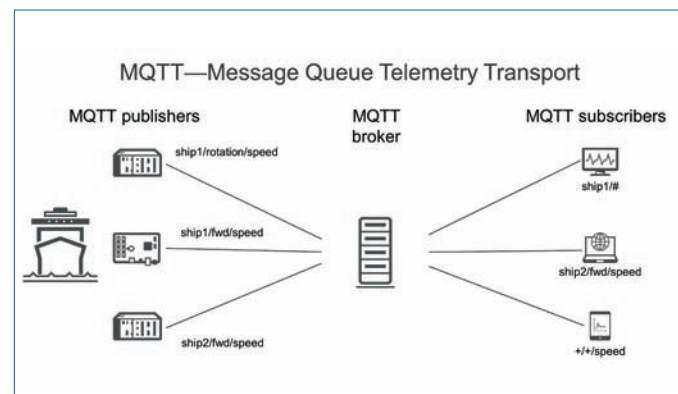


Figure 2: Edge devices send MQTT messages over the internet to a central broker that distributes the messages to authorised subscribers.

with configurable reliability, redundancy and filtering, and selects exactly which data goes where. To do so, DDS uses a device-to-device bus communication, which can deliver the data to thousands of devices.

Cloud development platforms

Amazon AWS IoT

Amazon Web Services (AWS) offers IT infrastructure as cloud computing, database storage, content delivery and other services. AWS IoT is a managed cloud platform that enables devices to connect and interact with other AWS cloud applications and services through a rules engine. It also provides a device gateway and device shadows. The device gateway is the service that manages the device connectivity to AWS IoT and supports MQTT, WebSocket and HTTP protocols. Device shadows can create a virtual device that retain the device's latest state, even when it is offline. Applications within AWS can publish to the virtual device and, when the device is back online, the state is synchronised. AWS provides open-source IoT SDKs to help connecting hardware devices with AWS IoT.

AWS uses an IoT rules engine that applies a SQL-like syntax to select data received from a device and perform actions. The rules engine makes it possible to build IoT applications that can gather,

	HTTP/HTTPS	WebSocket	DDS	MQTT	AMQP
Description	Transmit data over the Internet from applications, websites, etc.	Transmit data over the Internet from applications, websites, etc.	Communication bus to connect intelligent machines	Lightweight protocol for collecting data and publishing it to servers and subscribers	Queue system to reliably transfer messages between applications and processes (servers)
Typical use case	Web	Web	D2D	D2S	S2S, (D2S)
Real-time behaviour	No	No	Yes, μ s–ms range	No, ms–s range	No, seconds range
Messaging	Request/Response	Request/Response	Databus	Publish/subscribe	Publish/subscribe
Transport	TCP	TCP	TCP, UDP, shared memory etc.	TCP	TCP
Security	Yes: HTTPS (SSL or TLS)	Yes: wss:// (SSL/TLS)	Yes	Possible: SSL or TLS	Yes: TLS or SASL (Simple Authentication and Security Layer)

Table 2: Common application protocols for IoT connectivity

analyse, process and act on the data received from the device. The rules engine can route the message to AWS endpoints like AWS Lambda (a compute service to run your uploaded code), Amazon Kinesis (to process a large stream of data in real time), Amazon S3 (simple storage service), Amazon Machine Learning and Amazon DynamoDB, among others.

IBM Watson IoT for Bluemix

Bluemix, IBM's cloud development platform, is a PaaS. With Bluemix, you can access IBM software for services like big data analytics, storage, databases, security, IoT and cognitive applications.

Watson IoT for Bluemix lets an application communicate with the connected devices and consumes data received from those devices and device gateways. MQTT is used to communicate with the devices and gateways. Devices can securely connect to Watson IoT using MQTT over TLS.

The device needs to be registered with IBM Bluemix before an MQTT connection can be established with the Watson IoT MQTT broker. Rules and logic to handle the data can be defined in any of the languages that IBM Bluemix supports, such as node.js (Node-RED), Java and Python.

PTC ThingWorx

ThingWorx is a model-based IoT application development platform that provides a complete application design, run time and environment. ThingWorx provides components for connectivity, analytics, collaboration, and visualisation including augmented reality. The core development features of the platform are:

- **Composer:** An application modelling environment to model the 'things', logic, visualisation, data storage and security
- **Mashup builder:** A web page is called a mashup with ThingWorx, and visualisation of web pages can be created using the mashup builder tool
- **SQUEAL:** A search feature that allows searching through all the data in a model
- **Execution engine and storage:** An event-driven platform for execution and storage to store, relate and expose big data to make it valuable and actionable

ThingWorx supports device connectivity in several ways: direct network connections, MQTT and AMQP, third-party device clouds, and OPC-UA connectivity through PTC Kepware software.

Microsoft Azure IoT Suite

The Azure IoT Suite allows data collection from devices and provides a set of services such as data analysis, data storage, real-time and historical data visualisation, and integration with back-office systems. The Azure IoT hub receives the data from IoT devices. The device data can then be stored or passed on for further processing, analytics and management. Devices can communicate with the IoT hub over HTTP, MQTT or AMQP protocols. Microsoft offers a set of Azure IoT device SDKs through GitHub.

Other cloud platforms are available, such as Google Cloud Platform, GE Predix and many more. For more information, see the vendor's specific product web pages.

National Instruments Australia Pty Ltd
www.ni.com

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OIL-IN-WATER SENSOR

The TriOS enviroFlu is a submersible sensor for the measurement of oil in water. In order to improve sensitivity, the sensor utilises a UV fluorescence measuring principle rather than the more conventionally used infrared scattering or absorption methods. This allows the enviroFlu to determine the slightest traces of polyaromatic hydrocarbons (PAHs) in water, essential for safe operation in drinking water and condensation system cooling water.

Significant application areas include the petrochemical industry, leakage detection in cooling or wastewater streams, as well as general environmental monitoring and protection of RO membranes in desalination plants. TriOS has certification for marine customers monitoring bilge water and exhaust gas scrubbers according to IMO regulations like MEPC.184(59). Optionally available with titanium construction, the sensor can be easily incorporated into unmanned sea water monitoring systems.

The enviroFlu can be mounted inline to monitor flow in piping, submerged in deep sea marine applications (down to 6000 m) or used as a mobile device with the optional handheld kit which includes battery power.

A nano-coating reduces build-up and fouling of the measuring window, reducing sensor maintenance. The enviroFlu provides sensitive, real-time monitoring without the need for sample preparation and consumable reagents.

Control Components Pty Ltd

www.controlcomponents.com.au

HIGH-EFFICIENCY AIR FILTERS



Kaeser has launched its latest generation of compressed air filtration products. Due to design enhancements, users can expect up to 50% lower pressure loss, according to the company.

The element head of the filter unit has been optimised for best possible airflow, according to Kaeser. Its tapered internal structure channels the compressed air to the centre of the element interior for even charging of the filter media. Deep-pleated filter media is used to remove particles and aerosols, while a carbon fibre mat traps oil vapours. Together with good flow dynamics, this ensures high filtration efficiency with minimal pressure loss. As the filters are available with air connection flanges of various sizes, there is no need for reducer sections when connecting to different air distribution networks.

The pressure drop also remains low for longer due to the high contaminant retention capacity, resulting in lower lifetime operating costs.

A low pressure loss also reduces the load on upstream compressors, thereby creating the potential for reductions in costs. As an example, a 1 bar air pressure reduction can save up to 6% in associated energy costs.

Fitted as standard to Kaeser particulate and coalescence filters is a differential pressure gauge, and the enclosures are cast from seawater-resistant aluminium. The filter elements are protected by inner and outer cages made from continuously welded profile stainless steel.

The filters are available in four filter grades and 12 housing sizes, providing filtration for flow rates from 0.6 to 32 m³/min.

Kaeser Compressors Australia

www.kaeser.com.au



INDUCTIVE FLOW SENSOR

The ifm efector SM4000 flow sensor is based on Faraday's principle of induction. The conductive medium flowing through a pipe in a magnetic field generates a voltage which is proportional to the flow velocity or flow rate. This voltage is detected via electrodes and converted in the evaluation electronics.

Analog, binary and pulse outputs offer various possibilities to process the measured data. In addition to flow rate, temperature and totalised values are also available. Due to the flexible programming by means of push-buttons, the flow sensor can be adapted to different conditions. The sensor is mounted via an adapter and is available with an EPDM O-ring for drinking water applications. Measurement values are presented using a 4-digit alphanumeric LED display.

The SM4000 is suitable for conductive liquids with a flow rate of 5–3000 mL/min with a conductivity down to 20 μ S/cm and viscosity less than 70 mm²/s (70 cSt) at 40°C.

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GRIPPER FOR STEEL PLATE

SMC has added to its gripper range with the launch of the MHM-X6400, which uses a magnet for the handling of steel plate, without the need for vacuum. Suitable for workpieces with uneven or irregular surfaces or featuring holes, this magnetic gripper is designed to provide reliable and safe handling at reduced cycle times for improved productivity. It is also useful for many sheet metal handling applications including robotic systems.

In developing the MHM-X6400, SMC has looked to improve its handling flexibility by using magnetic grippers where vacuum was never an option due to the inherent limitations of a vacuum system. With a holding force of up to 120 N, the MHM-X6400 continues to hold a workpiece even when air supply is lost completely or pressure drops are experienced. Furthermore, with a residual holding force of 0.3 N or less, cycle times are reduced and productivity output is improved.

Suitable for a range of transfer applications, the holding force of the MHM-X6400 can be adjusted by simply changing the height of the bumper being used. Made from Fluororubber, the bumper also prevents the workpiece from slipping and damaging during operations, improving safety.

The MHM-X6400 also features three mountable surfaces and the option to mount auto switches.

SMC Australia | New Zealand
www.smcworld.com

OXYGEN ANALYSER

Michell Instruments is now offering users in the semiconductor and gas manufacturing industries a trace oxygen analyser for ensuring the quality of ultrahigh-purity gases.

Analytical Industries' PI2-UHP oxygen analyser has a low detection limit of 0–50 PPB low range with LDL

<0.1 PPB. It is designed to measure trace-level oxygen contamination in ultrahigh-purity inert gases in the semiconductor industries.

The Pico-Ion electrochemical sensor is maintenance-free and routine calibrations are quick and simple due to the built-in auto-calibration and sample

handling system. There is no need to add electrolyte. The analyser has an integral temperature-controlled heated enclosure and stainless steel all-welded sample system. Fully automated auto-zero and auto-cal, as well as an integral data logger, are all features of the analyser.

To ensure the zero gas is completely free of O₂, an oxygen scrubber is included as part of the integrated sampling system. To protect the sensor, a sample bypass is provided to isolate the sensor from high oxygen levels during start-up, sample line switching and maintenance.

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



MASS FLOW METERS AND CONTROLLERS FOR GASES

Bürkert has released high-precision mass flow meters (MFM) and controllers (MFC) for gases. The devices feature an integrated industrial Ethernet switch and support all standard industrial Ethernet protocols.

Typical applications for mass flow meters and controllers are in the areas of metal, glass or ceramic processing, coating technology, or the production of foams in the food and plastics industries. MFCs/MFMs are also used in fermenters and water treatment systems.

The Type 8741 flow meters and controllers handle nominal flow rates of up to 150 l/min (relative to N₂), while the Type 8745 devices permit a maximum of 2500 l/min (relative to N₂). Due to their wide measuring range, the same MFC/MFM devices can often be used at different locations within an application, thus reducing the number of device versions.

The mass flow controllers employ direct-acting proportional valves. The Type 8745 can also be combined with a Type 3280 or 3285 motor-driven valve for high-pressure applications of up to 22 bar. Valve orifices up to DN20 can be realised for applications with high flow rates, even at low differential pressures such as those found in burner control systems. All MFC/MFMs are also available with UL approval. In

addition to industrial Ethernet interfaces supporting Profinet, EtherNet/IP, EtherCAT or Modbus TCP, standard signal interfaces will soon also be available for Types 8741 and

8745, thereby further expanding the application spectrum.

Bürkert Fluid Control Systems
www.burkert.com.au



**NEW
PRODUCTS**



COMPACT CORIOLIS FLOWMETER

The digitally based SITRANS FC430 Coriolis flowmeter features a compact size, a high accuracy of 0.1%, low pressure loss, a stable zero point and a data update rate of 100 Hz.

Support tools provide direct access to all operational and functional data, certificates and audit trails.

The SITRANS FC430 also offers SIL3 certification on the system, meeting the highest standards of safety.

The complete FC430 flowmeter system can be ordered for standard, hygienic or NAMUR service. All versions can be ordered for CT service, according to OIML R117 (liquids other than water).

All compact variants can be validated and configured for SIL2 or SIL3 operation. SIL3 operation requires two flowmeters in series, monitored by a SIL-rated control system.

Suitable for both liquid and gas service, the flowmeter has a fast response to rapid changes in flow, making it suitable for fast dosing applications. It also has high immunity to process noise and a high turndown ratio.

The product is available with 4–20 mA analog output with HART 7.2. Additional I/O functions can be freely configured for analog, pulse, frequency, relay or status. The transmitter comes with a user-configurable graphical display, Siemens' SensorFlash technology, a micro SD card for configuration backup, a firmware update and data storage.

Siemens Ltd

www.siemens.com.au

HIGH HEAD SUBMERSIBLE PUMP

Dirty water submersible pumps are not normally designed for high head applications. The Tsurumi KTZ615 uses a 15 kW motor to achieve higher head performance of 55 m with a maximum flow of 2800 L/min. The head is achieved with a single-piece impeller made from high-chrome cast iron.

The pump has double dual mechanical seals with an integrated oil lifter. The seals run in oil to provide greater longevity and performance reliability. The oil lifter keeps oil circulating even if the pump is not running in a strictly vertical position.

A pressure relief port protects the mechanical seal faces from extreme pressure while simultaneously diverting abrasive particles away from the seal face, making the pump suitable for mining applications.

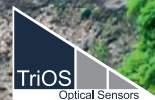
The cable entry has a sealed gland that won't let water into the motor even if the cable is damaged or cut. The KTZ is made from high-chrome cast iron and comes with a strainer that is able to handle solids up to 12 mm. The KTZ series is widely used in mining, tunnelling, quarries or concrete batch plant applications and piling duties.

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A photograph of a worker in a white hard hat and safety glasses, looking down at a tablet device. The worker is in a control room with multiple computer monitors in the background. The image has a blue and green color cast.

CONTROL SYSTEM MIGRATION

SURVIVING THE 'PERFECT STORM' TO IMPROVE
PERFORMANCE — PART 2

Industrial companies are faced with an increasingly competitive business environment and control systems that are becoming obsolete. The fast pace of technology development opens up new opportunities, but this is being offset by an increasing skills shortage. Incremental migration coupled with outcome-based service programs can help an organisation move forward and reduce TCO.

As explained in Part 1 of this article, proactive is the new normal when it comes to keeping automation technology up to date. Companies that migrate to a newer, more effective control system gain a significant advantage over competitors that simply wait for assets to reach end of life. The 'doing nothing' option simply isn't viable.

Upgrade before operational issues arise

Industrial organisations must immediately do proper planning and budget allocation for control system upgrades in order to avoid resource scarcity. Leading global automation suppliers have data indicating hundreds of thousands of legacy DCS nodes and thousands of software licenses will soon become obsolete or phased out.

It is clear that inaction on migration strategies is causing existing services to be underutilised and, by early next decade, a crossover will occur where demand for control system upgrades will outstrip the available qualified resources.

Before migration to a new automation system can take place, most companies require a strong financial justification for the needed capital expenditures. This justification compares the cost of continued operation with the DCS to the costs and benefits of migration to a modern control solution. Together, these factors comprise the total cost of ownership (TCO).

Process control systems don't have moving parts and aren't subject to normal wear and tear, so reasons for migration must go beyond basic loss of functionality to other more complex areas.

The upgrade possibilities for a legacy DCS include:

- Technology refresh involving the replacement of legacy electronics with modernised ones providing improved efficiency, lower power consumption and environmentally friendly materials
- Technology upgrades involving the replacement of existing equipment with newer generation technology that enables improved performance, reduced maintenance costs and new operational and functional capabilities
- Intellectual property upgrades transitioning current control strategies, applications and HMIs to more advanced technology

Put an effective project plan in place

The first step in preparing for a control system migration is developing a comprehensive project plan. This involves working with all stakeholders — including operations, engineering and plant management — to align on scope, risk assessment and the overall project roadmap. Project participants should evaluate and prioritise what is important from their individual perspectives. This helps to create ownership and a shared vision throughout the organisation.

In the early stages of a control system migration, the project team should identify the primary objectives for technology upgrades. These may include:

- Increased control system reliability
- Reduction of risk
- Enhanced alarming capabilities
- Improved historical capabilities
- Expanded access to DCS information from third-party systems
- Improved overall intercommunications capability
- Increased security capabilities (often overlooked)

As part of good engineering and project management practices, companies should determine the best time to migrate and identify the optimal migration path associated with clearly defined goals. They should also define the project through front-end engineering and use a proven approach with comprehensive checklists and detailed cutover plans. Lastly, it is important to define intermediate operability and training plans.

Besides a scheduled turnaround, there are a host of other factors that enter into the optimal timing for a migration. These include:

- Production rates
- Holiday schedules
- Availability of support
- Release dates of software and associated functionality
- General business outlook

Increasingly, control system migrations are performed 'on-process' using technology that replaces the existing user interface and provides modern functions, while retaining the original system's controllers, field connections and devices. With this approach, all or part of the old DCS and the new automation system operate simultaneously, allowing elements as small as one control loop at a time to be migrated to the new platform. If the plant has a redundant control architecture, on-process migration allows an upgrade to the next system release while maintaining view and control of processes.

Collaborate to reduce costs and risks

The success of a migration project can be ensured by initial preparation involving the control system supplier and their migration specialists. The supplier's expertise, combined with extensive data gathering and analysis in the early stages of the project, help reduce the effort and risk involved in migration. Close collaboration with the automation vendor can also minimise interruptions to process operators, and eliminate loss of control and view of the process.

Knowledgeable assistance from the control system supplier can include:

- Strategies for migrating and supporting existing control system nodes
- Proposals for consolidating legacy control systems to drive down costs and enhance safety
- Recommendations for ensuring the reliability, robustness, security and future expandability of process control networks

By working together, automation suppliers and end users can set forth a plan to help plants take advantage of the latest control innovations without compromising their initial investments. In addition, they can utilise long-term support to maintain intellectual property in graphics and advanced control. Such a holistic view not only ensures facilities have a smooth transition to the latest automation system, it also pinpoints areas of potential improvement that can be addressed using new technology, resulting in a higher ROI than just addressing the obsolescence issue.

The aim of any modernisation effort is to minimise process disruptions and preserve existing field wiring while reducing system footprint, engineering and installation effort. To this end, users should compare the cost of different 'migration in place' strategies with a traditional 'rip and replace' approach.

Typical migration alternatives can include:

- Moving control to current hardware to preserve the installed I/O and all of the existing engineering (ie, obsolescence avoidance/intellectual property preservation)
- Moving control to current hardware to preserve the installed I/O and re-engineering to the current control software (ie, obsolescence avoidance/control modernisation)
- Moving control to current hardware, upgrading to new I/O and re-engineering to the current control software (ie, platform and control modernisation)
- Removing the control system, including I/O, and completely re-engineering all of the control software (ie, rip and replace).

Properly planned and implemented, control system migrations enable industrial organisations to migrate legacy control platforms at their own pace, allowing new controllers to be added at any time and integrated with existing equipment. They also permit the upgrade of subsystems and function blocks to new controllers whenever the user decides.

Realise the benefits of modern technology

Once industrial organisations have upgraded to the latest automation technology through an up-to-date advanced DCS platform, they will enjoy the benefits of improved operational efficiency, greater process reliability, reduced risk and increased plant productivity. Additional advantages will be realised through lower operating expenses (OPEX) and capital expenses (CAPEX).

An advanced DCS platform may also employ scalable capabilities for project execution and system management, including virtualisation and cloud engineering solutions, and remotely configurable universal I/O cabinets, which allow for late-stage design changes, reduced footprint and minimal hardware required for implementation. This approach reduces and in some cases even eliminates marshalling, simplifies engineering and configuration during the design phase of a project, and saves on installation costs. Additionally, the use of advanced collaboration and HMI technology gives users the ability to share information across multiple locations and simplify engineering and operations across thousands of distributed assets.

Sustain assets with outcome-based support

It has never been more crucial for manufacturers to continuously improve their operations and respond appropriately to changing market conditions, while upholding the best performance standards and reducing total cost of ownership. Companies need to employ a knowledgeable staff, manage the complexities of open technology, plot an appropriate technical direction applicable to their specific situation, and maintain the correct alignment between support and business strategies.

Most plant automation departments are challenged just keeping their heads above water but are aware they have issues to address, not the least of which are missed opportunities to improve performance. Operations should move beyond traditional transactional business approaches and engage in a true relationship with an automation partner who takes ownership for outcomes.

Some control system suppliers provide flexible control system support programs that offer agreed service levels rather than prescribed quantities of materials and labour. This 'pay for performance' approach takes a strategic view to minimise the total cost of ownership, guarantee performance and utilise the automation system to improve business results. The programs are based on shared risk and reward, comprehensive life cycle coverage, risk and change management, best practices, and a clear support contract with specific performance benchmarks.



ONCE INDUSTRIAL ORGANISATIONS HAVE UPGRADED TO THE LATEST AUTOMATION TECHNOLOGY THROUGH AN UP-TO-DATE ADVANCED DCS PLATFORM, THEY WILL ENJOY THE BENEFITS OF IMPROVED OPERATIONAL EFFICIENCY, GREATER PROCESS RELIABILITY, REDUCED RISK AND INCREASED PLANT PRODUCTIVITY.

With an outcome-based service solution, the customer hands partial or complete responsibility for system support to the automation vendor. This means they no longer have to worry about the complications of skills competency, parts maintenance, technology roadmaps, etc. The two parties agree on scope, outcome levels and a fixed cost, and the customer maintains governance. The services can be delivered to stabilise existing platforms (addressing remedial requirements to bring the system to a supportable basis) or sustain their performance for a period of time (supporting the system while improvements are being made, and then implementing outcomes-based responsibility).

Outsourced services can also employ a 'pain/gain' model for the automation supplier versus key performance indicators (KPIs), which imposes penalties if a loss of view (LOV) or loss of control (LOC) occurs. All this hinges on the system's integrity, meaning it needs to operate with supported hardware and software implemented to best practices. The project begins with an assessment of plant performance, an audit of the existing system, benchmarking and risk assessment. Then a maintenance plan is developed that is unique to the site.

When fully executed by the automation supplier with guaranteed system performance, outcome-based support services provide preventive maintenance routines based upon proven best practices. They also deploy continuous system monitoring, which offers alerting to support incident management and diagnostic data for reporting, availability, capacity and problem management. Support experts are responsible for identifying automation and cyber vulnerabilities, and remediation requirements, and a dedicated performance manager has active management of all incidents and plans.

Conclusion

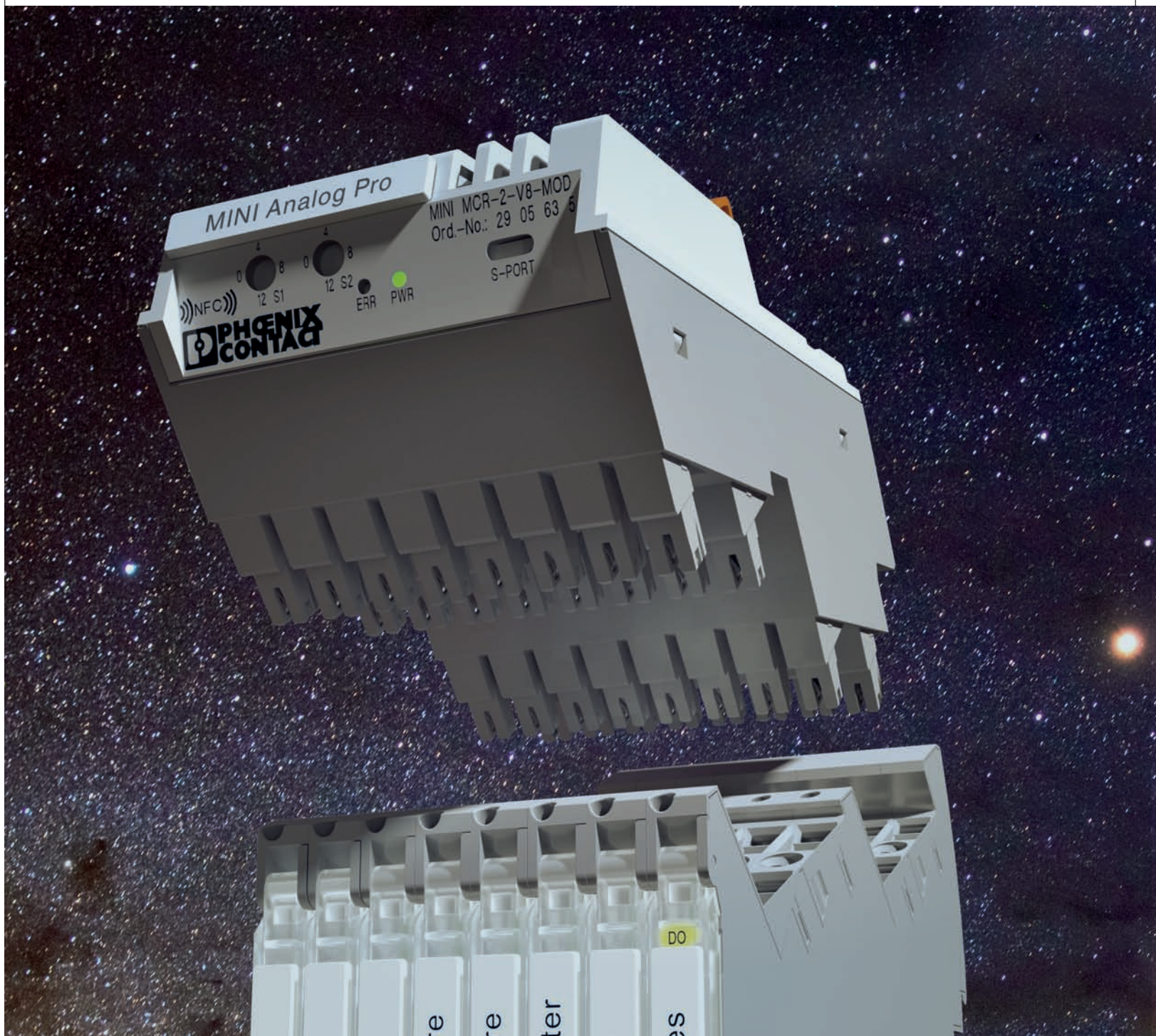
For industrial organisations, a successful modernisation program can help reduce total cost of ownership, increase production rates, meet regulatory guidelines and manage risks, extend the life and performance of systems, and improve response to changing business demands.

When it comes to plant automation systems, there is no upside to inaction. Control system migration projects, although challenging, have the potential to deliver great value to industrial operations. The process used to arrive at migration timing and scope has considerable influence on whether that value is actually achieved. The most critical consideration is planning: the more upfront detailed planning performed, the lower the risks in the execution phase of a project.

A well-planned and executed automation migration ensures seamless integration of new technology and continuous life cycle support for legacy systems. It also puts the end user in control of the plant modernisation strategy, allowing them to determine component investments and how much longer to maintain current capabilities. The transition to new technology can be executed with practically no change to physical wiring and intellectual property.

Whichever migration strategy is implemented, comprehensive outcome-based support services can maintain and enhance automation systems throughout their entire life cycle, helping sustain the benefits of investing in new technology.

Honeywell Process Solutions Ltd
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Space-saving with bus and network connection

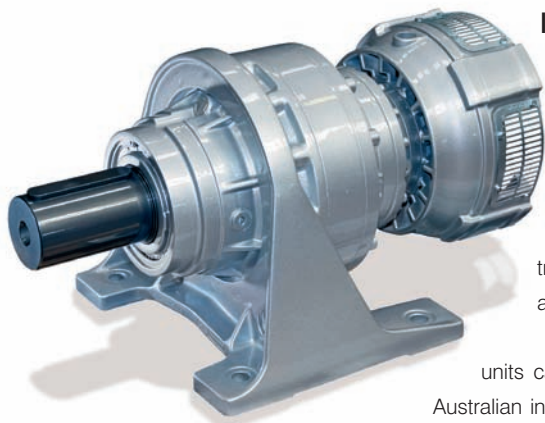


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The highly compact MINI Analog Pro signal conditioners offer the easiest installation and startup in a confined space. Integrate up to eight field signals in an industrial network with the new gateways for bus and network connection that save space and are interference-free.

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INTEGRATED COOLING FAN FOR DRIVES

To enhance the performance of its Trasmital planetary gearboxes, Bonfiglioli is introducing an integrated fan option for its latest 300M series. The fan is connected directly to the IEC motor, which leads to an improved thermal rating and increased thermal power of up to 217%, depending on the model.

Planetary gearboxes are staple workhorses for bulk materials handling, mining process equipment, food and beverage, materials handling, water treatment, waste handling and heavy industries. They typically use a low speed and high torque for good performance in a compact space.

The high levels of torque together with the compact nature of planetary gear units can lead to thermal restrictions, particularly in arduous conditions common in Australian industries. By running cooler than their predecessors, the gearboxes can safely utilise more torque.

A keyway hollow shaft connection for the fan means that no joint is required. Integrated fins optimise the airflow and cooling surfaces throughout the entire air conveyor housing.

The integrated fan is designed to fit any size Bonfiglioli or commercial motor. The 300M series has 100% interchangeability with Bonfiglioli's current 300 series models, so no machine modification is required when upgrading to the later units.

Bonfiglioli Transmission Pty Ltd

www.bonfiglioli.com.au



RADAR INSTRUMENT

The VEGAPULS WL S 61 radar sensor is designed for all simple applications in the water supply and sewage sectors. Featuring a wide range of mounting options, it can be readily integrated into existing infrastructure.

Radar technology offers numerous advantages compared with ultrasonic sensors, which used to be standard in this sector; radar is independent of weather influences, strong sun, wind, fog or rain. In addition, no compensation is needed for variations in the signal transmission time due to air temperature fluctuations. With an accuracy of ± 5 mm, the product covers a wide range of applications.

The sensor is particularly suitable for level and flow measurement in water treatment plants. Its fine focusing enables its use in pumping stations and rainwater overflow basins, for flow measurement in open channels, and for level monitoring.

The sensor's robust housing is wear- and maintenance-free, and its high degree of protection, IP68 (2 bar), also makes it suitable for applications where the sensor may be temporarily submerged. The unit complies with the latest LPR standard (level probing radar) and is approved for open-air use without restrictions or special attachments.

Bluetooth permits wireless operation from a smartphone or tablet (or a PC with PACTware), making commissioning and diagnosis simple. Corresponding display and signal processing units enable the display of measurements and provide the relay outputs needed, for example, to control a pump.

VEGA Australia Pty Ltd

www.vega.com/au



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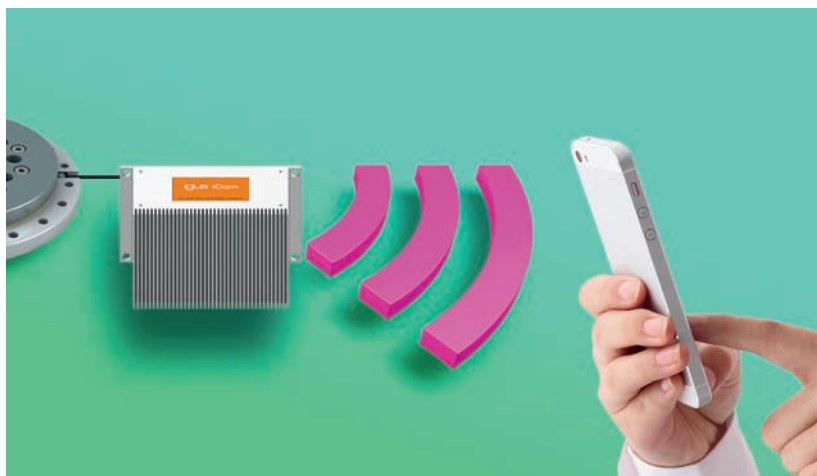


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NEW
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MONITORED SLEWING RING BEARING

The lubrication-free and maintenance-free polymer igus slewing ring bearings from Treotham are suitable for installations where reliability is required. In order to avoid failure of the bearings and an unscheduled shutdown of equipment, igus has developed the intelligent isense slewing ring bearing. It uses a sensor to measure the wear of the bearing and informs the user when replacement is required.

In control desks, welding equipment, indexing tables or chain saws: igus slewing rings resting on plain bearings are primarily used in applications requiring a high level of reliability — often in conjunction with high cycle speeds and high loads. The iglidur polymer slewing ring bearings have sliding elements between the inner and outer bearing rings, which are made of aluminium or stainless steel. The maintenance-free sliding elements made of high-performance iglidur J plastic ensure that friction and wear are minimised without the use of lubrication.

A wear sensor mounted in a slot under the sliding elements measures the axial lowering of the SRB head ring caused by abrasion and passes the information on to the icom communication module. After the information has been compared with a previously determined application-relevant wear rate, the necessity for replacement can be indicated in good time via the icom module.

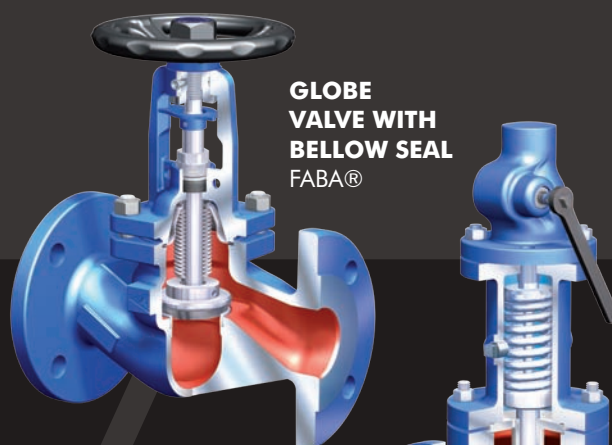
The communication module receives the data from the sensor and sends the information to the desired end devices via WLAN.

Treotham Automation Pty Ltd
www.treotham.com.au

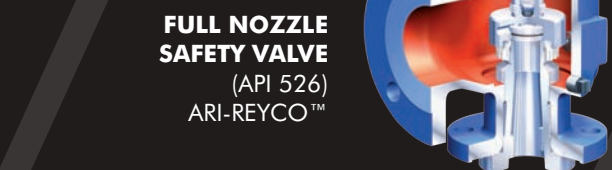
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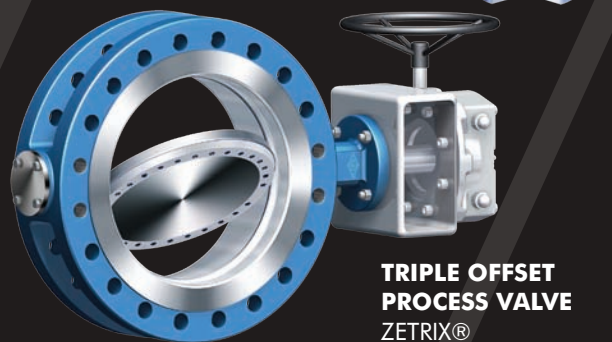
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NEW
PRODUCTS

THIN CLIENT REMOTE MONITOR

The VisuNet GXP remote monitor from Pepperl+Fuchs brings a compact, modular design to hazardous areas that allows for easy set-up and maintenance. With 54.61 cm (21.5") display size and full HD resolution, the VisuNet GXP's screen guarantees an optimum display of processes.

A key advantage of the VisuNet GXP is its modular design. The three main components — the display, computer and power supply — are easy to disassemble on-site and allow operators to replace components independently in the event of a fault.

This light thin client solution can be easily installed by one person due to its light weight. Equipped with the latest generation firmware RM Shell 4.1, the VisuNet GXP is easily configured and networked to the process control system via Ethernet in Zone 1/21. It provides the highest security standards and contains advanced functions, such as predefined backup connection to increase connectivity and process stability. Combined with the Pepperl+Fuchs VisuNet Control Centre, the solution is designed to bring the benefits of Industry 4.0 to the life sciences industry.

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



ETHERNET SWITCHES

With a combination of managed and unmanaged switches, Hirschmann's GECKO switches are suitable for use in smaller networks or on the edge of larger installations. They can also be used for carrying video signals or transmitting control data.

For industrial manufacturers looking to enter the world of managed switches, the GECKO switches offer simple network management and enhanced network availability. Network parameters can be centrally configured using a web interface, while redundancy and diagnostic functions ensure high network availability.

Featuring four or five Fast Ethernet ports (10/100 Mbps) and the ability to mount on a DIN rail, the compact dimensions (25 x 114 x 79 mm) of the GECKO switches require little space and inactive ports can be disabled to protect against possible misuse.

The switches can be managed through SNMP or via HiDiscovery and Industrial HiVision from Hirschmann. A web interface is also available. For monitoring purposes, the switches

provide diagnostic and documentation options, such as a system log, remote monitoring (RMON) and Link Layer Discovery Protocol (LLDP). Rapid Spanning Tree Protocol (RSTP) and quality of service (QoS) functions are also supported.

Additional features include an IP30 protection rating, a wide operating temperature range, high resistance to shock and vibration, a 24 VDC power supply and power consumption of less than 3 W.

Belden Australia Pty Ltd
www.belden.com





M12 POWER CABLES

The assembled M12 power cables from Phoenix Contact offer high power in a compact design. Assembled K- and L-coded cables in PUR or PVC and with IP65/IP67 ingress protection extend the existing range with S- and T-coding.

The coded pin connector patterns prevent mismatching. The connectors are standardised according to IEC 61076-2-111 and have UL 2237 approvals. The M12 pin connector patterns are considerably smaller than the usual 7/8" connectors, enabling users to supply compact devices and motors with power from a decentralised location.

The 5-position K-codings are designed for AC applications up to 16 A and 630 V. DC applications in the low-voltage range up to 16 A and 63 V are covered by the L-codings. These are available in a 4- and 5-position design with four conductors and functional earth ground contact. An optional 360° shielding provides reliable EMC protection. The connectors can be mounted quickly with the Speedcon fast locking system.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

**NEW
PRODUCTS**



PORTABLE OSCILLOSCOPE

The 200 MHz Fluke 190 Series II ScopeMeter is designed for engineers in the field who require a lightweight oscilloscope for electronics testing in harsh industrial environments. It is available to rent from TechRentals.

This Series II ScopeMeter comes with four floating, isolated input channels and a range of operational features including digital persistence

mode, roll mode (30,000 points/channel for low frequency signal analysis), TrendPlot paperless recording and Fluke's Connect-and-View triggering.

It features 10,000 points/trace waveform capture in scope mode and a sample rate of 2.5 GS/s. It has independently insulated inputs with an IP51 dust and drip-water proof rating and a safety rating of CAT III 1000 V/CAT IV 600 V. The automatic capture and replay of 100 screens is possible, and a USB host port provides access for direct data storage.

TechRentals

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AUTOMATED FIELD CALIBRATION FOR THE OIL AND GAS INDUSTRY

HOW TO SAVE TIME AND MONEY WHILE REDUCING RISK



Calibration is an essential element of any instrumentation maintenance program — but without the right tools, calibration operations can be time-consuming and error-prone.

Technicians who maintain and troubleshoot process automation systems used in refineries, pipeline custody transfer applications or pumping operations know that there are thousands of sophisticated devices required to perform countless critical operations ceaselessly, accurately and reliably. Those devices require regular inspection, testing, calibration and repair to protect the health and safety of the public. Businesses and governments require highly specific documentation of those maintenance and calibration tasks performed on these critical assets.

Traditional calibration and documentation practices are labour-intensive and in today's downsized environment there simply aren't the resources to keep up. However, automated calibration practices are proving a practical alternative because they require smaller teams, while increasing productivity and operational reliability at a lower overall cost.

Increased safety and productivity with reduced costs

Whether you're installing a new device, changing the settings of an existing device or reinstalling a repaired device, calibration is the only way to ensure that the device meets performance requirements.

This is important for:

- **Safety:** When valves and gauges are not regularly calibrated, they can fail, cause an unsafe condition possibly leading to an explosion and loss of life, and cause great damage to infrastructure.
- **Quality:** To perform at the highest efficiency and quality, equipment must be well maintained and adjusted.
- **Revenue:** Calibration of the devices that make custody transfer measurements are necessary to ensure that purchased products, such as petroleum or natural gas, are measured and taxed correctly.
- **Compliance:** Government regulation and enforcement agencies often require calibration and documentation to verify that devices conform to rules and standards. Poor calibration documentation can put the manufacturer at risk of government fines and loss of production.
- **Cost savings:** With automated calibration and documentation, a lean team can complete twice as many calibrations in the same amount of time, which lowers the cost per calibration significantly. Regular calibration can also reduce the risk of lost revenue from accidents; if a disaster strikes, good calibration records can support a strong defence against legal action.

Dispelling myths

In the oil and gas industry, some believe that digital fieldbus devices do not require calibration. This is not true. A fieldbus signal provides diagnostic information; it does not provide information about the accuracy of the device, nor does it verify that the device is reporting the process accurately and precisely.

For example, a fieldbus flow transmitter can report diagnostic information about the transmitter, but it cannot report on the



physical condition of the orifice plate across which it is measuring flow. Consequently, even if the electronics are operating perfectly, the flow reading transmitted may be inaccurate. Calibration is required to ensure the flow reading is accurate.

Addressing documentation challenges

Traditionally, documenting a calibration has meant hand writing the results on a clipboard or in a logbook. Pencil-and-paper documentation both produces and perpetuates errors. The data in handwritten records is often illegible or insufficient. And facilities that use a computerised maintenance management system (CMMS) must allot additional time to manually enter the handwritten data into the system, which creates additional opportunities for error.

Another challenge is that many facilities store field data in more than one database. Calibration data entered in the operations database may not be populated into, or accessible by, the maintenance database. These challenges are being addressed by:

- installing more digital instruments and valves;
- using interconnected asset management software to help manage documentation;
- using handheld documenting process calibrators to automate field calibrations and upload digital documentation to a CMMS;
- using route-based calibration.

Doing more with less

Budget cuts and the retirement of experienced workers have been substantially reducing engineering, maintenance and operations

staff numbers. Working with a leaner team makes it harder to have a large group of technicians to do rounds and, as a result, calibration rounds often fall by the wayside.

Reductions in team size also mean that experienced team members have less time for mentoring and on-the-job-training. This means that equipment and system-specific knowledge is not being successfully transferred from the individual to the institution and, as older operators and engineers retire, they take this knowledge with them.

Automating calibration and documentation

Companies in the process industries can mitigate losing the benefit of staff experience and knowledge by using multifunction documenting process calibrators and a new generation of handheld pressure calibration tools. Most of these devices feature recording and memory functions so that the technician can log measurements and upload them to a PC for reporting and analysis. Multifunction calibrators consolidate multiple calibration steps and functions into a single handheld device that sources, simulates and measures pressure, temperature and a wide variety of electrical and electronic signals. Likewise, handheld pressure calibrators combine pressure and temperature measurements and in some cases an integrated electric pump, which saves hand-pumping and extra equipment to carry around.

These multifunction tools are instrumental in:

- reducing the number of tools technicians have to carry and learn to use;
- making it possible to collect multiple datasets with one tool;

Oil and gas



WHETHER YOU'RE INSTALLING A NEW DEVICE, CHANGING THE SETTINGS OF AN EXISTING DEVICE OR REINSTALLING A REPAIRED DEVICE, CALIBRATION IS THE ONLY WAY TO ENSURE THAT THE DEVICE MEETS PERFORMANCE REQUIREMENTS.

- replacing many manual calibration steps with automated procedures;
- allowing just one person to perform calibrations in most cases;
- limiting the calculated error to a single tool rather than multiple tools;
- isolating a device from the process, verifying that it's depressurised and applying pressure with an electric pump.

Using calibration routes

The biggest savings from using a documenting calibrator come in the route management tool built into the device. The technician can load up a 'round' of calibrations that walks the technician consistently through the steps of each procedure. Using a single set of permits and paperwork for an entire route of calibrations for maybe 20 instruments reduces the cost per calibration considerably compared to performing one-off calibrations.

Reducing maintenance costs and risk

Because documenting process calibrators automatically record the as-found and as-left state of each field device in situ, and

can be operated by a single technician, route-based documenting calibrators can save as much as 50% of the time and cost of traditional manual, single-device calibration methods. Besides saving maintenance costs, this process can help companies avoid the legal costs and lost revenue from accidents. Good calibration and maintenance practices help reduce the probability of accidents. And, if a disaster strikes, good calibration records can be a part of a facility's legal defence.

In summary, implementing route-based calibration, paperless documentation and CMMS data management:

- makes it more practical and affordable for companies to perform calibrations more consistently;
- reduces risk and liability exposure;
- supports knowledge transfer from the individual to the team and to the institution;
- helps to increase both productivity and quality.

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VARIABLE SPEED DRIVE

The ABB ACS380 variable speed drive is specifically designed for heavy-duty loads and persistent predictability in large-scale producing machinery. With a range of selectable options to keep costs low, the ACS380 is in line with ABB's philosophy of interface sharing that includes software tools and options for seamless scalability between series.

Housed in a compact frame with a wide temperature tolerance from -10 to 50°C without derating, the ACS380 machinery drive delivers high torque accuracy via numerous integrated features such as PID, limit-to-limit travel, encoder feedback and timers. An in-built EMC C2 filter secures compliance with the latest European and international standards for global industrial environments.

The ACS380 has been designed with an integrated icon-based control panel, and an optional Bluetooth control panel for easy configuration and monitoring of parameters from mobile devices. To protect both people and machinery, safety functions such as TÜV-certified safe-torque-off (STO) comes as standard.

Industrial Ethernet protocols such as Profinet, EtherNet/IP, Modbus and EtherCAT are supported as well as RS485 and CANopen protocols to ensure painless integration across all makes of automation system. Additionally, the ACS380 supports mechanical, electrical and regenerative braking through networking multiple drives on a common DC bus system and includes compatibility with ABB's synchronous reluctance motor (SynRM).

The ABB ACS380 machinery drive can be used for energy-efficient control of heavy-duty mixers, lifts, compressors, conveyors and winches, and in extruding, winding and unwinding applications.

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

POWER MONITORS

Omron's KM-N2 and KM-N3 power monitors offer a choice of both panel-mounted installation and DIN rail mounting for control panels.

The KM-N2 offers numerous advantages, such as high precision power measurements for inside control panels and a 9-digit, seven-segment display. The lettering used is large and white for added brightness and improved visibility. It accepts all international voltages and can function with either single- or three-phase connections using 2-, 3- or 4-wire circuits. Up to four standard current transformers can be connected to one unit.

The KM-N3 can precisely measure up to four circuits per unit with an IEC class of 0.5S. It features a large, easy-to-read white and green LCD for efficient visibility. Each power monitor can detect incorrect wiring connections and has special mechanisms for countering RF noise generated by inverters. RS485 is provided for communications to a central monitoring system, using Modbus RTU or CompoWay/F protocols.

The KM-N units are part of a series of black panel components that have a consistent look and feel. All panel components within the range are DIN rail mounted with a retentive clamp and have a footprint with a common height of 90 mm. This simplifies wiring, improves heat dissipation in the panel and removes dead space that occurs when adjacent components have varying heights.

Omron Electronics Pty Ltd
www.omron.com.au



PORTABLE FLAW DETECTOR

Optimised for single-handed operation, the Olympus EPOCH 6LT flaw detector combines an ergonomic design with powerful ultrasonic functionality in an instrument built specifically for rope access and high-portability applications, such as inspections of offshore oil platforms, in-service wind turbines, aviation, bridges and structural steel.



For rope access and other high-portability inspections, technicians can either use just one hand or attach the product to their legs for hands-free functionality, allowing them to do inspections safely, comfortably and efficiently.

The unit is lightweight, weighing 890 g with a grip-orientated weight distribution. Hands-free operation means that the device can securely be attached to a user's leg or harness with the display rotating so users can properly view the A-scan and readings. The rotary knob and simple button design make it easy to navigate through the user interface, even while wearing gloves. The device also has intuitive software featuring a two-screen, icon-based interface to make navigation even quicker and easier.

Compliant with EN12668-1:2010, the product is engineered to IP65/67 for dust and water resistance and drop tested to protect against the hazards found in challenging inspection environments.

The unit features optional Wi-Fi connectivity for 'on the go' backups, downloads and cloud applications on the Olympus Scientific Cloud. It also has optional corrosion software, combining the ease of use of a thickness gauge with the flexibility of a flaw detector.

Olympus Australia Pty Ltd
www.olympusaustralia.com.au



PANEL PCs

Aplex Technologies' ARCHMI-9XXA Series of 12.1" to 32" panel PCs are powered by Intel's 6th generation of i5 and i3 Core processors.

The ARCHMI-9XXA Series is also equipped with Intel HD Graphics, and offers expanded functionality by optional expansion I/O boards of the TB-528 Series, including Mini-PCIe, CAN bus, POE, USB and I/O modules. It also supports a smart battery UPS module that offers emergency power backup for up to 30 min.

Wireless communication is also available (3G/4G, LTE, Wi-Fi, Bluetooth) as well as GPS, along with support for up to 32 GB of RAM.

The PCT/resistive touch screen is installed within an IP66-compliant front bezel and the unit has a die-cast aluminium chassis.

Backplane Systems Technology Pty Ltd

www.backplane.com.au

INDUSTRIAL SOFTWARE SUITE

Schneider Electric has announced the EcoStruxure Industrial Software Platform, an integrated, modular software suite designed to address operational and business imperatives across the value chain in industrial and infrastructure businesses.

The software platform offers a solution capability for engineering, planning and operations, asset performance, and control and information management. It is the latest addition to Schneider Electric's EcoStruxure, the company's IoT-enabled, plug-and-play open architecture, which delivers end-to-end solutions in six domains of expertise: power, IT, building, machine, plant and grid.

The platform is hardware- and systems-agnostic and can be deployed in a scaled, modular fashion. This enables companies to protect their investments in systems and technology while upgrading their technology footprint to support digital transformation.


The platform offers a wide range of commercial options (subscription, SaaS, perpetual) and deployment flexibility (on-premise or cloud-based) for all its available functionality. This is said to enable a low total cost of ownership without compromising risk, data security or performance requirements.

The domain-specific functionality of the platform is intended to enable business excellence in engineering, operations and asset management. The rich information management, business process knowledge and decision support capability available across the modules of the platform specific to industry problems allow companies to upgrade competencies, retain rich operational experience and develop a next-generation workforce.

Schneider Electric

www.schneider-electric.com.au

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NEW PRODUCTS



EMBEDDED COMPUTER

The Aaeon BOXER-6839 is a high-performance multicore standalone embedded PC featuring sixth- or seventh-generation Intel Core i socket type processor, fanless operation, extensive I/O, PCIe expansion and robust construction.

The BOXER-6839 is based on the Intel Q170 chipset, and factory installed processor options include seventh-generation Core i7-7700T, i5-7500T, i3-7100TE and sixth-generation Core i7-6700TE, i5-6500TE and i3-6100TE. Pentium and Celeron processor options are also available. It is equipped with two SODIMM socket supporting up to 32 GB of DDR4 system memory, three Gigabit RJ-45 Ethernet connectors, six USB 3.0 ports, two USB 2.0 ports, six RS-232/422/485 ports and 34-bit DI/O.

A 2.5" SATA hard drive can be internally mounted for operating system and data storage. An externally accessible CFast slot is provided for removable storage. System expansion is possible via two full-size Mini-Card slots and a riser card that provides one PCIe [x4] slot and one PCIe [x1] slot. The onboard Intel HD graphics engine provides two HDMI and one VGA output for high-resolution displays.

The heatsink and fanless design of the BOXER-6839 coupled with an operating temperature range of -20 to 55°C ensures long-term operation in industrial and embedded environments.

The BOXER-6839 can be powered from a 9–36 VDC source. An optional 120 W 100–240 VAC power pack is also available.

Interworld Electronics and Computer Industries

www.ieci.com.au

DRIVE TRAIN MONITORING

Schaeffler Drive Train 4.0 — part of the Schaeffler Smart EcoSystem suite of digitally integrated products — is said to expand conventional condition monitoring approaches by linking diverse digital information sources into a single platform with options for increased efficiency, machinery lifespan and sustainability, reduced downtime, reduced energy use and reduced TCO.

Drive Train 4.0's latest features include two micro services, which include the calculation of rolling bearings' nominal remaining useful life during operation based on real load spectra, and automated rolling bearing diagnostics with the FAG SmartCheck vibration analysis system. Both services connect to the Schaeffler cloud, where the corresponding big data and software solutions are implemented. Software installations on the end devices are not required; an internet browser and a network connection are sufficient.

Applications include bulk handling and conveyor applications, mining and energy; building, construction and access equipment installations, such as forklifts and logistics; food and beverage and agribusiness processes, including paper and packaging; manufacturing, metals and process engineering, transport and industrial motor and transmission applications, including pumping and HVAC installations; and utilities including electricity, water and wastewater.

Schaeffler Australia Pty Ltd

www.schaeffler.com.au



INDUSTRIAL CELLULAR GATEWAY

The ICX35-HWC industrial cellular gateway from ProSoft Technology provides a communication solution for system integrators and OEMs that monitor devices in hard-to-reach spots. With the gateway, they can monitor and troubleshoot their devices in real time over 4G LTE cellular connections, with fallback to 3G.

To allow enhanced communication, a built-in EtherNet/IP controller supports SMS messaging to the gateway as well as the reading of diagnostic data such as signal strength and data usage, allowing the user to avoid time-consuming and costly site visits.

The gateway can also be monitored through ProSoft Connect — a secure, cloud-native platform designed specifically for the IIoT. With secure VPN connections via internet and cellular links, the device offers remote site access to corporate networks (VPN Client Mode).

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au





STANDARDISED DRIVE SYSTEMS

NORD DRIVESYSTEMS has established three preferred sizes for efficient variable-frequency drives in materials handling and conveyor applications. The standardised drive systems simplify purchasing, engineering, commissioning and spare parts stocking, as well as being easy to install, operate and maintain. Limiting the number of variants can yield greater total cost of ownership (TCO) savings than any other measure except for lowering energy consumption, according to the company.

The LogiDrive line of three preferred drive variants is optimised for intralogistics applications and can be used for conveyor systems spanning many hundred metres. The VFDs allow for simple daisy-chaining as short power lines can be connected from one drive to the next. Three geared motor variants meet all typical performance requirements: IE4 permanent-magnet synchronous motors with power ratings of 1.1, 1.5 or 2.2 kW are combined with efficient two-stage helical-bevel gearboxes in two sizes for torques up to 260 Nm. Robust frequency inverters from the NORDAC LINK series enable a wide range of speeds. The systems feature a high overload capacity and offer a versatile range of functions. Interfaces for all commercially available communication protocols are available, including Profinet, Ethernet POWERLINK, EtherCAT and EtherNet/IP.

LogiDrive systems are easy, quick and safe to install due to coded plug-in connectors. Maintenance switches, key switches and direction switches on the devices allow for flexible direct access to individual drive axes for set-up or service. Sensors and actuators can be connected via M12 plugs. Plug-and-play, pre-parameterised inverters simplify maintenance, and drive components can be individually replaced.

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

MODULAR LIGHT CURTAINS

The Allen-Bradley GuardShield 450L safety light curtain system from Rockwell Automation is a flexible, cost-effective solution that enhances safety while improving productivity through innovative transceiver technology.

Unlike traditional safety light curtains based on predefined transmitter and receiver units, this modular light curtain system features a transceiver design that employs plug-in modules to establish each unit's function as a transmitter or receiver. Once powered up, the transceiver learns its functionality from the plug-in module.

Five-pin plug-ins are available for basic on/off functionality, while eight-pin plug-ins provide manual and automatic restart with external device monitoring (EDM). To further simplify set-up, advanced function settings are configured through DIP switches located on the plug-in module.

Suitable for hand and finger detection, and offered in a wide range of protective heights, the light curtain system is also equipped with an active protective field that senses the entire length of the transceiver. This feature reduces the inactive sensing areas that generally appear at the top and bottom of other light curtains.

Unlike traditional light curtain systems, the active sensing field and compact design allow users to install the GuardShield 450L light curtain system inside a machine frame as opposed to outside or on the machine. Additionally, flexible mounting kits and built-in alignment indication allow for quick, trouble-free installation.

Rockwell Automation Australia

www.rockwellautomation.com.au



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SAFETY INSTRUMENTED SYSTEMS

USING SINGLE-LOOP LOGIC SOLVERS



When implementing safety instrumented systems, single-loop logic solvers provide an affordable option that delivers simple installation, easier validation and faster start-up.

The industrial process industries are experiencing a dynamic growth in process functional safety applications. Much of this growth has been driven by increased awareness of destruction of property, injuries and loss of life associated with tragic events that are widely publicised in the worldwide media.

Companies, of course, have a moral and legal obligation to limit risks posed by their operations. In addition to their social responsibilities, the costs of litigation measuring in the billions of dollars has caught the eye of risk management executives worldwide. As a result, management recognises the financial rewards of utilising a properly designed process system that optimises reliability and safety.

That's why companies are now actively taking steps to comply with various national and worldwide safety standards such as ANSI/ISA 84 and IEC 61508/61511. To accomplish this, safety practitioners look to a new generation of equipment specifically designed and approved for use in safety instrumented systems that utilise electrical, electronic or programmable (E/E/PE) technologies.

Safety instrumented systems

A safety instrumented system (SIS) is defined as an instrumented system used to implement one or more safety instrumented functions (SIFs). A SIS is composed of any combination of sensors, logic solvers and final control elements for the purpose of taking a process to a safe state when predetermined conditions are violated.

A SIF is a function to be implemented by a SIS that is intended to achieve or maintain a safe state for the process with respect to a specific hazardous event.

Examples of SIF applications include:

- Shutdown in a hazardous chemical process plant.
- Open a valve to relieve excess pressure.
- On/off control to prevent tank overflow.
- Shut down fuel supply to a furnace.
- Add coolant to arrest exothermic runaway.
- Automatic shutdown when operator not present.
- Close a feed valve to prevent tank overflow.
- Initiate release of a fire suppressant.
- Initiate an evacuation alarm.



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IEC 61508 provides guidelines

To help companies implement a SIS, the International Electro-technical Commission (IEC) developed ‘IEC 61508: Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems’. The main objective of IEC 61508 is to provide a design standard for safety instrumented systems to reduce risk to a tolerable level by following the overall hardware and software safety lifecycle procedures, and by maintaining the associated stringent documentation. IEC 61508 has become the benchmark used mainly by safety equipment suppliers to show that their equipment is suitable for use in Safety Integrity Level (SIL) rated systems.

For legacy products, suppliers are performing a Failure Modes, Effects and Diagnostic Analysis (FMEDA) hardware-only assessment which provides failure data for SIS designers and may also provide proven-in-use data. This does not include any assessment of the product development process which contributes to systematic faults in the device design.

New devices that are fully compliant with IEC 61508 address systematic faults by a full assessment of fault avoidance and fault control measures during hardware and software development.

Safety integrity level (SIL)

To determine a SIL, the safety practitioner team’s process hazard analysis (PHA) procedure identifies all process hazards, estimates their risks and decides if specific risks are tolerable. Once a SIL has been assigned to a process, the safety practitioner has to verify that the individual components (sensors, logic solvers, final elements, etc) that are working together to implement the individual safety instrumented functions (SIFs) comply with the constraints of the required SIL.

For any device used in a SIS, the team must pay close attention to each device’s safety failure fraction (SFF) and probability of failure on demand (PFD_{avg}).

Tables 1 and 2 provide additional information. Table 1 shows the required availability and probability of failure for the four SILs, where safety availability is the availability of a SIS to perform the task for which it was designed; the average probability of failure on demand (PFD_{avg}) is the likelihood that a SIS component will not be able to perform its safety action when called on to do so; and the risk reduction factor (RRF) is defined as $1/PFD_{avg}$; the number of times that risk is reduced as a result of the application of a safeguard.

Table 2 shows that a more complex device (such as a device involving a software component) must achieve a defined SFF to be suitable for a specific SIL, where the Safety Failure Fraction (SFF) is the ratio of the average rate of safe failures plus dangerous detected failures of the subsystem to the total average failure of the subsystem; and the Hardware Fault Tolerance (HFT) is the level of required device redundancy. For example, an HFT of 1 means that there are at least two devices in the system and a dangerous failure of one device does not prevent the safety function from performing.

For each device in the SIF, both the SFF and the PFD_{avg} have to be compared to the rules outlined in the safety standards to ensure that they are sufficient for use in the required SIL of the SIS. If these devices are classified as Type B, such as microprocessor-based devices, the development process including software must also be assessed and approved for the required SIL level. While the standards do allow proven-in-use data as proof of a device’s

Safety Integrity Level (SIL)	Safety Availability	Probability of Failure on Demand Avg (PFD_{avg})	Risk Reduction Factor (RRF)
SIL 4	>99.99%	0.0001 to 0.00001	10,000 to 100,000
SIL 3	99.90% to 99.99%	0.001 to 0.0001	1,000 to 10,000
SIL 2	99.00% to 99.90%	0.01 to 0.001	100 to 1000
SIL 1	90.00% to 99.00%	0.1 to 0.01	10 to 100

Table 1: The SIL is a measure of the amount of risk reduction provided by a SIF, with SIL 4 having the highest level of safety integrity, and SIL 1 the lowest.

LIMIT ALARM TRIP

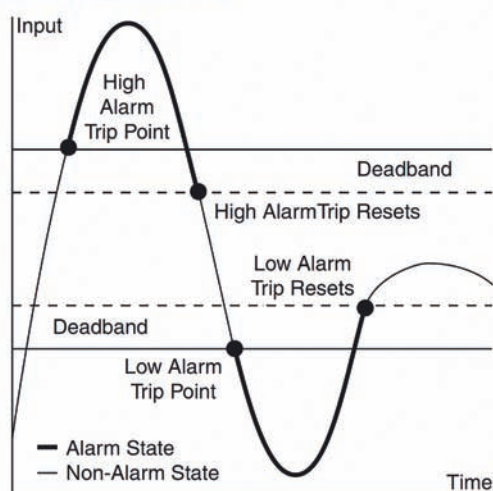


Figure 1: Single-loop logic solvers, with selectable dead bands to reduce false alarms, can be used to warn of unwanted process conditions or to provide emergency shutdown.



BY USING THE LATEST GENERATION OF SINGLE-LOOP LOGIC SOLVERS, USERS CAN REALISE MANY OF THE SAME ADVANTAGES OF LARGER AND MORE EXPENSIVE SAFETY-CERTIFIED PLCs AT A FRACTION OF THE COST.

ON/OFF CONTROLLER

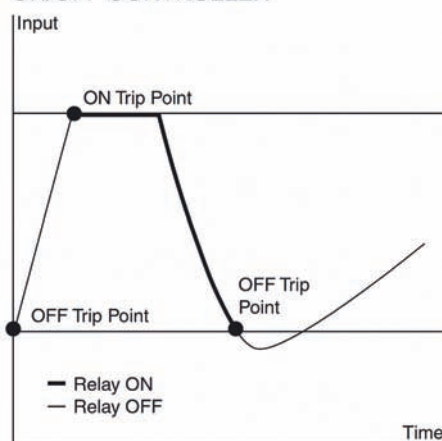


Figure 2: Safety trip alarms can be used as simple on/off controllers in level applications when filling, emptying or preventing overflow of a container or tank.

Safety Failure Fraction (SFF)	Hardware Fault Tolerance (HFT) for Type B Device		
	0	1	2
< 60%	Not Allowed	SIL 1	SIL 2
≥ 60%	SIL 1	SIL 2	SIL 3
≥ 90%	SIL 2	SIL 3	
≥ 99%	Special requirements apply (see IEC 61508)		

Table 2: To be considered for a specific SIL level application, a Type B 'complex' device (such as a microprocessor-based logic solver), must achieve a defined SFF rating.

reliability, such information is usually very hard to verify and document. For this reason many end users prefer devices fully assessed by third-party organisations.

It is always the responsibility of the end user to perform or verify the calculations for the entire safety loop. Since a SIF relies on more than one device, it is imperative that all devices in the loop work together to meet the required SIL levels. The device's SFF and the PFDavg values used for these calculations can be found in an FMEDA report.

FMEDA reports

IEC 61508 requires a quantitative, as well as qualitative, assessment of risk. An FMEDA provides a systematic way to assess the effects of all probable and known failure modes, including online monitoring and error checking, of a SIS component. It is a detailed circuit and performance evaluation that estimates failure rates, failure modes and diagnostic capability of a device. This data is provided to be

used by a competent functional safety practitioner to determine a device's applicability in a specific safety-related application. It is best if the FMEDA report is certified by a well-qualified third-party agency that specialises in functional safety approvals.

Logic solvers

Until recently, the thought of a safety system conjured up images of triple modular redundant (TMR) systems that represent enormous capital expenditures. Today, however, manufacturers offer a wide gamut of safety-certified devices that can be integrated into very cost-effective solutions. One simple, economical, yet highly dependable option is using a safety trip alarm as a single-loop logic solver.

A single-loop logic solver monitors a temperature, pressure, level, flow, position or status variable. If the input exceeds a selected high or low trip point, one or multiple relay outputs warn of unwanted process conditions or provide emergency shutdown (Figure 1), or provide on/off control, such as in a level control application (Figure 2). Of course, such device would need to be certified to IEC 61508:2010 for SIL 2 and SIL 3 applications.

Increased sophistication

The sophistication of alarm trips, and their applicability in SIS systems, has increased exponentially since their introduction. This includes programmable inputs; local configuration using onboard controls; safe password protection; a process display; transmitter excitation (the ability to power a transmitter eliminates an additional possible point of failure); and comprehensive internal, input and sensor diagnostics.

Input and instrument diagnostics with fault alarms

Specially engineered safety trip alarms can check their own operation and configuration on start-up, and then continuously monitor this information, as well as the input signal. If internally diagnosed faults or external faults, such as loss of sensor or a bad quality input occur, the alarm will trip a fault alarm.

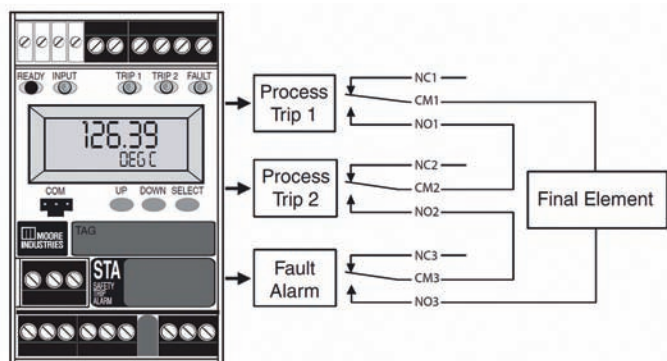


Figure 3: Single-loop logic solver in a high integrity architecture.

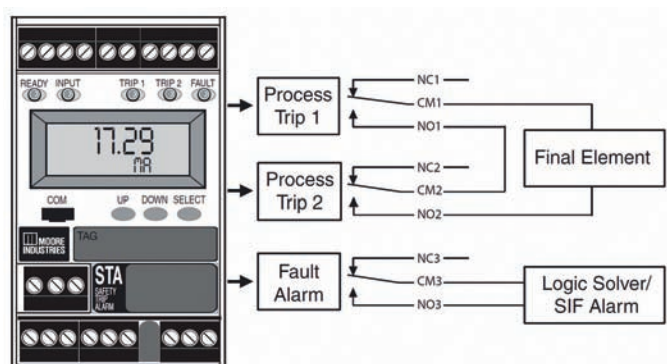


Figure 4: Single-loop logic solver in a high availability architecture.

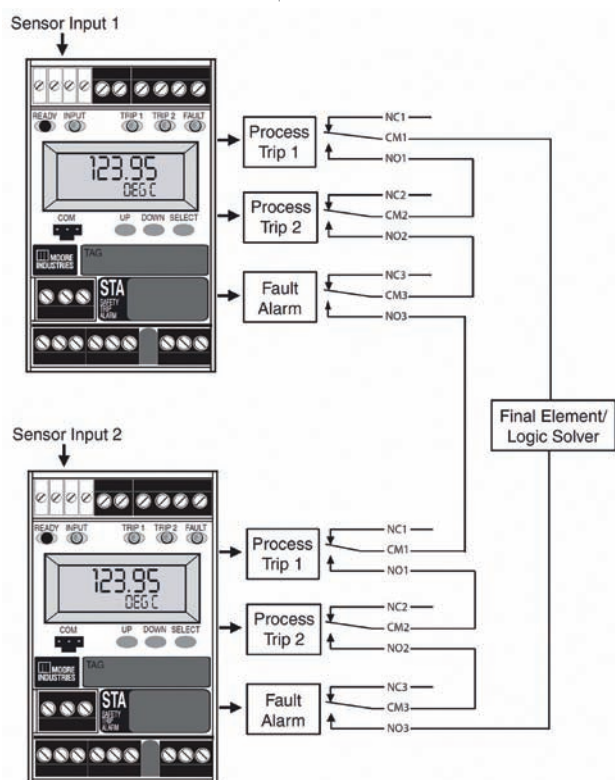


Figure 5: Single-loop logic solvers in a 1oo2 redundant/voting architecture are applicable for use up to SIL 3.

SIL 2 and SIL 3 applications

By using the latest generation of single-loop logic solvers, users can realise many of the same advantages of larger and more expensive safety-certified PLCs at a fraction of the cost. If a microprocessor-based single-loop logic solver has an SFF greater than or equal to 90%, and the PFDavg data falls within the required range, it is suitable for use in SIL 2 applications using a 1oo1 (no voting or redundancy required) architecture. In a 1oo2 architecture (redundancy) this same single-loop logic solver could be suitable for use in a SIL 3 application provided the software is assessed and suitable for SIL 3 applications.

Typical examples of single-loop logic solvers in safety instrumented systems include:

- **High integrity architecture:** This configuration offers the highest trip integrity in a non-redundant application (Figure 3). Since all three relays are wired in series, any trip alarm or fault alarm will trip the final element or logic solver.
- **High availability architecture:** In this configuration, the safety trip alarm provides higher process or system availability (Figure 4). The fault alarm is wired separately to inform a safety system that there is a fault alarm and that this component's ability to carry out its portion of the SIF cannot be performed. This configuration would be used in applications where it is desirable to keep the process running should a fault occur because of a bad input or instrument fault. The output process trip relays are connected in a 1oo2 scheme to trip, providing security against a single relay failure. However, should the fault relay become active, the fault should be removed before the safety trip alarm can provide proper safety coverage.
- **1oo2 redundant architecture:** In this architecture, every component appears twice, and may be applicable for use in SIS

systems up to SIL 3 (Figure 5). Advantages are improved reliability of trip action and reduced vulnerability to a single failure compared to a 1oo1 architecture. The logic in this configuration is an 'OR' statement for the safety function; if either sensor input reaches a trip condition or a fault relay is activated, the loop or function will reach a tripped state.

Third-party safety certifications

Today, some single-loop logic solvers are designed 'from the ground up' in accordance with IEC 61508. An essential requirement to verify their design is a third-party certification from TÜV, exida or a similarly accredited approval body. This certification provides unbiased, verified evidence that the unit is appropriate for use in specific SIS strategies. For example, the certification may verify that the device is appropriate for SIFs up to SIL 2 in a simplex or 1oo1 configuration. For increased process availability or higher SILs (such as SIL 3), the devices may be applied in 1oo2 or 2oo3 architectures (Figure 6). Hazardous area approvals, specifically Class 1, Division 2 for non-incendive (Type N) applications and Zone 2 applications, are a must.

Just the right fit

Today, there are solutions for SIS strategies with hundreds of I/O and there are those for systems with just a handful of I/O — and everything in between. The latest generation of safety-certified single-loop logic solvers fits into this scenario nicely. They provide an affordable option that delivers simple installation, easier validation and faster start-up. Perpetual benefits that last for the life of the system include less maintenance, faster testing, easier documentation of the safety management reports and modular replacement strategies.

Moore Industries Pacific Inc
www.miinet.com



SALINITY MEASUREMENT SYSTEM

The Roxar Salinity Measurement System is designed for the sensitive, real-time measurement of saline water in gas production well streams.

Emerson Industrial Automation says that operators can instantly identify changes in the flow stream and the smallest amounts of saline water at high levels of sensitivity. This enables the operator to take immediate remedial action to prevent threats to production, such as scaling, hydrate formation and corrosion. The onset of formation water and its salinity, if not controlled, can lead to well shutdowns and cost producers millions in unplanned shutdown time.

The system, which is a key element of the Roxar Subsea Wetgas Meter and based on microwave (MW) resonance technology, provides

quantitative and qualitative real-time salinity measurements in many types of field conditions — particularly in the high gas volume fraction (GVF) and wet gas flows that characterise wet gas fields.

The Roxar Subsea Wetgas Meter provides individual flow rates of gas, condensate/oil and water. The salinity system consists of a salinity sensor mounted flush with the wall of the meter. The MW resonance technology ensures an instant response to changes to conductivity of the flow stream and can measure water conductivity down to ± 0.1 S/m and up to 99.99% GVF with a sensitivity in the range of ± 0.004 S/m. Small pockets of formation water leaking into the flow can therefore be detected instantaneously.

Emerson Automation Solutions

www.emersonprocess.com.au

RADIAL PISTON PUMPS

Moog has launched its RKP high-pressure radial piston pump series. With a maximum operating pressure of 350 bar and peak pressure up to 420 bar, the RKP series addresses a wide range of applications including presses, metal forming and heavy industries.

Moog RKPs are high-performance variable displacement pumps that combine high performance with up to 90% efficiency. Their rugged design, featuring heat-treated sliding parts and zero load on the bearing, ensures a long service life with minimal maintenance downtime.

The extensive range of sizes now includes 19, 32, 63, 80, 140 and 250 cm³ pumps. Size 140 cm³ is the latest addition, helping to bridge the previous gap between 80 and 250 cm³ pumps in the high-pressure field. The entire range is also available with Moog's medium-pressure (280 bar) RKP series.

Moog RKPs are designed to meet the needs of a wide range of applications. A broad selection of compensator types and control options provide the flexibility to configure the pumps according to the specific application. The pump's ability to operate at zero speed and unlimited speed range/pressure hold make it suited to SCP (speed control pump) operations in cycles that require long pressure holds. Additionally, its quiet, low-vibration operation is suitable for applications where noise is a concern. Furthermore, all RKP products are ATEX certified for use in potentially explosive environments.

Moog Australia Pty Ltd

www.moog.com



RFID INTERFACE WITH BUILT-IN PLC

The Turck TBEN-L-RFID is an interface module that can be used outside the cabinet due to its IP67 rating, making it suitable for retrofitting RFID applications.

The module allows actuators and sensors to be connected with RFID read/write heads simultaneously. These features reduce the installation and wiring efforts that are required for industrial identification solutions.

The product expands the Turck TBEN-S-RFID module's functionality with PLC capabilities via CODESYS. This compact module's controller function can filter and pre-process RFID data and link to broader control operations, enabling high-speed dynamic or multitag RFID applications. The device includes four RFID ports for readers and eight universal DXP I/Os for sensors or actuators. It offers 256 MB of flash memory and runs on an 800 MHz CPU, which accesses a 128 MB DDR3-RAM. TBEN-L-RFID devices connect via an M12 connector to the Ethernet layer, with power supplied via a 7/8" connector.

The device features multiprotocol Ethernet technology. Users can set the protocol used for the module — either Profinet, EtherNet/IP or Modbus TCP — via the CODESYS environment.

Turck Australia Pty Ltd

www.turck.com.au



OXYGEN ANALYSER FOR COMBUSTION CONTROL

The Michell Instruments XZR250 oxygen analyser is designed for monitoring combustion control in industrial boilers. It was developed as a cost-effective, easy-to-operate instrument with a probe designed to cope with the high temperatures in the flue. Effective combustion control has growing importance for operators as it not only helps increase fuel efficiency but also ensures compliance with legislation on allowable emissions.

The XZR250 uses a zirconium-oxide sensor with a life span of up to seven years (depending on the fuel used) to keep maintenance to a minimum. A key benefit of the sensor is its fast response of less than 15 s to changes in oxygen concentrations of up to 90% of the range. It is also accurate to $<0.25\% \text{ O}_2$, allowing optimum combustion control.

The XZR250 requires no specialised tools for installation, is lightweight and has a fast start-up routine.

The probe can be inserted directly into boilers up to 700°C and uses the Pitot effect to ensure the sample gas is sufficiently cooled to protect the sensor from damage without the need for complex sample conditioning. As with any process instrument, regular calibration is necessary to ensure the accuracy of the measurements. The XZR250 can use air as a calibration gas, making calibration cost effective and simple to perform.

When the sensor needs replacing, this can be done with minimal process downtime, using Michell's sensor exchange program.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au



CYBERSECURITY CERTIFIED SAFETY CONTROLLER

HIMA's HIMax safety controller has been awarded a cybersecurity certificate from TÜV Rheinland. The test agency certified the processor and the communications module in accordance with international standards IEC 62443-4-1, IEC 62443-4-2 and ISASecure EDSA 2.0.0. The certificate

is based on stringent testing and evaluation of all requirements regarding IT security over the entire lifetime of the safety controller, and it says that the HIMax fulfils the requirements of security level SL 1.

Nowadays, plant operation is only reliable when plant operators systematically implement cybersecurity measures in addition to functional safety. The key normative basis for this is the international standard IEC 62443, 'IT security for industrial automation and control systems', which specifies separate network levels with defined conduits. The newly developed cybersecurity certificate from TÜV Rheinland also conforms to this standard.

TÜV Rheinland tests controllers in accordance with the IEC 62443 standard (Part 4-1, 'Secure Product Development Lifecycle Requirements', and Part 4-2, 'Technical security requirements for IACS components').

HIMA additionally received the Embedded Device Security Assurance (EDSA) certificate from ISASecure. ISASecure certification (ISASecure EDSA 2.0.0 – Level 1) is based on a test methodology derived from the IEC 62443 standard. Along with these two certificates, the cybersecurity of the HIMax controller is documented by an Achilles Level 1 certificate issued by the independent Canadian industrial security specialist Wurldtech.

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RUGGEDISED CABINETS

Power management company Eaton has expanded its current industrial portfolio to include ruggedised cabinets to support the growing trend towards the digitalisation of process and communications and provide a safe, secure and available environment for IoT technology, automation and big data, which is moving traditional UPS products outdoors.

Eaton's ruggedised cabinet range is designed to ensure continuous backup power to critical applications where data collection and processing are located in harsh environments subject to extreme weather, dust, vermin and vandals.

The range caters for most applications through customisable designs and offers an ingress protection of 42 to 55, ensuring vital electronics remain protected at all times.

The specially designed, all-in-one solutions combine Eaton's critical power solutions with a suitably selected cabinet to provide the required protection from in-application environmental conditions.

The ruggedised portfolio will service key sectors such as oil and gas processing, waste treatment, CCTV and security systems, automated car parks and industries requiring uninterrupted power supplies.

Features include AC, DC and combined AC/DC UPS; 1–40 kW singular and modular units; remote monitoring and control; 18–34 RU enclosure sizes; and air-to-air heat exchange. Featuring anti-rust paint and multipoint locking, the cabinets are made of a marine-grade aluminium material.

Eaton Industries Pty Ltd
www.eatonelectric.com.au



CONTROLLER

The GE RSTi-EP CPE100 controller is a compact yet flexible high-performance controller that is suitable for multiple applications.

Saving time and resources, the controller has the same run time as an existing RX3i controller and leverages existing application libraries and templates. The stand-alone programmable automation controller (PAC) contains 1 MB of user memory and four Ethernet ports.

The Ethernet ports support a range of protocols, including Profinet, SRTP Client/Server, EGD, Modbus TCP Client/Server and OPC-UA Server. LAN1 is a high-speed Ethernet and LAN2 comprises three switched ports configurable as either a second embedded Ethernet controller or an embedded Profinet controller.

The controller is secure by design, incorporating technologies such as Trusted Platform Modules and secure, trusted and measured boot. Centralised configuration allows encrypted firmware updates to be executed from a secure central location and a suite of cybersecurity technologies and tools help prevent unauthorised updates. Additional built-in security protocols help protect against man-in-the-middle and denial-of-service attacks.

The product features a wide operating temperature range of -40 to 70°C and is suitable for a range of applications and environments.

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

MINIATURE LOAD CELLS

The Burster model 8431 and 8432 precision miniature load cells are designed for precise tension and compression force measurements in limited spaces. They feature a special connection cable, convenient load application via threaded pins with external winding and small dimensions.

They are especially suitable for machine or tool manufacturing, handling gear and laboratory applications. The miniature load cells also adopt features found typically on larger load cells, such as hermetically sealed construction, overload protection and boring for pressure compensation when applied under vacuum.

They feature temperature compensation from -55 up to 200°C and offer measurement ranges from 0–2.5 N to 0–100 kN, with a measurement accuracy of 0.2% FS. They have minimal lateral sensitivity due to supporting membranes, and include overload protection for both tension and compression.

Bestech Australia Pty Ltd
www.bestech.com.au



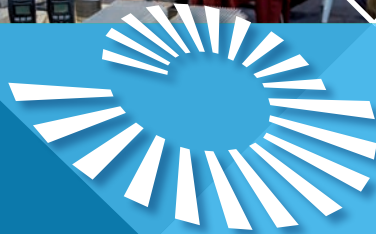


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AS I SEE IT



CHANGE CREATES OPPORTUNITIES

In this ever-changing world, we need to accept that change is a natural part of everyday life.

Once you started and finished your career with one company, and today the average is between 10 and 15 jobs over a career.

There was a time when many utilities were taken for granted. Electricity was available and reliable, at a reasonable cost. If you needed more, the infrastructure was provided and you paid for the service. Water and gas supply was also available and reliable.

Over the past few years prices have gone up and reliability has decreased. This is opening up new opportunities and we see many companies developing new solutions to tackle the challenges of today. Solar, wave, wind and hydrogen are just a few examples of generation and the storage of energy that are creating another fast growing market.

For many years we had a defined list of options for transport, and today each of them is being challenged. Petrol cars are being challenged with electric vehicles, and ride sharing is challenging the ownership of cars. Where will the autonomous vehicles take us?

Once upon a time companies produced products and services for the local market at local prices. Today it's a world market, taking competition to a new level. You once went to the local bookstore to see what was available, and today you can search the world for a book, pay for it online and have it almost instantly — plus technology can read the book to you while you are driving to work.

The challenge is to grasp the changes. What do you need to do to capitalise on these changes and enhance your career opportunities? The answers are in education, innovation, collaboration and networking. Education: With technology changing so fast, you need to invest in your most valuable asset — yourself.

Innovation: You need to either create or find new innovative solutions to what you do on a daily basis, or risk being left behind.

Collaboration: As an individual, either a person or as a company, your own knowledge and resources limit you. The challenge is to find like-minded people who can expand your collective knowledge and deliver better outcomes.

Networking: How will you find that new innovative solution, or find people to collaborate with, to ensure you don't get left behind? The answer is to network with like-minded people. This is usually undertaken on several levels: business, industry and local communities.

The Institute of Instrumentation, Control and Automation is focused on assisting our industry to create networking opportunities, foster the opportunity for you to meet like-minded people, to create a better understanding of what technology is currently available, and to meet others with whom you can collaborate to enhance your opportunities.

The IICA is continuing to see record attendances at the IICA events around Australia. Where else will you be able to enhance your professional career, with so many presentations and an expo to see the latest technology available?

We look forward to seeing you at our next event.



**Greg Garrihy is the CEO of the Institute of Instrumentation, Control & Automation (IICA). He has a solid business and industry background, with his most recent role being a partner at nem*

Australasia, assisting business leaders achieve their potential by enhancing their performance, vision and aspirations. He has been involved in the automation and process control industry since 1997 and has held key roles in several market-leading automation and instrumentation companies. He has also been chair of the IICA South Australian branch for the past four years.



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