



AUSTRALIAN ASSEMBLED SIL 3 CERTIFIED ESD BALL VALVE SOLUTIONS

GAS TRANSMISSION, MINING, REFINING, POWER



POWERFLO
SOLUTIONS



~~unsolvable.~~

7%-10% of total production is lost due to unplanned downtime. This can now be avoided. IIoT by Honeywell is solving the industry's biggest challenges, once thought to be unsolvable. Helping you avert unplanned plant downtime before it occurs.

Honeywell

© 2016 Honeywell International Inc. All rights reserved.



For more information, please visit
www.hwll.co/IIoT



ROTEX trunnion-mounted and floating, metal- and soft-seated ball valves are now being fully assembled with a wide range of gear operators and actuators in Australia.

Fire safe and NACE compliant, as well as with SIL 3 certification on the complete ROTEX actuated valve assembly, these valves are designed specifically for use in oil and gas applications — both in upstream and downstream refining; gas transmission and compression; and HIPPS systems.

Available in a range of special alloys, including Duplex and Super Duplex; titanium Gr.12, Hastelloy C, Alloy 20 and Monel, ROTEX Maxflow valves are well proven in other more arduous applications such as in nickel HPAL, solvent extraction, air separation and in fertiliser plants for ammonia, ammonium nitrate and other corrosive media. For erosive service, special trim materials such as tungsten carbide and chromium alloys are available. Executions with steam jackets and extended bonnets are manufactured to order. An extensive range of pneumatic and electric actuator solutions, along with SIL 3 certified ESD controllers, solenoid valves, position monitors etc. are available — along with custom-designed stainless steel control panels, so that even the most intricate of control solutions can be tailor-made.

PED certification is also available on all locally stocked product.

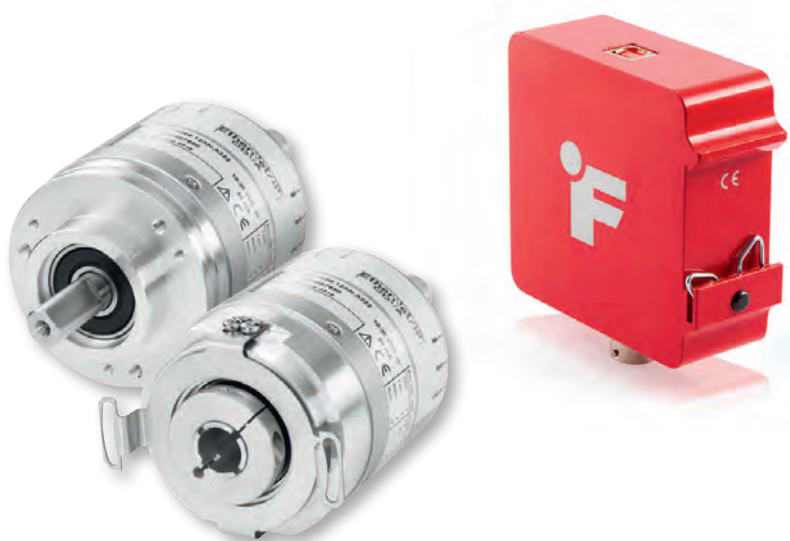
Powerflo Solutions Pty Ltd
www.powerflo.com.au



POWERFLO
SOLUTIONS

CONTENTS

- 4 Fiscal measurement of natural gas
- 8 Hot products online
- 10 New products
- 20 Robots everywhere
- 35 Industry 4.0: Ignore at your peril
- 38 Monitoring motor supply pays off
- 48 Free conference program to feature at AOG 2017
- 50 Training: are the fundamentals being left behind?



READ ONLINE!

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

A large offshore oil and gas platform is shown against a clear blue sky. The platform is yellow and has multiple levels with various pipes, valves, and equipment. A large red and white crane is mounted on the platform, extending upwards. The platform is supported by several legs that go into the water. The water is blue with some ripples.

FISCAL MEASUREMENT OF NATURAL GAS

Oil and gas fiscal measurement accuracy for allocation and custody transfer depends on many factors including measurement technology, fluid quality, rate of production, operating conditions and process complexity.



Fiscal measurement must not be confused with custody transfer; in fact, fiscal measurement is a more general term meaning “measurement for money” that includes both allocation and custody transfer flow measurement.

- **Allocation** is the numerical distribution of products between parties according to their equity share.
- **Custody transfer** is contract driven: that means that there is a contractual obligation between buyer and seller which may require adherence to accuracy, repeatability, linearity or uncertainty standards as defined by measurement standards such as API, GOST (Russian equivalent to API), etc. Custody transfer need not imply change of ownership.

Gas custody transfer flow measurement can take place anywhere along the process value chain from the wellhead to delivery or sale location. The dynamics of where these transactions are actually located can be influenced by a number of factors with the two primary ones being regulation and commercial arrangement. However, for the lowest uncertainty in measurement, custody transfer generally takes place at stable, predictable single-phase locations or physical discrete handover points (eg, platform/production exit location, pipeline entry/exit, terminal entry etc).

Natural gas

The natural gas delivered to consumers is composed almost entirely of methane (CH_4). However, natural gas found at the wellhead, although still composed primarily of methane, is by no means as pure. Once separated during initial processing it commonly exists in mixtures with other hydrocarbons, principally ethane, propane, butanes and pentanes. In addition, raw natural gas contains many other compounds such as water vapour, hydrogen sulfide (H_2S), carbon dioxide (CO_2) and nitrogen, along with other impurities. Typical natural gas concentrations for Australian sources are shown in Table 1.

Gas gathering systems and major transportation pipelines impose restrictions on the composition of the natural gas that can be shipped into the pipeline. Gas gathering systems usually focus restrictions on the

amount of water and other contaminants such as H_2S , benzene, mercury and arsenic. Gas transportation systems, since these are usually after gas processing, generally focus restrictions on quality factors such as CO_2 , N_2 and overall Wobbe Index. This normally determines the location of a primary custody transfer point, as quantity and quality must be measured to meet the relevant requirements.

Flow measurement

A complete measurement system is usually composed of many different parts:

- Pressure-reducing lines with overpressure protections, since it is important to stabilise the pressure and maintain it at a constant value to optimise the measurement of the flow rate.
- Metering lines that can include control valves to limit the capacity per line.
- Gas samplers or gas chromatographs (GC) to provide information on gas quality and composition.
- Proving/calibration systems for the periodic checking of the meters.
- A data management and control system.

A large amount of instrumentation is associated with the various steps of the measurement process, and accuracy and reliability are very important to ensure that the overall system uncertainty that has been agreed to within the contract can be achieved and maintained.

Measurement uncertainty

All meters and metering systems are subject to uncertainty and it is a common mistake to confuse accuracy and uncertainty but they are subtly different.

- **Accuracy** is matching the meter output to a known standard or reference, and will include terms like bias, readability and precision. This can be considered the best estimate according to the scale of the measurement.
- **Uncertainty** is more related to repeatability, and is an estimate of the limits where the true value is expected to lie for a given confidence level.

Fiscal measurement systems are typically driven by regulation (taxes, royalties etc) and generally follow the same principles as a custody transfer system. A standard natural gas measurement system has an

State	Victoria (Bass Straight 1986)	Queensland (Roma Field 1986)	SA and NSW (Gidgealpa Field 1986)	WA (North West Shelf 1986)
Methane (%vol)	90.6	87.4	91.1	87.6
Ethane (%vol)	5.6	5.4	4.7	5.6
Propane (%vol)	0.8	1.9	1.02	2.0
Other alkane (%vol)	0.2	1.3	0.43	0.9
Nitrogen (%vol)	1.1	3.6	3.5	0.7
CO ₂ (%vol)	1.7	0.4	2.4	3.2
Specific gravity (air=1)	0.61	0.64	0.62	0.60
Heating value (MJ/m ³)	38.7	39.5	39.3	40.0
Wobbe index	49.4	49.1	49.9	51.0
Greenhouse CO ₂ /GJ (Greenhouse Challenge Workbook 1997)	58.9	56.7	63.2 (NSW) 57.6 (SA)	62.3

Table 1: Australian natural gas composition. (Source: Australian Institute of Energy)

uncertainty of $\pm 1\%$ of energy, and so to get within this value the other system components that combine to generate an energy figure must be better than this.

The main components of a gas measurement system are shown in Figure 1.

Compression stations (upstream production)

Natural gas is highly pressurised as it travels through a pipeline; as gas is a compressible fluid, the aim is to increase the pressure in the pipelines so more gas can be transported keeping the pipeline size constant. To ensure that the natural gas flowing through any one pipeline remains pressurised, compression is required periodically along the pipe. This is accomplished by compression stations, usually placed at 60 to 160 km intervals along the pipeline. The natural gas is compressed by either a turbine, motor or engine. Siting is dependent on terrain, and the number of gas wells in the vicinity; frequent elevation changes and a greater number of gas wells will require more compression stations.

In addition to compressing natural gas, compression stations also usually contain some type of liquid separator, much like the ones used to dehydrate natural gas during its processing. Although natural gas in pipelines is considered 'dry' gas, it is not uncommon for a certain amount of water and hydrocarbons to condense out of the gas stream while in transit.

Pressure reducing

For delivery to the consumers the gas in the main trunk lines is depressurised to manageable levels, and metering lines are usually installed downstream of pressure-reducing stations. This was mandatory years ago when flow computer technology was not

so advanced; a constant value of pressure could greatly help to ensure a stable signal sent by the meter. Pressure-reducing lines are composed of a main pressure regulator that will reduce the inlet pressure to a fixed value, and other equipment to ensure overpressure protections: monitor regulators, relief valves and slam shut valves. The choice of the devices used to protect equipment and the pipeline from overpressure problems can be defined by national standards or by customer internal procedures.

Pressure-reducing lines usually include filters and heat exchangers to improve the gas characteristics, eliminating dust, particles and hydrates that could damage downstream equipment.

Meters

There are many different flow measurement technologies available for fiscal measurement; one of the first differentiators is measurement by volume or by mass. Volumetric measurements are called inferential, as these types of meters can calculate the capacity after measuring another parameter, such as the fluid velocity. Examples of volumetric meters are orifice fittings, turbine meters and ultrasonic meters. Direct mass measurement is performed by mass flow meters, such as Coriolis meters.

Even if it's true that each technology will most certainly work at all given conditions, it is also true that not of all of them will give the maximum performance. The choice of technology to be used will depend on many factors: pressure, temperature, flow rate and range, gas composition and quality, desired accuracy and redundancy, component and installation cost, maintenance cost, required footprint and so on. It is also necessary to take into consideration other important as-

pects linked to the characteristics of each meter, such as pressure loss, rangeability, requirements for flow conditioning and the ability to deal with dirty gas or noise in the system. A complete knowledge of gas flow conditions must be understood before the right meter technology can be chosen and the meter station design can proceed.

Odorant injection

Natural gas has no odour so it is mandatory to have it odourised in the event of a leakage, as the ability to smell gas is one of the simplest ways to detect a leak. Odorant injection systems vary from simple and manual ones (ie, absorption type) to complex and completely automated units where concentration ratio is ensured by a microprocessor-based control unit that will keep track of the liquid actually injected and automatically adjust the injection rate to keep the odorant ratio constant.

Gas composition

Knowing the correct gas composition is an important factor in fiscal measurement: it is used to determine the latent energy content of the gas (that is the amount of energy that we will get when we burn it). In addition it is necessary to know if there are any sulfur compounds, hydrogen sulfide and mercaptans (both natural and added as odorants). Contaminants can reduce pipeline integrity, so their monitoring can be combined with energy measurements for complete custody transfer analysis. The physical properties are required for measurement so that quantity can be reported in the required units. Finally, it is important to know the gas characteristics in order to select all the main station components such as filters, heaters, regulators and meters.

There are two main components installed in the field that can be used as an aid in



FOR CUSTODY TRANSFER APPLICATIONS, FLOW COMPUTERS (FCs) ARE USUALLY MANDATORY; THEY MEASURE, MONITOR, AND MAY PROVIDE CONTROL OF GAS FLOW FOR ALL TYPES OF METERS.

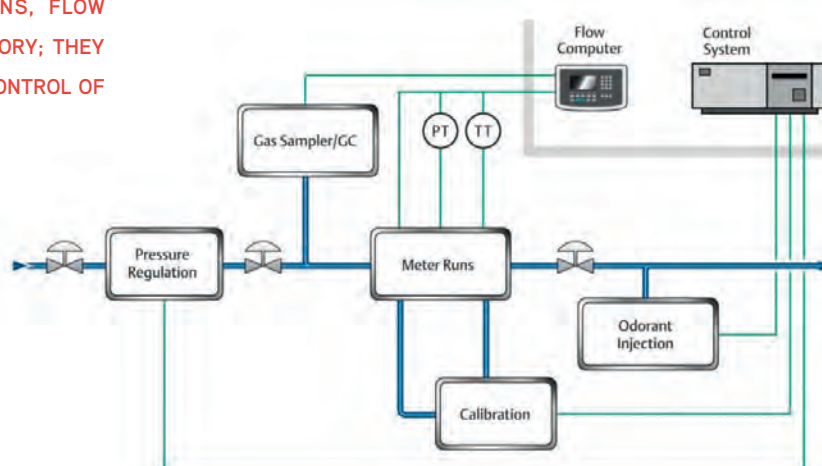


Figure 1: The main components of a gas measurement system.

determining gas composition: gas samplers, which collect a sample from the flowing line for transportation to a laboratory for analysis, and inline gas chromatographs, which separate the compounds in the gas and reports the results.

A sampler is normally used where many lines are present, where a lab is readily available and where cost is an issue. A gas chromatograph is normally located on large gas stations with dedicated buyer use. The output may be interfaced to a flow computer or HMI.

Proving and calibration

Periodic calibration of meters is necessary, as their performance can be affected by many things, such as change in physical properties (pressure, temperature, flow rate), mechanical wear, obstructions in the pipe, product build-up and encrustations. For all these reasons, meter performance must be regularly verified to make sure that results are consistent and traceable to an external reference. Meter calibration validates consistent meter accuracy and provides traceable evidence of meter performance.

The simplest and cheapest way of calibration is to ensure mechanical tolerances are compliant with a standard, ie, orifice plate. Another way of calibrating a flow meter is to put it in series with another flow meter of higher accuracy and to compare their readings. A calibrated master meter may be used to measure the flow in a pipe and to calibrate other meters. To achieve a check on the performance of a master meter they are often used in a pair, either in series, so that the consistency of their readings is continually checked, or in parallel, where one is used most of the time and the second is kept as a particularly high-precision meter for occasional checks. Test results are calculated

by comparing the reading of the master meter with the meter on test.

Meters can also be sent to external laboratories that can provide calibration services. The third-party calibration facility will normally provide detail of the offset from the reference standard for the meter over the calibrated flow range. This known offset can then be applied as a correction within the flow computer.

Third-party calibration of a gas volume meter is a costly operation, but it is necessary to ensure the high performance required of the meter and to ensure that the system agreed uncertainty can be achieved. One method of reducing such costs is to use a meter that has an advanced diagnostics capability.

Troubleshooting

Flow meters with advanced diagnostics help the operator to be aware of potential problems in the meter and in the sensors (equipment wear, damage). They also help with a number of other events that can occur during operations, in both fluid conditions or in the pipeline itself. As an example, such a meter can help the operator detect problems such as entrained liquids, liquid accumulations, blockage (eg, in the flow conditioner) and pipe coating.

Advanced diagnostics, together with the possibility to set actionable alerts once a specific problem has been identified, will help tremendously by offering an operational insight into pipeline parameters and measurement system health between two consecutive calibrations.

Flow computers

For custody transfer applications, flow computers (FCs) are usually mandatory; they measure, monitor and may provide control of gas flow for all types of meters.

In volumetric flow measurement, different types of meters will read different gas characteristics — in which case the FC will receive a signal from the meter plus gas temperature and pressure. In many cases, an algorithm is required to convert the reading into a flow rate. Since gas is compressible and affected by temperature, the gas temperature and pressure must also be monitored and compared to a specified standard temperature and pressure within the algorithm.

Mass flow needs to be calculated based on the density of the gas. Since a natural gas stream contains a mix of various hydrocarbon gases of different densities and also some inert gases like nitrogen and carbon dioxide, the gas flow computer will require the entry of mole percentages for each gas component. Mole percentages must be determined via gas sample analysis.

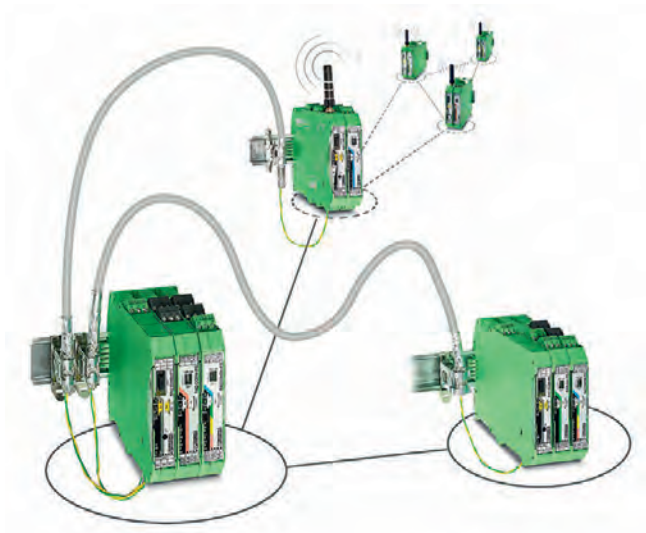
Based on accurate mass flow calculations it becomes possible, based on the energy content of each gas component, to calculate energy flow, since each gas component contains different energy content. Energy flow metering is the ultimate goal, since this is where the true value is for the customer.

In addition to providing volumetric, mass and energy flow data, the gas flow computer also provides date and time as well as instantaneous, hourly and daily data. The gas flow computer typically stores timestamped volume records for up to 35 days in order to provide sufficient time for a host system to retrieve the records as well as to allow time for human intervention if this retrieval fails to occur.

Emerson Process Management Aust P/L
www.emersonprocess.com.au

HOT PRODUCTS

ON WWW.PROCESSONLINE.COM.AU THIS MONTH



WIRED AND WIRELESS I/O SYSTEM

Phoenix Contact has upgraded its cable-based Radioline RAD-RS485-IFS stations to accommodate both wireless and cable-based modules.

Phoenix Contact Pty Ltd

<http://bit.ly/2exSCf9>



INFRARED CAMERA

The FLIR E8 infrared camera is suitable for fault finding sources of energy loss, overheating electrical and mechanical equipment and moisture intrusions.

TechRentals

<http://bit.ly/2dHyOSq>



LASER DISTANCE SENSOR

Banner Engineering has added flush-mount housings to its rugged Q4X laser distance measurement sensors, offering a more compact housing.

Turck Australia Pty Ltd

<http://bit.ly/2e2gtTl>



LEVEL TRANSMITTERS

The type 2290 and 2291 radar level transmitters from GF Piping Systems are suitable for the chemical process industry and water treatment.

Georg Fischer Pty Ltd

<http://bit.ly/2ezzdc8>



Switch to a gas partner who gives you a choice of solutions



Manufacturing has a wide variety of gas intense processes. Whether it's food, pharmaceuticals & biotechnology, metal fabrication, or waste and water management, Air Liquide knows that reliable gas supply is crucial to your operations. Providing over 100 years of experience and with major sites throughout Australia, Air Liquide has local teams that will work with you to determine the most beneficial, cost-effective gas mix and optimal supply mode for your particular needs.

Gas that works for you

airliquide.com.au





MASS FLOW METERS WITH HART 7

The ST51A, ST75A and ST75AV thermal dispersion mass flow meters from Fluid Components International (FCI) are designed to provide users with an economical yet rugged solution to measuring air or gases in demanding industrial process and plant applications. They combine surface-mount, lead-free, RoHS compliant electronics with all-welded, equal-mass flow sensors. The added HART digital bus communication and its associated device driver (DD) have been certified by the Fieldcomm Group to meet Version 7 standards.

The ST51A and ST75A were recently independently evaluated by functional safety experts Exida and found to meet SIL 1 compliance with IEC 61508.

The flow meters also offer dual 4–20 mA outputs that meet NAMUR NE43 and feature a 500 Hz pulse. The electronics are housed in an IP67-rated, dual-cable port transmitter enclosure available in aluminium or stainless steel. The transmitter can be mounted directly to the flow sensor or remotely mounted up to 30 m away.

The ST51A is an insertion-style flow meter for use in pipe diameters from 63 to 610 mm and is easily connected into the pipe via a 0.5 or 0.75" NPT compression fitting. These thermal flow meters measure from 0.08 to 122 MPS with turndown ratio of 100:1 and with accuracy of $\pm 1\%$ reading, $\pm 0.5\%$ FS.

The ST75AV includes built-in Vortab flow conditioning to ensure high accuracy and repeatability in applications which lack enough straight-run. It features a wide 100:1 turndown ratio and measures from 0.01 to 950 NCMH with accuracy of $\pm 1\%$ reading, $\pm 0.5\%$ FS.

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

LED UV CURE SYSTEM

The Panasonic UJ35 UV cure system utilising LED technology requires substantially less energy than conventional curing systems and has a lifetime of over 20,000 h.

Unlike a lamp-based system that needs to be kept turned on throughout the operation, the LED type can turn UV irradiation on and off as needed. Under certain circumstances, this could extend the LED life up to 100,000 h.

The LED heads irradiate using 365 nm or 385 nm wavelength UV rays that do not contain infrared rays (heat). This makes them suitable for applications that require high precision bonding with minimum thermal distortion, such as the assembly of thin plastic components. The compact body is also equipped with temperature feedback control, providing better performance for bonding and fixing with UV curable resin. The intelligent control system allows for up to 10 steps and seven different irradiation patterns to be programmed for each of the four LED heads, making one unit usable for up to four individual processes.

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



COMPRESSORS

Kaeser Compressors has launched two new versions of its CSG-2 series dry compression rotary screw compressors: the CSG-2 T with integrated refrigeration dryer and the CSG-2 RD with integrated i.HOC rotation dryer.

An integrated design, together with a generously dimensioned aluminium block heat exchanger, helps to ensure a minimal pressure loss of less than 0.1 bar. In addition, the energy-saving scroll refrigeration compressor helps to achieve further compressed air energy savings.

Where pressure dewpoints below $+3^{\circ}\text{C}$ are required, the CSG-2 RD series dry compression rotary screw compressors with integrated i.HOC rotation dryer are available. The i.HOC rotation dryer can achieve pressure dewpoints as low as -30°C . The hot compressed air from the second compression stage is used to regenerate the desiccant. This heat is essentially available for free, as no additional energy is required to power the drying process.

The i.HOC rotary dryer's intelligent control ensures dewpoint stability even with fluctuating flow rates and at compressor partial load. When commissioned, the target pressure dewpoint is reached after just one rotation of the drum. As a result, the user obtains a reliable air dryer with maximum efficiency and lower energy costs. Both the air- and water-cooled CSG packages from Kaeser are available with the integrated i.HOC rotary dryer or integrated refrigeration dryer. Drive powers range from 37 to 90 kW, operating pressures 4 to 10 bar with flow rate up to 13.5 m³/min.

Kaeser Compressors Australia
www.kaeser.com.au

The Best Sensors for Process Automation

Cost-effective. High accuracy. Easy Setup.



Compact, lightweight **2D/3D laser profile scanner** for automation including mounting on a robot arm. High speed scanners with frequencies of up to 2kHz



Extremely high accuracy **flow meter** with $\pm 1\%$ Reading. Features small flow measurement with a wide range from 0.01 to 10,000 l/min



Laser thermometer for high speed and accurate temperature measurement. Wide temperature range ensures suitability for most applications

ETHERNET/IP ENCODERS



Turck has announced EtherNet/IP-enabled encoders that provide an optical-based encoder solution with electronic multiturn capabilities for position applications requiring feedback for customers using the EtherNet/IP and CIP (Common Industrial Protocol) interface. Common applications for the ODVA-certified encoder include automotive production, logistics, metal processing and textile applications, as well as printing and packaging machines.

The EtherNet/IP encoders are available in both single-turn (RS-107/108) and multiturn (RM-105/106) variants and come with a diameter of 58 mm. They offer a total resolution of up to 32 bits (16 for single-turn, 16 for multiturn) and have been designed specifically for high-speed applications. The encoders offer an RPI (requested packet interval) time of 1 ms, and allow operation in high-speed applications with up to a 1000 Hz update frequency.

The RS-107/108 and RM-105/106 EtherNet/IP encoders offer a cost-effective, compact EtherNet/IP encoder solution with Device Level Ring (DLR) capability. The DLR capabilities allow the network to stay active even if one direction of the communication bus lines is compromised. This is a bidirectional communication capability built into the encoder. For the customer it means that their process can continue while one unit is offline, greatly influencing efficiency and reducing costly downtime.

The RS-107/108 and RM-105/106 encoders are available in solid shaft and blind hollow shaft versions, with the blind shaft version having diameters up to 15 mm. The encoders feature an operating temperature range from -40 to +80°C and are IP65 rated.

Turck Australia Pty Ltd
www.turck.com.au



EMERGENCY STOP STATION

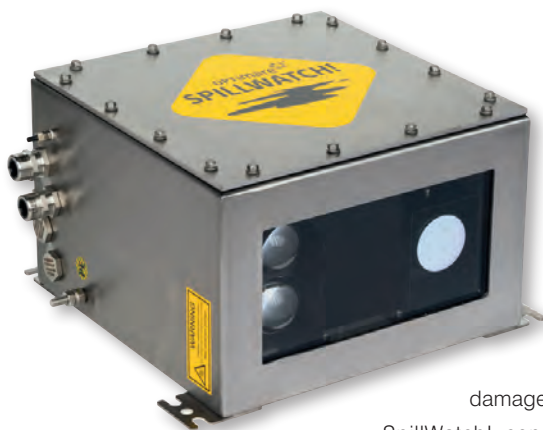
The BSH emergency stop station features a fully welded 316 stainless steel enclosure, making it suitable for harsh conditions. Cable entry is seamless with two pre-punched 20 or 25 mm diameter holes. Threaded entries in M20x1.5 and M25x1.5 are also available. An IP-rated plug will also be supplied if both entries are not used. The one-piece closed cell neoprene gasket is field replaceable if ever required and is available as a spare part.

The BSH E-stop station is modular in construction and benefits from having a DIN rail mounted in the base and strut-mountable feet in any orientation as standard. Having modular mounting options, pipe and gantry mount kits mean the enclosure can be easily mounted near processes of any kind. Custom brackets are available on request.

The latching emergency stop button is fitted with self-monitoring contacts for constant control of correct installation and open circuit in case of installation malfunction (such as extreme vibration or shocks).

Options include a hood for increased mechanical protection and build-up of dirt and dust on the emergency stop. A drilled and tapped label identification plate with screws fitted is provided according to specification.

Leveltec Engineering Pty Ltd
www.leveltec.com.au



OIL-ON-SURFACE DETECTOR

The OPTIMARE SpillWatch! is a non-contact oil-on-surface detector that provides users with an alert enabling countermeasures to stop or limit spillage — reducing cost for remediation and clean-up and limiting damage to the environment.

SpillWatch! sensor technology is based on fluorescence excitation and detection. Its optical set-up and all-solid-state optoelectronic components guarantee high sensitivity and allow low-maintenance operation. The system automatically filters out ambient conditions (such as sunlight), providing detection under all light, weather and surface conditions.

The OPTIMARE SpillWatch! is designed and manufactured for deployment in harsh and rugged environments with an IP66-rated weatherproof stainless steel housing. It offers real-time, around-the-clock detection and control of oil spills for the petrochemical industry, pipelines, power plants, harbours, desalination and aquaculture.

Automated Control Pty Ltd
www.automatedcontrol.com.au



FIBRE TERMINATION SYSTEM

Siemon has announced its LightBow fibre termination system that is designed to improve fibre termination speed, performance and reliability while reducing cost. Part of Siemon's LightHouse Advanced fibre-optic cabling solutions, the LightBow Termination System features a termination tool and pre-polished mechanical splice connectors that together reduce termination time, prevent fibre end-face contamination and air gaps, and enable easy verification of termination quality.

Ergonomically optimised for use in handheld or tabletop orientation, the termination tool reduces termination time by combining both splice activation and crimping in a single, optimised step and providing universal LC and SC connector compatibility with no time-consuming changeover. It also features integrated LC and SC strip templates moulded into the tool to ensure proper strip length of the fibre. To enhance connector performance, the tool's alignment channels simplify fibre insertion, while its bow feature maintains proper pressure of fibre ends during termination to eliminate air gaps. To further ensure reliability, the entire LightBow termination process is completed with the connector dust cap in place, protecting the critical end-face polish from contamination or damage.

For use with the LightBow termination tool, Siemon LightBow pre-polished mechanical splice connectors ship factory assembled to eliminate time-consuming field assembly of inner and outer connector bodies. Available in both LC and SC configurations, and in multimode and singlemode versions, the connectors feature a built-in verification window in the connector body for use with Siemon's 0.5 mW output power, Laser Class 1 visual fault locator (VFL).

Siemon Australia
www.siemon.com.au



IP67 WIRELESS ACCESS POINT

O-Ring has released a series of IP66/67 wireless devices. Suitable for harsh environments, they allow installation in nearly any application with no additional hardware required.

Featuring a high throughput of over 80 Mbps as standard, there are two configurations available. The first is a compact IP67 WLAN access point with an integral antenna unit suitable for tight areas, or an external antenna to suit wider coverage applications up to 5 km with a transmit power of up to 800 mW. POE compliant, the system is easy to install and requires only one cable for power and communications. Moving systems or clients is fast due to X roaming, and advanced monitoring and control provides the ability to send messages directly from the unit.

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



FPI-X™ Mag Meter Advanced Flow Measurement



The Ideal Mag Meter for Extreme Flow Conditions

Simple, Fast Installation:

No cutting pipe or welding flanges

± 0.5% Proven Accuracy

- ✓ Multiple Pump Discharge
- ✓ Severe Swirl
- ✓ Single Pump Discharge
- ✓ Total Station Discharge

**Contact AMS Instrumentation
& Calibration Pty Ltd today at
03 9017 8225**

**or visit us online to learn more:
www.ams-ic.com.au**

AMS

Unit 20, 51 Kalman Drive,
Boronia, Vic, 3155, Australia
www.ams-ic.com.au
P: 03 9017 8225 | F 03 9729 9604



Turnaround at Dow — time is money

TÜV SÜD engineer Olaf Fuchs is a forward-looking planner. He started working on his latest project approximately 30 months in advance: the turnaround at the Dow chemical plant in Böhlen, Germany — a so-called shutdown for safety and maintenance purposes.

In Germany regular inspections involving the total shutdown of process plants are required by law for inspection, safety tests, maintenance and repair. The Dow Chemical plant in Böhlen, Germany, recently engaged TÜV SÜD Chemie Service to assist DOW with the shutdown in order to ensure the safety of the plant up to the next periodic inspection.

Every day of shutdown in the chemical plant in Böhlen means approximately €1 million loss of turnover. It is no surprise therefore that Fuchs put a team of experts together for this project: "For this turnaround, we teamed up another 10 expert witnesses from our Germany-wide branch offices in addition to our 10 experts in Schkopau."

The men have a lot of experience and knowledge with regard to this plant, and without long-term practice in the chemical industry they couldn't, for example, properly assess occurring corrosion. "Today's machine-created welding seams cannot be compared to those from years ago," said Fuchs. "However, this does not mean that they are not important."

The heart of the olefin complex is the so-called cracker. The petroleum is directly supplied from the harbour in Rostock to the Dow chemical plant via a pipeline more than 430 km long. In the cracker, the naphtha is cracked into hydrocarbon compounds such as ethylene and propylene in 15 furnaces at approximately 800°C. Böhlen supplies the plants in Schkopau and Leuna with intermediate products. There, they are further processed and turned into high-quality plastics.

The cracker also supplies other parts of the plant with process steam, which presents a disadvantage. "When the cracker coughs, everything coughs," said Fuchs. And before the cracker can be inspected, all other parts of the plant need to be shut down and maintained. This alone takes 10 days.

During the large-scale shutdown, approximately 1200 employees from different third-party companies are working on the premises. Usually, there are only nearly 600 Dow employees and 300 external service staff. The logistics on the 320 ha premises are enormous for this turnaround. The material storage alone comprises, among others, two tents with 240,000 parts, 290 shower and changing room containers, 50 containers for granting the work permission on site, 63 office containers and a kitchen tent. For accessing the plant, a large car park with its own traffic lights was created.



The technical check of the plant entails tremendous effort and needs to comply with safety regulations. The different trades and employees jointly dismantle the respective installation, check it, replace or renew parts and afterwards assemble everything again.

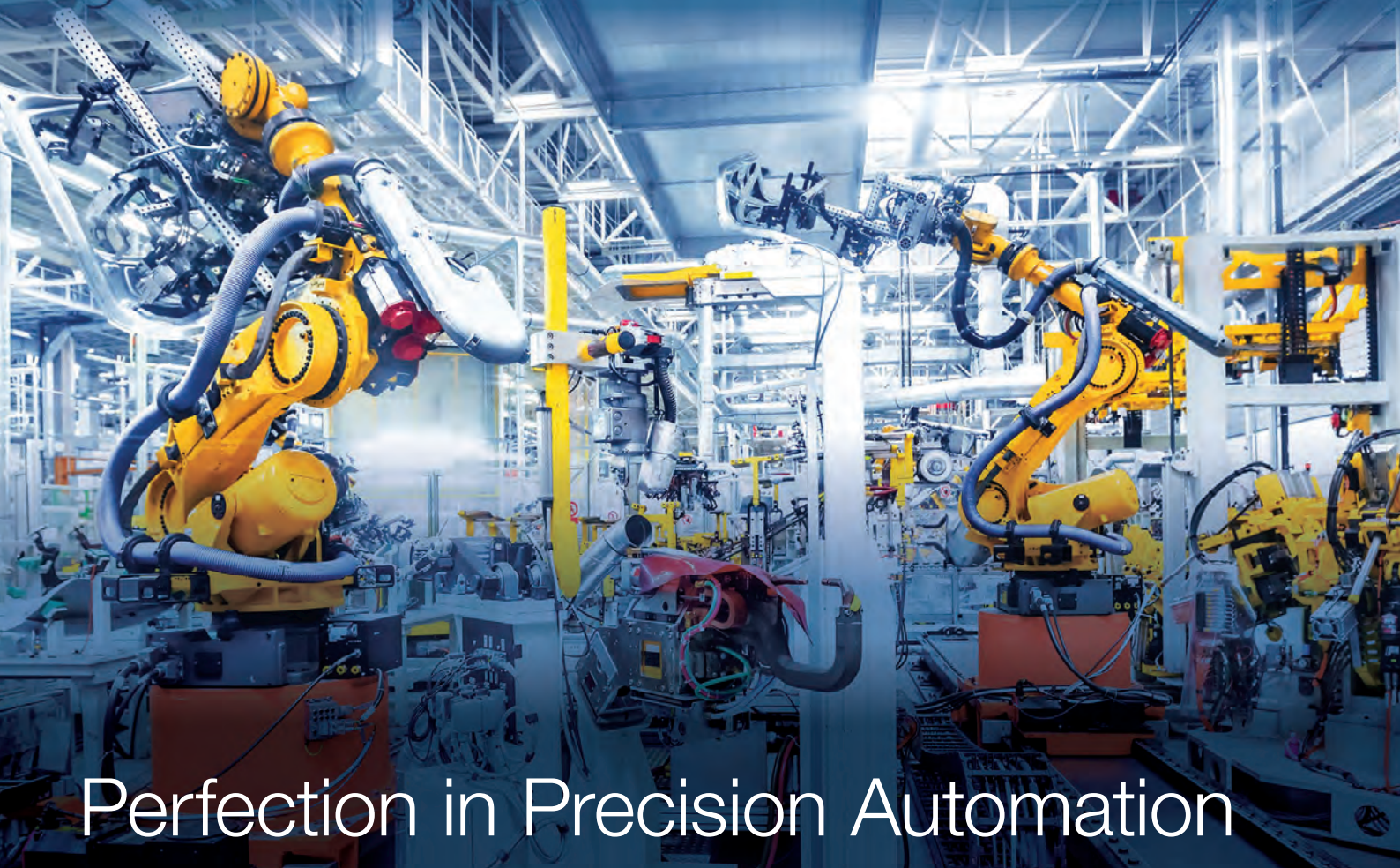
The turnaround team members need to coordinate around 1200 to 1500 jobs with a total of 25,000 sequences (individual tasks). Everything is closely interlinked. "For example, there is no point in getting all the people here in order to check something and then you don't have a security officer," said Reiko Hass, turnaround manager at the plant. "In order to start working, we need safety officers, a crane, scaffolding and the correct material."

In order to ensure a smooth process, planning is coordinated with everyone in advance and documented in a roadmap. All construction and spare parts are ordered in advance in all sizes in order to avoid delivery delays. During the shutdown, the adherence to the project schedule is checked. Dow closely monitors the project because next to the 50 days of shutdown, which cost €50 million, the company invests another €45 million in maintenance costs and technical innovations.

In this turnaround, the legal-related, statutorily prescribed checks form 80% of the work packages. These include the corrosion monitoring of all construction components. Thus, for example, a total of 100 nozzles at the vessels needed to be replaced due to corrosion. The replacement of each component is precisely documented. When the plant is started again after the check-up, Olaf Fuchs' team is still working on the documentation for some time. Every step carried out by TÜV SÜD Chemie Service must be fully documented for future reference should the need arise.

TÜV SÜD Chemie Service

www.tuev-sued.de/home_en



Perfection in Precision Automation

Sensors for process industries

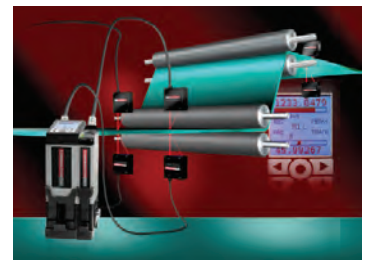
Automated processing requires excellence in loop calibration, motion and quality controls. Rugged miniature load cells are designed for systems with limited space or tight clearances. Advanced vibration and shock testing enabling intuitive operation, extensive analysis and reporting functions, and providing numerous upgrade possibilities. Non-contact laser thickness gauge system is the ideal tool for automated thickness control.



Honeywell load cells
High accuracy Honeywell
miniature & subminiature load cells



**m+p International VibPilot
Vibration Controller**
Professional 4/8-channel
m+p VibPilot Vibration Controller
& Dynamic Signal Analyzer



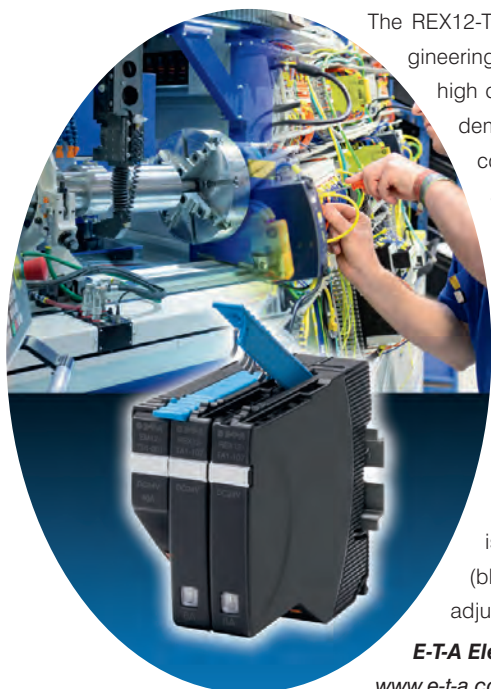
**mti instruments Micro TRAK 3
Laser thickness sensor**
MTI Microtrack™ 3 TGS
Thickness Gauge System

For more details, call 1300 735 295
Email InfoIndustrialAU@thermofisher.com

Find out more at thermofisher.com.au/IP

ThermoFisher
SCIENTIFIC

CIRCUIT PROTECTOR



The REX12-T electronic circuit protector from E-T-A is a protective device designed for mechanical engineering and process control. Providing electronic overcurrent protection, the REX12-T combines a high degree of flexibility with a compact design and is tailor made to the technical and economic demands of machine construction. The user does not require any additional accessories to connect the individual components electrically and mechanically, providing ease of mounting and minimised wiring time.

The single-channel REX12-T circuit protector uses the EM12-T supply module for installation. Both modules feature push-in technology and allow tool-free time-saving wiring. Due to its hinged connection mechanism, up to 16 circuit protectors can be placed and connected side by side on a symmetrical rail. No bridges, jumpers or busbars are required.

REX12-T provides selective overcurrent protection and offers visual failure indication by means of LEDs and auxiliary contacts.

Depending on the output current, the REX12-T disconnects after approximately 3 s in the event of an overload and in less than 10 ms in the event of a short circuit. Capacitive loads of up to 20,000 μ F can be switched on without problems. The circuit protector is available in all standard current ratings from 1 to 10 A, and the internal fail-safe element (blade fuse), which is adapted directly to the current rating of the circuit protector, allows easy adjustment to the cable cross-section.

E-T-A ElectroTechnical Applications Pty Ltd

www.e-t-a.com.au



VARIABLE RELUCTANCE PRESSURE TRANSDUCER

The Validyne DP15 is a variable reluctance pressure transducer capable of low- to high-pressure measurement with low power consumption. It features a replaceable pressure sensing diaphragm which allows pressure measurement from 0.08 to 3200 psi in 23 full-scale ranges. This makes it viable for a wide range of applications in one compact unit.

The DP15 consists of a flat diaphragm (magnetically permeable) supported between two coils, which produces a magnetic field when an AC excitation is applied. The opposition to the magnetic flux (called the reluctance) is determined by the air gap present between the two coils and the diaphragm. The coils are wired electrically as an inductive half-bridge.

Built with flexibility in mind, it provides wet or wet differential measurements, accepting liquids and gases on both sides of the diaphragm. In addition, a small internal pressure cavity volume ensures fast response to pressure variations.

It is also built to last, able to withstand extreme shock and vibration due to its heavy-duty stainless steel construction. Specially built units are also available for use in sea water, saline solutions, brine and other corrosive media.

Bestech Australia Pty Ltd

www.bestech.com.au



SAFETY SWITCH

The Euchner CTP safety switch offers guard locking and safe guard lock monitoring. It combines the proven principle of operation of electromechanical safety switches with transponder-coded safety engineering.

The safety switch is suitable for use when a high performance level and a locking force of up to 2600 N are required. It can be used for direct connection to safety control systems and for the series connection of up to 20 devices, depending on the version. Due to its robust housing with metal head and IP69K protection, the CTP can be used for almost every industrial use.

The CTP safety switch achieves category 4/PLe according to EN ISO 13849-1, as well as meeting all the requirements of EN ISO 14119 due to the transponder technology. Monitoring outputs and a diagnostics output can be connected directly to the PLC, and it has a comprehensive diagnostic function.

The safety switch has an LED indicator with all the relevant information on the front panel so users can see the status of the device instantly. It is small and easy to mount on the safety guard, and is compatible for mounting with existing safety switches.

Treotham Automation Pty Ltd

www.treotham.com.au



Service Bodies

Custom designed bodies to suit any commercial vehicle

For a single vehicle or a fleet we are the custom service body specialists



How MFI can design a body for you

- Custom designed to your exact requirements
- Exclusive features to maximise your efficiency
- Craftsman built to ensure your satisfaction
- Three year 100,000km warranty

*Speak to us
about the
MFI difference*

***YOUR FLEET
& TRADE SOLUTION...***

MFI Service Bodies
120 North Road Warragul VIC 3820

sales@mfisb.com.au
www.mfiservicebodies.com.au

1800 613 537



Robotic arms aid labelling and assembly

Auckland-based plastic injection moulding company TCI New Zealand was looking for an automated, cost-effective way to produce its customers' products and decided to investigate using 6-axis industrial robots. Now, TCI is using Universal Robots' UR3 and UR5 industrial robotic arms to perform labelling and assembly tasks for the EasiYo Yoghurt Maker line, as well as its storage bins.

With a Universal Robot assisting, several key processes in the manufacture of these products have been automated, relieving employees of repetitive assembly processes and ensuring smooth production flow.

The UR3 was the first machine implemented by TCI, with the costs of the robot recouped six months after it was first purchased. Satisfied with this return on investment, TCI then decided to purchase the UR5, with the payback period expected to be under 12 months.

"Previously we were paying two employees to work in 12-hour shifts to ensure around-the-clock production of our EasiYo Yoghurt Maker. If one employee didn't turn up for work, it meant the entire production line would be halted. This wasn't really financially sustainable for us, so we were looking for an automated solution that would guarantee quality assurance and help us to reduce costs," said Quintin Fowler, managing director at TCI.

During its search for an automation solution, TCI came across Universal Robots' technology at a trade show and made contact via Design Energy, Universal Robots' New Zealand distributor.

"We developed the layout for the production cell and designed and built an appropriate gripper unit for each of the applications," said Mike Shatford, managing director at Design Energy. "TCI then manufactured the machine frames and mounted the various operating units in the relativities we had laid out. Once the machines were completed, our technician spent time at TCI writing the robot programs and getting each cell operating to the customers' requirements."

"Design Energy were fantastic. We were initially considering an off-the-shelf robot from overseas, but I'm glad we were able to find a customisable solution," said Fowler.



All UR robots can be completely reprogrammed and deployed for other tasks in a matter of minutes. A graphical user interface with a teach function enables an operator to simply grab the robot arm and show it how a movement should be performed. The user-friendly interface then allows staff to drag and drop the routines to do their programming.

In contrast to traditional industrial robots in the market, Universal Robots' small and lightweight robotic arms are able to work safely alongside staff (subject to prior risk assessment). The robots' state-of-the-art force limit safety feature automatically stops the robot from operating when its movement is obstructed. The robot will not exert a force greater than the limit specified in the adjustable safety settings.

"One thing I loved about Universal Robots was that we didn't have to worry about guarding, whereas [for] a lot of the other robots in the market guarding was an issue because you'd have to use safety barriers for all the machines, which just complicates the situation," said Fowler.

Design Energy

www.designenergy.co.nz/

Dart Instruments
...sense the **RELIABILITY**

Dart Instruments Pty Limited A.C.N.109 479 763
Phone: 61 2 8456 7550 Fax: 61 2 8456 9988
Email: sales@dartinstruments.com.au www.dartinstruments.com.au

Everyday big savings with DirectAutomation!

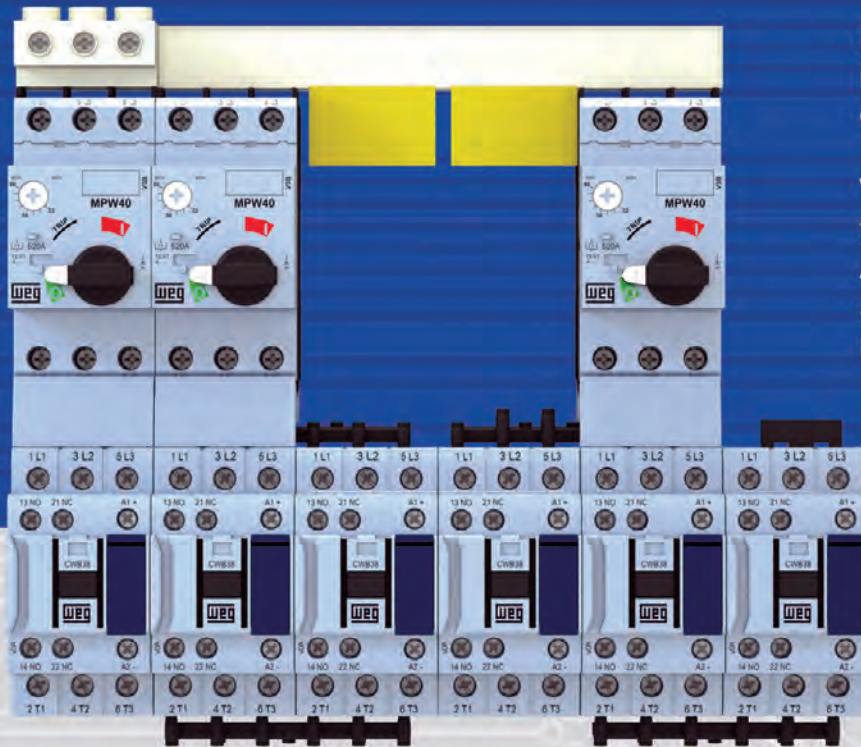
WEG Industrial Switchgear

Now available at the click of a button...

DirectAutomation

Meeting the demands of a high-tech industry and users requires intensive collaboration and strong focus.

WEG Australia is proud to announce the strategic alliance with Direct Automation for the sale and support of its industrial switchgear range Australia wide.



Easy ordering any way you want

We do it your way —

Phone us

Fax or

Email us,

Shop online.

Easy payment terms

30 day trading account

We accept purchase orders, EFT and major credit cards.

Everyday low prices

WEG IE3-conform control and protection components

The right choice for premium efficiency motors

Making Business Easier

The harmonious integration between the WEG CWB line of contactors, overload relays and motor protective circuit breakers allows fast and easy assembly of compact starters and protection sets of LV electric motors.

The modularity and flexibility of easy-connection busbars and connectors reduce assembly time while preventing mistakes. The easy-connection allows the combined assembly with WEG motor protective circuit breakers and thermal overload relays forming compact and robust DOL starters and star-delta starters.

Motor Protection Circuit Breakers

- Up to 100A / 55kW
- Adjustable Thermal Protection
- Fixed Magnetic Protection
- 13 x 1u Short-Circuit Release
- Type 1 / Type 2 coordination



Our everyday prices start at \$49.00* for a 4-6.3 amp Breaker
*(MPW18-3-D063)

Contactors - CWB Series

- Up to 38A / 18.5kW (AC-3)
- Built-in 1NO + 1NC
- Low Consumption DC Coils
- Wide range of accessories
- Type 1 / Type 2 coordination



Our everyday prices start at \$32.00* for a 9 amp Contactor
*(CWB9-11-30D25)

Direct Automation Pty Ltd
A.B.N 53 168 014 248 A.C.N 168 014 248
79 Dover Drive Burleigh Heads
Queensland, Australia 4220
Tel: 61-7-5535 3217 Fax: 61-7-5535 7284

Email: sales@directautomation.com.au

www.directautomation.com.au

Call Toll free 1800-633040

Automation

Communications

Process

Switchgear

Pneumatics



ROBOTS EVERYWHERE

OUR ONE-ARMED FRIENDS IN THE FACTORY ARE NO LONGER ALONE

Glenn Johnson, Editor

Robots are no longer a feature only of manufacturing plants — they are moving into our everyday lives and are getting ready to make a dramatic impact.

As automation engineering professionals, most of the readers of this publication are familiar with robots and their application in industries such as manufacturing, pharmaceuticals, and food and beverage. And of course the latest advancements have been mainly in the area of collaborative robots (or cobots) that can work safely alongside and assist human skilled workers.

While the heavy and powerful (and relatively dumb) industrial robot arm that has been evolving slowly since the 1960s will continue to be used in the near future — doing the heavy lifting and repetitive drudgery — it will be interesting to see how knowledge gleaned from the development of cobots will alter even these familiar workers. A cobot that can pack a pallet safely without safety fencing? Not sure about that one... after all, there are other dangers than just the robot in that situation.

But as we are all well aware, robotics is nowadays no longer just the domain of the industrial automation industry. Other industries are heavily investing in robotics research, and in many cases their research is arriving at practical and realistic possibilities. The robots envisaged in science fiction in the 20th century are beginning to look like distinct possibilities in our present generations. Automation engineers will no longer be the only people who work with robots —

they will be in our daily lives and many other areas of life and the economy as well. I have noticed that the level of awareness of these developments in the broader society is quite variable. While the geeks and engineers of the world may be well interested in the progress of robotics, many in the general public seem to be quite unaware — and I suspect unprepared for the changes to come. Recently in a conversation with my younger brother I mentioned that we would have driverless cars on our roads very soon, but he didn't believe me. "Not in my lifetime" were his actual words. He thought that bureaucracy would slow it down, and I tried to explain to him that the technology is no longer new, that it is in the final stages of refinement, and that we are already at the 'pointy end' of bureaucratic decision-making about allowing driverless cars. Only weeks later Singapore announced its driverless taxi trial¹ and now Uber is doing the same in the US. Needless to say, some people might be in for a bit of a shock. In this article I'd like to present a broader overview of how our friends the robots are beginning to make inroads into our lives, whether we are aware of it or not. And the key concept is *autonomy*.

What we have now

So far, industrial robots do not act autonomously — they do repetitive tasks as they are taught to do them — but they nevertheless



© Stock-Adobe.com/au/Master/Video



... OUR FRIENDS THE ROBOTS ARE BEGINNING TO MAKE INROADS INTO OUR LIVES, WHETHER WE ARE AWARE OF IT OR NOT.

act on their own to do those tasks once they are taught. Coming at it from a different direction, we see machines taking on robot-like qualities with the application of mechatronics and advanced software, but they are remote controlled by humans. Examples include Rio Tinto's mines in the Pilbara — using driverless trucks, trains and other equipment, but mainly involving long-distance remote control — or the now relatively familiar drones, whether they be military weapons or \$300 toys, which are also remote controlled by humans. So while they use similar physical technology to robots, they are not acting totally on their own, neither autonomously nor on a program. The same goes for the current state of robotic surgical machines assisting surgeons for some procedures.

There are, however, two areas of technology where actual (non-remote control) robots are making inroads right now: driverless cars and service robots.

Cars and friendly faces?

There have been attempts to build driverless cars going way back to the 1920s, but most of the major advances have occurred since 2000. Most major car makers and other companies (most notably Google) have been actively pursuing the development of their own driverless cars. Many of the more expensive luxury models of cars

available today, such as the Tesla Model S and the Mercedes-Benz S-class, already include extensive semi-autonomous, hands-free driving capabilities. In July 2015 Google revealed that in all their driverless car road tests between 2009 and 2015, only 14 minor collisions had occurred, and 11 of them were caused by other drivers. And as recently as early October, Audi announced it would be releasing a new model of its A8 saloon in 2017 (2018 in Australia) that will be the world's first 'Level 3' (totally hands-free) car². At this stage it would be safe to say that driverless car research has done more to extend and provide impetus in the field of robotics research than perhaps any other automation research endeavour.

And then there are 'service robots'. According to the International Federation of Robotics, a service robot is a robot which operates semi or fully autonomously to perform services useful to the wellbeing of humans and equipment, excluding manufacturing operations. Personal service robots are service robots that educate, assist or entertain at home. These include domestic robots that may perform daily chores, assistive robots (for people with disabilities) and robots that can serve as companions or pets for entertainment. Humanoid service robots have been deployed in many customer-service applications around the world (most notably in Japan), but so far with limited success and acceptance. People don't seem all that ready to take them seriously just yet — or maybe they are just not helpful enough, or realistic enough yet. Some argue that robots that look too human can be seen as 'creepy' and a more non-human appearance is more readily accepted.

The most common readily available robot for domestic use thus far is the already familiar robot vacuum cleaner — a relatively simple application — and in 2015, Moley announced the world's first robotic kitchen, which will be released in a consumer version in 2017 with "an iTunes-style library of recipes"³.

Market research reports have indicated an annual growth rate in the service robot market of 16.5% over the next five years⁴. But some have argued that referring to a piece of technology as a robot can have a detrimental effect on its uptake, because many equate the concept of a robot as 'future tech' that is unproven and unreliable. Robotic technology now currently available and accepted is often not even seen to be a robot — a Roomba is just a vacuum cleaner and a hospital robotic catering trolley is just a food trolley.



Hands free: an autonomous Audi test car. Source: Audi/Adelaide Advertiser

In time, driverless cars, which are really at the forefront of robot technologies today, will just simply be 'cars'.

Medical robotics and disability support

Another area where robotics is making great inroads is in medical services and prostheses for the disabled. The current use of robotic technology in operations is limited to the robot acting as a slave device under the control of a surgeon, but companies such as Cambridge Medical Robotics have already completed cadaveric trials using robots for some types of pelvic, upper gastrointestinal and colorectal surgeries⁵. While medicine has traditionally been slow to change, given that the safety of the patient is its primary concern, it is expected that financial pressures will force the medical industry to recognise that when robots can do something better and for the same price as humans, the robot way will be the best way forward.

Similarly, increasing advancements in robotic manipulators, including touch- and heat-sensitive fingertips, have been extending robotic capabilities to prosthetics for the physically disabled. Ekso Bionics, for example, has released a robotic exoskeleton — essentially a pair of powered legs — that assists a paraplegic patient to walk.⁶

Drones

Originally drones were the domain of the military, initially used as unmanned reconnaissance tools in war zones, and later as fear-some weapons delivery systems, allowing military personnel in the US to make strikes against opponents on the other side of the world. Drones available to the general public can cost as little as \$250, and for the most part are merely a flying camera (although one amateur in 2015 created a controversial YouTube video showing an automatic handgun being fired from a drone). Because they are mainly only used for photography, the main uses thus far for

commercial drones have been in commercial photography (such as for magazines or real estate advertising), public safety or service uses (such as police and fire services in rescue and surveillance applications), the media, agriculture (farmers remotely checking on herds or crops) and wildlife conservation (filming wildlife without disturbing them). There are, of course, talks of drones delivering parcels (Amazon's idea), but this may be some way off, since it will require a greater capability for autonomous operation. However, great strides forward have been made in drone development in making them autonomously able to avoid obstacles⁷. Newer and cheaper sensing technologies and software algorithms can make them much safer and less easy to inadvertently crash. For example, current models of personal drones are available that will automatically follow their owner, adjusting their flight path to avoid obstacles such as telegraph poles, cars and tree branches as they go.

What interests me about this is the possibility of merging a robot and a drone to literally produce a flying robot. This is probably where the development of robotic parcel delivery will lead.

The military leads the way in autonomy

In recent years, enormous strides in artificial intelligence (AI) research have been opening up more possibilities for robot autonomy. Robots that make their own decisions on the fly, depending on the circumstances they encounter, will make them more effective at carrying out their assigned task.

I haven't mentioned much about military robots, but it is in the military sphere where robot autonomy is being heavily researched, and also the most controversial. I am inclined to reserve judgement on whether 'killer robots' like in the *Terminator* movie series are a future thing to worry about or not. I think most experts in the robotics industry would argue that a robot, not being a conscious



AT THIS STAGE IT WOULD BE SAFE TO SAY THAT DRIVERLESS CAR RESEARCH HAS DONE MORE TO EXTEND AND PROVIDE IMPETUS IN THE FIELD OF ROBOTICS RESEARCH THAN PERHAPS ANY OTHER AUTOMATION RESEARCH ENDEAVOUR.



Bionic exoskeleton. Source: Ekso Bionics

being, is not responsible for its actions and is only a tool of those who make it and direct it into action. There is perhaps an enormous ethical dilemma brewing here. After all, human soldiers can make ethical decisions on the fly, but as we know they have also failed many times 'in the heat of the situation' to make the right decision as well. But there are many other military applications for robotics than 'robot soldiers'. The US military is, for example, currently testing a robotic submarine hunting vessel. The 40 m unmanned vessel 'Sea Hunter' is designed for autonomous missions and will be able to stay at sea for three months with no crew, negotiating all weather conditions and avoiding collisions with other ships⁸.

Even helicopters can be robotic now. In October 2015, Carnegie Mellon University, in partnership with aircraft manufacturer Sikorsky, demonstrated a fully autonomous Black Hawk helicopter teaming up with a fully autonomous ground vehicle (UGV) to show how a robotic vehicle team can perform search missions without humans⁹. The helicopter provides speed and range, while endurance and precision sensing are provided by the UGV.

Humans only define a mission by choosing the general area to search, but the execution is autonomous. The UGV can detect, classify and reason about the environment to safely navigate through unstructured environments. The helicopter arrives at the drop-off location, hovers, autonomously descends and alerts the UGV of touchdown. The UGV then drives out of the holding 'kennel' to a safe distance and alerts the UAV it is clear to take off. The UAV can ascend and return to base, while the UGV autonomously drives off to perform its mission. The importance of this development is in removing humans from very high-risk missions, such as searching contaminated areas. Most military autonomous robot applications to date have been about protecting human lives, rather than ending them, but watch this space.

References

1. Harris M 2016, Self-driving taxis roll out in Singapore - beating Uber to it, *The Guardian*, <<https://www.theguardian.com/technology/2016/aug/24/self-driving-taxis-roll-out-in-singapore-beating-uber-to-it>>
2. Blackburn R 2016, Hands-free cars on Aussie roads by 2018, *The Advertiser*, <<http://www.adelaidenow.com.au/technology/handsfree-cars-on-aussie-roads-by-2018/news-story/6ddb1d989d04ced9f7763bdbc2a33bc7>>
3. Moley Robotics 2015, <<http://www.moley.com/>>
4. RnR Market Research 2016, Service Robot Market Moving Ahead at 16.5% AAGR for 2016-2020, *PR NewsWire*, <<http://www.prnewswire.com/news-releases/service-robot-market-moving-ahead-at-165-aagr-for-2016-2020-595600051.html>>
5. Cambridge Medical Robotics 2016, Successful Preliminary Clinical Cadaveric Trials, <<http://cmrobotics.com/news/2016/successful-preliminary-clinical-cadaveric-trials/>>
6. Strickland E 2016, Demo: The Ekso GT Robotic Exoskeleton for Paraplegics and Stroke Patients, *IEEE Spectrum*, <<http://spectrum.ieee.org/the-human-os/biomedical/bionics/paraplegic-man-walks-in-ekso-robotic-exoskeleton-to-demo-its-killer-app>>
7. Ackerman E 2016, Aggressive Quadrotors Conquer Gaps With Ultimate Autonomy, *IEEE Spectrum*, <<http://spectrum.ieee.org/automaton/robotics/drones/aggressive-quadrotors-conquer-gaps-with-ultimate-autonomy>>
8. Deamer K 2016, US Military's Robotic Submarine Hunter Completes First Tests at Sea, *Live Science*, <<http://www.livescience.com/55662-darpa-submarine-hunter-completes-tests.html>>
9. Ackerman E 2016, Helicopter Robot Airdrops Recon Ground Robot, No Humans Necessary, *IEEE Spectrum*, <<http://spectrum.ieee.org/automaton/robotics/military-robots/helicopter-robot-airdrops-recon-robot-no-humans-necessary>>



Pilz Safe Automation: The Next Generation

Pilz has expanded its new PNOZ Multi range to include the new mB0 & mB1 safety controllers. The new base units offer significantly higher performance especially for machines that require a greater range of safety functions. As well as providing a large array of customisation & expansion, to easily meet all customer safety requirements, especially when integrating it into any type of manufacturers standard control system or PLC.

- ▶ New Powerful PNOZ Multi 2 Range
- ▶ Communicates with a wide array of PLC & field bus protocols
- ▶ Huge range of different IO Expansion options
- ▶ Don't settle for second best because of your standard control system



PILZ

THE SPIRIT OF SAFETY

Melbourne • Sydney • Brisbane • Auckland

Ph: 1300 723 334 Ph: 03 9560 0621 Fax: 03 9574 9035

www.pilz.com.au safety@pilz.com.au

NEW PRODUCTS

PANEL PCS

Backplane Systems Technology has released Faytech's IP65 sunlight-read-able, vandal-resistant aluminium touch PC series. They have been designed for industrial applications, especially outdoor or in environments with excess dust or liquid.

Faytech's fay-002 mainboard series is embedded into this industrial-grade LCD panel device and features GbE LAN, USB, two Mini Card slots, a Dual Core N2807 Celeron CPU (optional Quad Core J1900), 2 GB RAM (up to a maximum of 4 GB), 64 GB SSD and Wi-Fi.

The high-performance LCD panels with LED backlighting offer a long life span. These panel PCs can be coupled with specialty films and enhanced polarisers to create a clear picture even under direct sunlight. This Touch PC Series is water and dust resistant and provides highly stable connections to ensure secure connectivity in all situations and withstand severe weather conditions and harsh applications. Available in 10.4", 15" and 32" as standard products, they feature 10-point capacitive multitouch screens and 7H hardened glass. They run fanless from -10 to +60°C operating temperatures and are powered by a wide voltage input of 8–36 VDC. Customisation is available.

Backplane Systems Technology Pty Ltd

www.backplane.com.au



SOLAR DRIVES

ACSM1 solar drives from ABB are designed to reduce carbon footprint utilising solar power. With a maximum power point tracking (MPPT) algorithm built in to maximise the power available from PV arrays, the range has the ability to be run from either solar or from a backup AC source via mains or a generator.

The range is designed specifically to run three-phase 415 V induction motors featuring a wide range of power ratings from 5.5 to 45 kW. Remote monitoring is possible with the addition of optional fieldbus communication modules. The range includes pump-specific protection — such as sensorless flow calculation, a dry run detection ability and automatic pump cleaning sequences — that can be configured to suit any application.

Control Logic Pty Ltd

www.control-logic.com.au

ANTI-CORROSION COATING FOR GEARED MOTORS

Historically, businesses looking to deal with the problem of corrosion for their motors and gear boxes in corrosive and washdown environments have had two options: to use stainless products or products with a protective coating.

The problem with surface coatings is that when used on an aluminium surface they can easily be removed if bumped or scratched, and therefore offer only limited corrosion resistance.

The NORD nsd tupH Sealed Surface Conversion System provides protection at a molecular level — it includes a base layer that is permanently bonded to the aluminium substrate that provides a foundation for adhesion of the surface sealant. This foundation provides excellent roughness, is six to seven times harder than the aluminium substrate and up to 1000 times harder than paint. The system conforms to FDA Title 21 CFR 175.300 and has successfully undergone ASTM D714 and proven its resistance to blister formation. Similarly, it has proven its effectiveness against corrosion through ASTM D610-08, and scribe per ASTM D1654-08 according to DIN EN ISO 2409.

Further tests performed on the system included ASTM B117-09 salt spray test, ASTM D3170 Gravelometer test, DINEN ISO 9227 salt spray mist test, and DIN EN ISO2409 cross-cut test. It is approved for food applications according to FDA Title 21 CFR 175.300 with treated systems resisting cleaning agents in the pH2 to pH12 range. The company uses nsd tupH on a range of products, including its helical gear units, bevel gear units, UNIVERSAL worm gear units, smooth motors and electronic SK 1xxE.

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



Weidmüller 

NEW **Klippon® Connect – A-series** Maximum flexibility with PUSH IN technology

Weidmüller's new A-series terminal range with PUSH IN connection technology stands for safe wiring and simple handling. The PUSH IN technology reduces connection times for solid conductors and conductors with crimped-on wire-end ferrules by up to 50 percent compared to tension clamp terminals. The conductor is simply inserted into the contact point and that's it – you have a safe, strong, gas-tight connection. Offered now in two series, a universal range for maximum flexibility in design and an application range tailor-made for instrument signal wiring or control voltage distribution. The Klippon® Connect A-series provides the right connection solution for your needs. Let's connect.

www.weidmuller.com.au

Forget Wi-Fi & Fibre!

Wolverine Range of SHDSL Ethernet extenders may be your best option when Fibre or WiFi aren't! They are a cost effective & easy to use alternative when you need to go the distance.

- Reuse Copper Cables
- Go beyond 100m
- High Bandwidth
- Over 20Km distance
- Cybersecurity Enabled
- Pt. to Pt, Bus or Ring



Model DDW142
 - Compact
 - RS232/485 Ports
 - Layer 3 Router Option

For more information or application assistance
 Contact Westermo
 Australia:
 e: info@westermo.net.au
 p: 1 800 978 766
 w: www.westermo.net.au

VISUAL NOISE MONITORS

The SoundEar 3 series of visual noise monitors and noise level recorders is designed to offer a more complete view of the noise situation than walking around with a noise meter. The visual keys and data logging will make it easy to see where to take action in order to reduce hearing loss and noise pollution.

The SoundEar 3 series comes standard with a range of updated features and includes user-friendly management software for configuration and reporting.

A visual alarm instantly and clearly indicates where and when the preset noise limit is exceeded so the people nearby can take appropriate action to protect their hearing.

All SoundEar 3 models have several add-on options for connectivity including wireless and LAN, and can also send noise alerts to mobile phones.

All models come standard with an easy transfer of log data into the SoundEar software via USB. Users can record up to 90 days of noise measurements and capture LAeq, LCpeak, LAF and LAS.

The SoundEar Software provides an easy-to-use interface for creating reports of noise levels and exposures. All measurements can be saved in a CSV format for report creation.

Sound Safety

www.soundsafety.com.au



STRAIN GAUGE AMPLIFIER

The Futek IDA100 is a digitally configurable strain gauge amplifier that provides both analog and digital output via USB. The analog output can be used to send information directly to a PLC while the USB output can be used to simultaneously verify that the system is functioning correctly.

Manual adjustments cause unnecessary interruptions. Using the IDA100 eliminates the need for manual adjustment via dip switches and potentiometers so that micro-adjustments and calibrations can all be done electronically.

The analog output has a bandwidth of 1 kHz, while the digital output has a variable bandwidth of the selected sampling rate divided by 4. Powering the IDA100 via the 5 V USB connector also minimises introduction of noise into the sensor platform.

The IDA100 digital amplifier has a bipolar output with software-selectable excitation voltages of ± 5 or ± 10 VDC. It is also designed with an integrated 35 mm DIN rail clip. A high retention USB connector ensures that the power supply to the IDA100 will not be jeopardised should the connector experience a tug or pull during use.

Metromatics Pty Ltd

www.metromatics.com.au





Brisbane meatworks finds ideal vision solution

When your business supplies fresh meat products to major supermarkets and consumers across Australia, you can't afford to get it wrong. Products displaying illegible date codes, damaged packaging or wrongly labelled products can be disastrous for suppliers.

The Brisbane meatworks is unique. It is a globally recognised fully integrated facility that completes a full circle in beef production including slaughter, boning, value-add, retail-ready and distribution. According to its production manager, the site processes some 1200 head of cattle per day.

Apart from bulk meats it also produces stir-fry and diced beef and veal, beef sausages, corned, marinated, glazed and coated beef and veal products, corned beef silverside and hamburger patties.

"We currently have an annual production of over 15 million kilos for national distribution to prominent retail and supermarket shelves," said the production manager. "Due to very stringent requirements demanded by our retail distribution partners, our entire packaged shelf-ready product needs to be exactly as per what is ordered and labelled as."

The biggest challenge for any meatworks is traceability. Most facilities traditionally rely on casual labour in the final packaging and inspection process.

An inspection system was therefore needed that could guarantee speed, product integrity and accuracy. The meat works commissioned Omron, through its integration partner Pac Technologies, to install a vision inspection system that would minimise the risk of sending out any non-compliant products. A challenge for this application was to check both 1D and 2D barcodes at varying focal lengths on the final production line. Also, there was a requirement to check and verify the date code on each shelf-ready product.

Kim Simonsen from Pac Technologies, in conjunction with Omron application engineers, created a vision solution using FQ2 machine vision cameras on each line. On some lines, two cameras were used at varying focal lengths to handle the varying heights of the target product.

The carton barcode is pre-checked to verify that the product is as expected before the individual packs are checked.

"We accessed some very powerful algorithms built in to the FQ2 camera to achieve what the customer needed to satisfy their date and barcode checks," said Yang Qui, a senior application engineer from Omron Electronics, Brisbane. "OCR was used to not only check for the presence of the date code, but actually read the text to ensure that the date code was correct and readable. The small-sized 2D barcode was a challenge and required us to employ the high-resolution version of the FQ2 vision camera to obtain a reliable and accurate reading each and every time."



Omron Queensland State Manager Paul Gibb said Omron is also assisting other Queensland-based meatworks that produce down to shelf-ready product as well as bulk packs.

"There are common issues emerging when talking to each company about checking integrity and accuracy of the final packaged product and its labelling and identification," he said. "Hundreds of different product and label variants, many types of barcodes and date codes, varying existing PLC architecture, high turnover of transient workforce and a hostile operating environment all present a challenge to a solid and reliable vision solution."

One of the main challenges was how to process the data once reliable and accurate judgements of the final product are obtained.

"In this instance we used our powerful and flexible NJ Machine controller with SQL connectivity and EtherNet/IP to communicate directly to the customer's database without the need for any software-based middleware," said Gibb. "Since Omron's NJ controller has the option of EtherNet/IP communications, it communicated directly with the customer's existing PLCs, creating a seamless network from camera to database."

Gibb said Omron's FQ2 vision cameras are rugged enough to be installed directly on the production line in a meatworks hose-down environment and they have enough capacity to store more than the customer's total product line-up and label varieties.

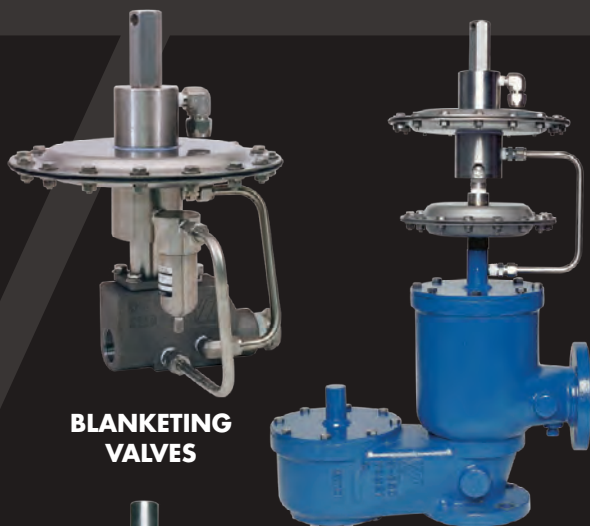
They support up to nine types of barcodes. The Australian meat industry also widely uses GS1-databar code and the FQ2 cameras have been successfully used for this type of product verification and production information inspection.

Omron Electronics Pty Ltd

www.omron.com.au

TANK PROTECTION VENTS & VALVES

- VACUUM/PRESSURE RELIEF
- INERT GAS BLANKETING



**BLANKETING
VALVES**



**PILOT OPERATED
VACUUM/PRESSURE VENTS**



**WEIGHT
& SPRING
LOADED
VENTS**

FLAME ARRESTORS – INLINE & END OF LINE

AUSTRALIAN AGENT & TECHNICAL SUPPORT



Tel: (03) 9699 7355
www.pressureandsafety.com.au

9344P&S-WN1P

**NEW
PRODUCTS**

PRESSURE TRANSMITTERS

Dwyer Series 628 pressure transmitters are suitable for OEMs and provide an accuracy of 1% FS.

The corrosion-resistant 316L stainless steel wetted parts allow the Series 628 transmitters to measure the pressure in a multitude of processes from hydraulic oils to chemicals. They are available in absolute and gauge pressure ranges with a variety of optional outputs, process connections and electrical terminations to allow users to select the right transmitter for the application.

As a robust oil-filled sensor, they have high shock and vibration resistance, ensuring stability in controlling pressure for process applications. There is a wide range of models and connections that can meet pressure measurement specifications from low to very high.

Applications include compressors, pumping systems, irrigation equipment, hydraulics and industrial process monitoring.

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



SPLICING CONNECTORS

WAGO has introduced the next generation of its 221 LEVER-NUTS splicing connectors. The 221 Series saves 40% more space in the junction box providing simple, safer installation of solid, stranded and fine-stranded wires. The 221 simplifies electrical installation even in the most space-restricted applications. Advantages include a transparent housing that makes it possible to verify proper insertion and strip length and operating levers can be manipulated using noticeably less force.

Permissible nominal current is 20 A with a nominal voltage of 600 V. Conveniently accessible test slots are available in the wire-entry face and one opposite for easy testing.

The 221 Series is available in 2-, 3- and 5-wire connectors and can safely connect wires ranging from 0.14 to 4 mm². These options provide reliable connectivity for applications ranging from building technology, lighting connections, blind motors, wiring of intercom systems, door and gate control systems as well as motors and pumps for industrial applications.

WAGO Pty Ltd
www.wago.com.au



PORTABLE ULTRASONIC FLOW METERS

Flexim has introduced the FLUXUS F608 and G608 portable gas and liquid flow meters for usage in hazardous areas. They are based on the previous F601 and G601 models, but have been specifically engineered for their use within hazardous areas and are covered by IECEx certification.

The extremely resistant carbon fibre housing, together with the rugged transducer design, ensures a high impact protection as well as a resistance against oil, water and many other liquids. The F608 and G608 share the same efficient battery management as the F/G601, and the system can be fully set up in less than five minutes due to the intuitive user guidance and the automatic transducer recognition.

The application range of the FLUXUS range of portable flow meters is from pipes as small as 1 cm up to 647 cm inner diameter and temperatures ranging from -40 to 199°C. Being equipped with two flow channels and multiple inputs and outputs, the flow meters are designed for direct usage in demanding environments, such as in upstream gas — where they can be carried as personal luggage to platform visits — as well as in the downstream industry.

The F608 and G608 also feature highly precise bidirectional measurement at fast and even very slow flow rates over a wide dynamic measurement range and are not prone to temperature and zero drift.

Aquip Systems Pty Ltd

www.aquip.com.au



ETHERNET HART MULTIPLEXER

TRANSMIT PROCESS DATA VIA ETHERNET

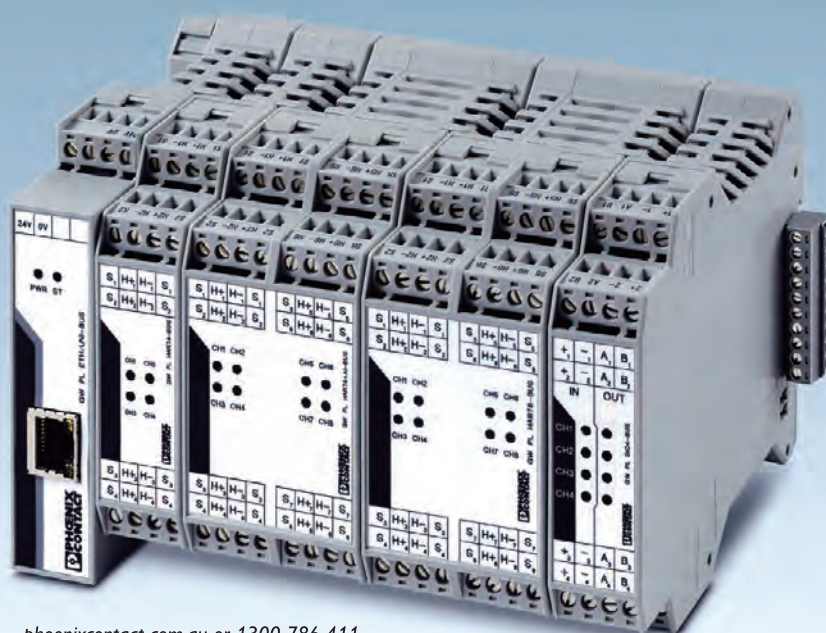
NEW

Transmit critical HART process data over ethernet networks with the **new multiplexer**.

In addition to the high ethernet speed, benefit from the additional transmission of secondary process data.

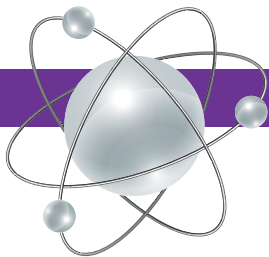
The Basic module can communicate via HART-IP and Modbus TCP, the Universal Head station offers all the capability of the Basic, as well as Profinet connectivity.

- ✓ Modular system enables scalable station configuration with up to five extension modules
- ✓ Digital extension module enables additional digital I/Os to be acquired
- ✓ HART master per channel maximises data transfer speed



phoenixcontact.com.au or 1300 786 411

**PHOENIX
CONTACT**



Octobot demonstrates autonomous soft robotics

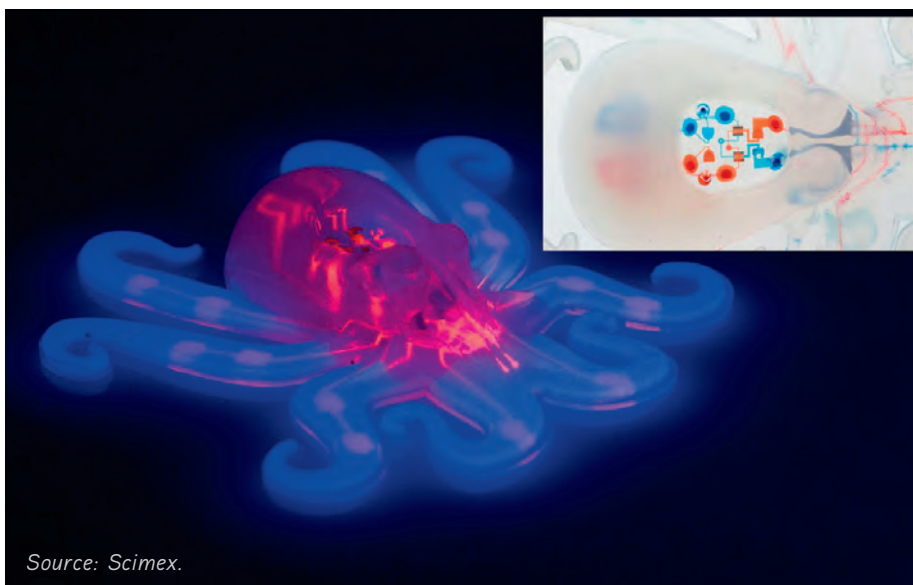
A self-powered, octopus-inspired, entirely soft robot has been demonstrated in *Nature*. Soft robots are resilient and have the ability to adapt to some natural environments better than conventional robots made of rigid materials.

The new soft robot has eight arms that are pneumatically driven by the release of oxygen gas from a hydrogen peroxide fuel source reacting with carefully placed platinum catalysts, Jennifer Lewis and colleagues have reported. They created the so-called 'octobot' using a combination of methods, including 3D printing of the pneumatic networks within the soft body. The octobot operates for between four and eight minutes, a run-time that could be improved by a more sophisticated design of the components that control how the fuel is used, the authors suggest.

Soft robots possess many attributes that are difficult, if not impossible, to achieve with conventional robots composed of rigid materials. Yet, despite recent advances, soft robots must still be tethered to hard robotic control systems and power sources. New strategies for creating completely soft robots, including soft analogues of these crucial components, are needed to realise their full potential.

According to the report, "Soft robotics is a nascent field that aims to provide safer, more robust robots that interact with humans and adapt to natural environments better than do their rigid counterparts."

The report goes on to say that unlike conventional robots composed of rigid materials, soft robots based on hydrogels, electroactive polymers, granular media and elastomers are physically resilient and have the ability to passively adapt to their environment. Moulded and laminated elastomers with embedded pneumatic networks are widely used materials in soft robotics. Actuation of these elastomeric composites occurs when interconnected channels that make up the pneumatic network are inflated with incompressible fluids or gases supplied via tethered pressure sources. Robotic end effectors with bioinspired and rapid



Source: Scimex.

actuation, deployable crawlers, and swimmers with complex body motions, as well as robust jumpers, have been developed on the basis of this design strategy. However, in each case these robots are either tethered to or carry rigid systems for power and control, yielding hybrid soft-rigid systems.

The octobot is an example of the untethered operation of a robot composed solely of soft materials.

The robot is controlled with microfluidic logic that autonomously regulates fluid flow and, hence, catalytic decomposition of an onboard monopropellant fuel supply. Gas generated from the fuel decomposition inflates fluidic networks downstream of the reaction sites, resulting in actuation. The body and microfluidic logic of the robot are fabricated using moulding and soft lithography, respectively, and the pneumatic actuator networks, onboard fuel reservoirs and catalytic reaction chambers needed for movement are patterned within the body via a multimaterial, embedded 3D printing technique.

The researchers conclude that the new design and fabrication approach lays the foundation for a new generation of completely soft autonomous robots that are able to perform more complex functions.

ProcessOnline.com.au

Your online community — at your convenience 24/7

Search products, articles, news & tech papers with **FREE** access

The ultimate for small tanks!

The future is 80 GHz: a new generation
of radar level sensors

When it comes to contactless level measurement of liquids in small containers, smaller is better. With the smallest antenna of its kind, VEGAPULS 64 is simply the greatest! With its excellent focusing and insensitivity to condensation or buildup, this new radar sensor is truly exceptional. Simply world-class!

www.vega.com/radar



TURCK

Your Global Automation Partner



WARNING

Not suitable for repairing
cheap controls

(or your reputation).

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



TBEN-S1 Ultra-Compact Multiprotocol Ethernet I/O Modules

Enormous flexibility in just 1.25 x 5.6 inches, designed for assembly directly on the machine and built to withstand extremes of hot and cold.

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

NEW PRODUCTS

IOT GATEWAY

To facilitate the adoption of IoT, Advantech has developed its smallest industrial IoT gateway. The UNO-1251G is the size of a micro PLC and is DIN-rail mountable. The industrial computer comes with a programmable OLED display, easily accessible wireless communication slot and built-in CANbus. It supports over 450 PLCs, controllers and I/O devices protocols with WebAccess/HMI software.



With an integrated CANbus connector, the UNO-1251G is especially suitable for networking intelligent I/O devices such as sensors and actuators. To aid the development of CANbus applications the UNO-1251G includes the Advantech CANopen Protocol Library, which provides a C application programming interface (API) with which to use, configure, start and monitor CANopen devices.

An easily accessible side-mounted expansion slot is included, which can be used for installing an optional wireless card without having to open up the entire unit. The UNO-1251G is also designed to be operated remotely from any computer or tablet with a VNC (Virtual Network Computer) client.

The programmable OLED display provides operators with system status messages. It comes with a range of default messages, but is also programmable by site engineers using the OLED Display API.

As well as the RISC 32-bit ARM Cortex-A8 processor, the UNO-1251G also includes an externally accessible micro SIM for 3G access and a micro SD card slot for additional storage, USB port, two 10/100 LAN ports, LED indicators, integrated 1G micro SD Card with OS installed and three COM ports.

Advantech Australia Pty Ltd

www.advantech.net.au

REMOTE ACCESS SOLUTION

The Hirschmann Secure Remote Access Solution is a combined hardware and software system designed to help companies leverage the increased connection of devices brought on by the Industrial Internet of Things. The Secure Remote Access Solution is a partnership between Belden and Secomea.



The product allows customers to remotely access their sites in order to troubleshoot and fix problems. At its core is Secomea's GateManager, a cloud service which enables customers to connect their operator stations to their remote devices. LinkManager software running on PCs or mobile devices connects operator stations to the cloud. SiteManager software running on PCs or the Hirschmann GECKO connects the remote devices to the cloud.

The simple set-up, ease of use and secure technology make the solution suitable for the machine building, automotive and food and beverage industries, which often need remote access to plants and machinery around the world. Remote access reduces the need for travel and allows staff to work more efficiently by handling multiple systems simultaneously.

Belden Australia Pty Ltd

www.belden.com

RUGGED SWITCHES

Crystal Group has recently announced the expansion of its rugged switch line with the introduction of the RCS7450 and RCS7750 rugged switches. Designed for deployment in harsh environments the rugged switch line provides highly robust networks with long-term field operation.

Crystal Group's rugged switches are designed with improved cooling, shock, vibration and humidity performance. Built on the Brocade ICX 7450 and ICX 7750 network switches, Crystal Group's RCS7450 and RCS7750 rugged switches are enterprise-class, stackable LAN solutions for small and medium-sized applications. While meeting relevant industry and military standards, the rugged switches offer high port density, long-term reliability and flexibility.

The RCS7450 is available with 24 or 48 copper ports or with 48 fibre SFP ports. This unit can deliver 960 Gbps in stacking bandwidth, up to 336 Gbps in full duplex switching capacity and up to 250 Mpps forwarding capacity.

The RCS7750 offers 48 SFP connectors ports, 5.67 Tbps in stacking bandwidth, up to 1.92 Tbps in full duplex switching capacity and 1.4 Gpps forwarding capacity.

Both units are available in a 1U form factor and weigh between 7.26 and 9.98 kg, depending on supply configuration. Mounting for the units complies with the EIA-310 19" rack standard using Delrin glides or a fixed mount.

Crystal rugged switches are designed for extended temperature ranges between -40 and +55°C. The units also support IPv6 routing and allow multiple units to be integrated into a single logical unit addressable with a single IP address.

Metromatics Pty Ltd

www.metromatics.com.au



ERNTEC

FAULHABER Drive Systems for Electrical Grippers

Today, the productivity rate for pick & place units and precision movement in advance manufacturing is measured in cycle times ranging below one second.

Electrical gripper systems are characterised by accurately attuned, flexible gripping-force control and precise, synchronised movement, often in a small space - with maximum dynamic response.

To drive such a solution, leading companies rely on the technologies and know how of FAULHABER

The BX4 Brushless, 4-pole servo motor series is a great solution for precision gripping and dynamic movement in advanced manufacturing operations.

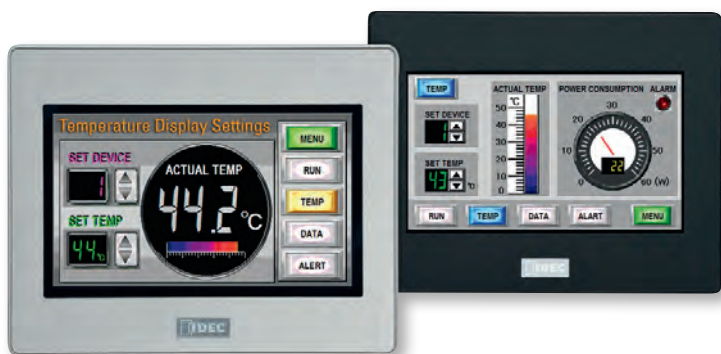
FAULHABER



FAULHABER BX4.

Get a grip
on precision.

For further information web search
"BX4 erntec" or call 03 9756 4000



HMI

IDEC Corporation has announced the 4.3" HG1G HMI, which takes advantage of the worldwide standard 4.3" LCD screen size. Being so widely used in consumer gaming devices and other commercial products, this screen size offers a larger and higher resolution display area at a lower cost.

The HG1G display has a TFT colour LCD with high resolution of 480 x 272 pixels, 65k colours, and 800 cd/m² brightness (sunlight viewable). Viewing can be configured for either portrait or landscape, with a viewing angle of 60° from top, 65° from the bottom and 70° from the left or right.

The HG1G HMI supports multiple communication protocols, up to four simultaneously. The serial port can support both RS232C and RS422/485 communications simultaneously, and the Ethernet port can support up to four hosts and three user communication protocols at the same time. It also has a built-in web server for remote monitoring. Remote users can monitor current values or processes, and control operation, print information, switch screens or change program values. Users can also remotely perform troubleshooting, run tests and perform maintenance.

The HG1G HMI LED backlight has a life of 70,000 h and the backlight can be automatically switched off when the unit is not in use.

A wide operating temperature range from -20 to 55°C, along with IP66F/IP67F and NEMA 4X protection, allows for installation outdoors, or indoors in washdown areas. The unit is suitable for installation in Class 1, Division 2 installations and has UL 508 approval. Input voltage is 12-24 VDC.

IDEC Australia Pty Ltd

www.idec.com/australia



**too
much
heat?**

energy efficient switchboard cooling

up to 43%
reduced energy
from 1000w to
4000w of power
lower running &
operating costs



With unrivalled efficiency and performance in its class, Pfannenberg's second generation of eCOOL air conditioners can reduce energy consumption by 43%.

Utilising free sizing software, easily calculate your required cooling capacity and avoid costly over-sizing and lost efficiency. It's accurate, quick, and easy to use.

UNRIVALLED EFFICIENCY & PERFORMANCE.

for more information call 1800 557 705 or email sales@control-logic.com.au
www.control-logic.com.au



industrial.
electrical.
automation.

INDUSTRY 4.0: IGNORE AT YOUR PERIL

Everyone has by now heard and read about Industry 4.0 and the Industrial Internet of Things (IIoT). We have all heard about how this will lead to the digitalisation of manufacturing and the convergence of the cyber and physical worlds on the plant floor — creating the ‘Factory of the Future’ in which machines think for themselves, analyse big data and continuously optimise and evolve so that the process operates as efficiently as possible.

But until now a lot of the concepts and technologies are theoretical and lack a practical application in the real world — especially in Australian manufacturing. Some people think the leap to this technology is too great, or is too far in the future to play a meaningful role in their own plant.

However, on a recent trip to Germany I was very lucky to visit a newly commissioned factory that had incorporated a number of Industry 4.0 concepts and see some of this stuff in action for the first time. This factory produced medical devices that were individually customised to the target patient. Patient data was collected and incorporated into the manufacturing process in near real time so that the devices that were being produced were personalised and tailored to the individual. Each device coming off the line was slightly different in some regard and essentially bespoke.

The concept of ‘Batch Size One’ is a key theme in Industry 4.0 and is achieved by decentralising the manufacturing process and storing the required manufacturing data (or ‘blueprint’ as they called it) with the work piece itself. The work piece then travels around the factory visiting the various automated workstations to be manufactured using the locally stored manufacturing data. At any point in the process you could remove the work piece and read the RFID information and understand exactly at what point in the manufacturing process the part was up to and what was left to complete and with what customisation or options the part contained.

Another observation that struck me was the modularity of the production lines. The line was made up of a number of components or workstations each designed to complete a specific task.



Most were automated; however, a few of the workstations required an operator to conduct manual tasks and even one with a collaborative robot in which the worker worked side by side with the cobot to complete the specific task. The units seemed interchangeable and I was told they could be arranged to suit, and if the work piece didn't require that particular manufacturing process or function then it would just pass straight through. Again, this meant the plant could be reconfigured very quickly to ensure it was optimised to the particular manufacturing process required at the time.

There were other things which may not be specifically Industry 4.0 or IIoT concepts, such as the integration of the production lines into the supply chains of their raw materials and component suppliers. Each vendor was integrated into the production process and was responsible for ensuring their specific raw material or component was supplied, delivered and placed in suitable quantities within the manufacturing process to meet the required production levels. They had automated quality checks before goods reached production and measured defect rates, essentially removing the requirement for an inwards goods function by the company. All of this combined certainly gave me a

feel for what an Industry 4.0 ‘Factory of the Future’ could look like and I was buoyed by the fact that companies were doing this here and now in Germany. I did, however, note that the production rates were significantly below that of what I would expect from a traditional mass production line — but I understand that this is the trade-off for being able to manufacture complex individual bespoke goods that are tailored to your customer's requirements. To me this is exactly the direction our manufacturing industry needs to take as we will simply struggle to be competitive with the mass production of commodity items in a high-cost country such as ours.



Scott Moffat is the Managing Director of Pilz's subsidiaries in both Australia and New Zealand. He is a senior executive with over 20 years' experience and extensive knowledge

in the automation, safety, energy, mineral processing and petrochemical industries, and possesses a unique blend of engineering background and corporate finance coupled with strong business acumen and customer focus.



PANEL METERS

The Watanabe WPMZ series digital panel meters address issues found with previous meters such as complicated operation and displays that are hard to read. The updated meters now feature a 2.4" TFT full-colour LCD display which allows simultaneous display of two channels. A user-friendly settings menu makes it easy to select between display values, bar graphs and trend graphs for quick analysis.

The WPMZ series consists of two separate meters, the WPMZ-5 and WPMZ-6. Both units feature an input frequency range from 10 MHz to 500 kHz for single channel input, and up to 250 kHz for 2-channel input. A response speed of 25 ms ensures smooth operation and fast feedback.

The WPMZ-5 provides rotation and speed measurements and can be connected to a number of sensors including magnetic speed sensors, photoelectronic sensors, slit sensors and rotary encoders. An example application would be the control of rotation in a delivery roll and pull roll conveyor belt system by measuring rotation speed.

The WPMZ-6 provides instantaneous and integrated flow rate measurements with a maximum sampling rate of 100 S/s for analog inputs. An example application would be to stabilise a mixing process by monitoring the difference of flow rate between two different liquids.

Bestech Australia Pty Ltd

www.bestech.com.au

HYGROMETER

Michell Instruments' S8000RS chilled-mirror hygrometer offers an accuracy of $\pm 0.1^\circ\text{C}$, with a wide measurement range of -80 to $+20^\circ\text{C}$ dewpoint, making it a suitable choice for moisture control in a range of metallurgical processes, including sintering.

Sintering is a process where powdered metals are bonded together to form light and strong products, from filters to machine parts. Because the powdered metal is not fully melted, the temperatures involved are relatively low — around 600°C — but careful control of moisture is essential to ensure the finished quality. Because the raw material is powdered metal, moisture present in the furnace could cause clumping or, as the moisture evaporates in the heat, the creation of large holes in the finished product. To avoid this, accurate control and measurement of moisture is vital. For sintering carried out at 600°C , maintaining a constant dewpoint of -60°C in the furnace is necessary and the gas is sampled at several points in the process. A fast-responding moisture analyser is essential so that action may be taken quickly if moisture levels rise above acceptable limits.

The S8000RS is claimed to be the smallest hygrometer on the market that is able to reliably reach dewpoints of -80°C . This small size is possible because it does not require any external cooling, which makes it well suited to metallurgical applications where its small footprint makes it easy to install in an air-conditioned instrumentation cabinet.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au



PROGRAMMABLE Incremental and Absolute Encoders



PCA

www.pca-us.com.au

+ 61 2 9482 3733

Features

- Program with a mobile phone
- No software to install
- Wi-Fi connection to encoder
- Online storage of configuration
- Range of housing sizes 58, 40 and 36mm

Options

- Incremental Only
- Absolute single or multi turn
- Gray or Binary Code
- Dual Incremental and Absolute
- Any values 1 to 16,384



New!



ARTICULATED JOINT KIT

The igus Robolink D components kit is a modular direct drive articulated joint kit. The kit was designed to make it easier for developers to configure and build a fully articulated plastic or aluminium robot arm, with up to six degrees of freedom. The arms have been designed to operate safely in collaborative applications with human co-workers to enhance productivity.

Where the first-generation Robolink W relied on wires, the D generation uses directly driven joints. The direct drive makes it more tough and durable, opening up more opportunities for lean automation. Robolink D is much more precise and can handle loads up to 4 kg.

The kit includes articulated joints driven by worm gears, with NEMA 17 or 23 stepper motors optionally built into them, along with self-lubricated PRT slewing ring bearings. They are currently available in three joint sizes: 20, 30 and 50. In addition to the joints, the kit also includes different connection elements made of plastic or steel.

Whether used as individual components, or as a complete solution, Robolink D allows a high degree of flexibility to be maintained. The designer can select their own control solution, with many options available, including stepper motor control cards, PLCs or educational solutions. The kit can be used in many applications, ranging from automotive to medical.

Treotham Automation Pty Ltd

www.treotham.com.au



view - measure - evaluate

application....
with
Innovation

Metromatics is one of the leading suppliers of data acquisition systems, process monitoring and control systems instrumentation and has an extensive Sensor range and manufactures IP66 rated industrial and outdoor LCD Displays to suit a broad range of markets.

Call us today.

- Load Cells**
- Torque Sensors & Multi Axis Sensors**
- Force & Pressure Sensors**
- Accelerometers**
- IP66 Industrial Displays**
- IP66 Sunlight Readable Displays**
- Ethernet, Modbus & Profibus I/O**
- Signal Conditioners & Converters**
- 4-20mA Isolators & Splitters**
- Portable & Rack mount Data Acquisition Systems**



Metromatics

Brisbane: (07) 3868 4255 Sydney: (02) 9460 4355
Melbourne: (03) 9872 4592 Adelaide: (08) 8343 8516 New Zealand: +64 9 620-6573
email: sales@metromatics.com.au internet: www.metromatics.com.au

Brisbane

Sydney

Adelaide

Melbourne

Perth

New Zealand



MONITORING MOTOR SUPPLY PAYS OFF

Colin Kinsey, Power Systems Specialist

Supply voltage phase imbalance and harmonics can have a significant effect on the life of a three-phase motor, making the case for supply monitoring and filtering to improve efficiency and reduce downtime.

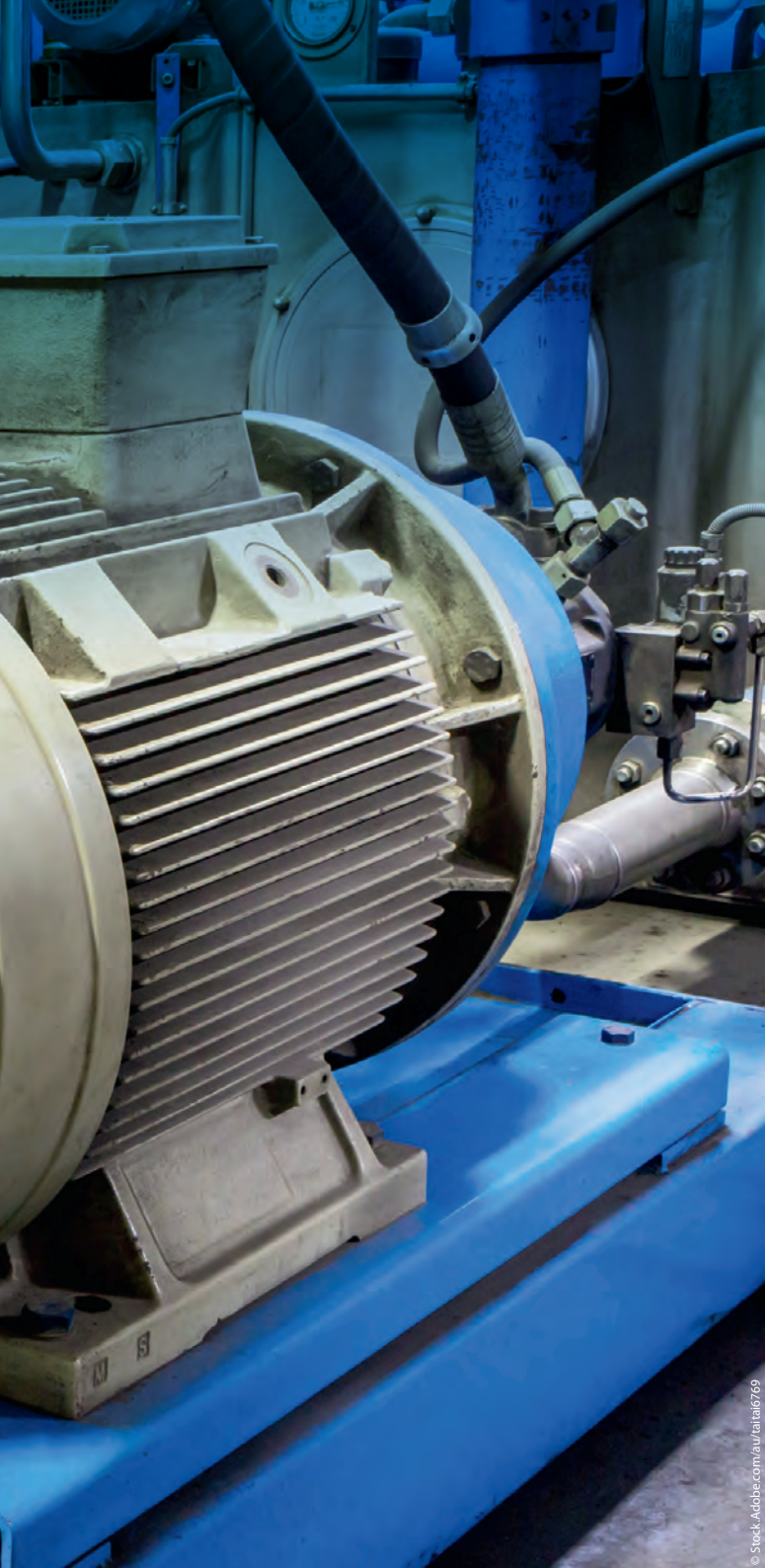
The life of three-phase motors is often cut short because of voltage imbalance and voltage harmonics. It is sometimes argued that the use of a variable speed drive removes the effect of problems with the supply lines, but this is usually a false argument because of problems that occur on the input converter and DC link when there is voltage imbalance and voltage harmonics. There is a case for monitoring of supply conditions in particular when critical motor applications are involved, but monitoring by itself is not enough. However, monitoring with programmable critical limits of imbalance and harmonics, etc, combined with logic functions as inputs to PLCs, relays and active filters, has significant advantages. No doubt a lot depends on the application as to the cost-effectiveness but monitoring and control can provide a smooth running mechanical plant. Think of high inertia loads that must be brought up to speed reliably — and within specified time limits — when supply conditions are less than ideal.

Why voltage imbalance is bad for motors

In short, unless derated, motor life is badly affected by line voltage imbalance. The NEMA derating curve shows that under a 4% imbalance, 20% derating is required. Somehow 4% imbalance sounds small but the effects are magnified. Apart from a reduction in torque as a result of negative sequence components, there is the imperilling of insulation because of excessive current. In addition there can be problems associated with harmonics, particularly the 5th, causing large counter torque. The solution is not found by increasing the rating of motors because apart from the capital cost, the result is excessive use of electrical energy as a result of lower efficiency.

Imbalance: the new norm

Network providers might take issue with the bald statement that voltage imbalance is the new norm. However, the growth of dis-



the three-phase conductors and returning via the neutral. For the majority of motors, and with the exception of star-delta starters, there is no zero phase component.

The theory of symmetrical components is due to Charles Fortesque (1918)² and, if one has time, there are many textbook references to enjoy. Practical aspects of symmetrical components are the province of transmission engineering in which generators, lines, transformers, etc are described in terms of positive, negative and zero sequence impedances. In Figure 2, there is a graphical representation of the three components making up a set of unbalanced three-phase phasors. It might look a little confusing but on a step-by-step basis, V_a , V_b and V_c are the phase to neutral voltages of a 4-wire system. Obviously the diagram represents a severely unbalanced scenario but it makes for easier visualisation. The positive sequence voltages are V_{a1} , V_{b1} and V_{c1} . These have the same phase rotation as V_a , V_b and V_c . The phasors, V_{a2} , V_{b2} and V_{c2} , have opposite phase rotation (look carefully and you'll note that V_{c2} follows V_{a2} and V_{b2} follows V_{c2}). The zero sequence, V_{a0} , V_{b0} and V_{c0} are in phase with one another. The latter sequence is responsible for neutral current but obviously this cannot occur in a three-wire system.

We will take a somewhat less dramatic example, with two sets of unbalanced phase voltages, as set out below.

- The red phase voltage is 237.37 volts, phase angle 0°
- The blue phase voltage is 235.84 volts, phase angle -119.02°
- The yellow phase voltage 237.46 volts, phase angle 120.31°

In symmetrical components, this yields:

- Positive sequence of 236.88 V
- Negative sequence of 1.47 V
- Zero sequence of 1.12 V

tributed generation — think of rooftop solar as one example — is one very good reason. Quite apart from non-uniform loading of phases, the power flow on much of our distribution networks is no longer a one-way thing — from substation to load — and solar rooftop PV is not necessarily balanced. In short, much depends on at what point you are connected to the network as to what level of imbalance might be encountered. For a new installation of a motor control centre a thorough power quality analysis is more than a good idea because power quality is increasingly under pressure.

Symmetrical components

Unbalanced voltages and currents can be analysed into a set of three components comprising two balanced pairs, one rotating in the normal phase rotation of the supply, the other rotating in the opposite direction, and in the case of four wire circuits, an in-phase (zero) component effectively flowing in-phase through

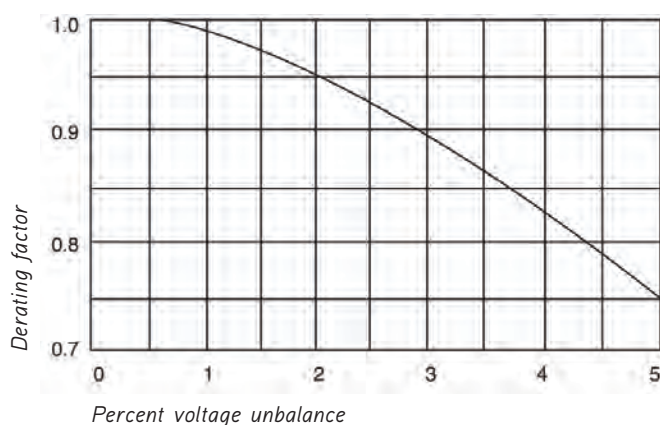


Figure 1: Motor derating versus % voltage imbalance.



... NEGATIVE SEQUENCE VOLTAGE, THE AUTOMATIC RESULT OF PHASE IMBALANCE, IS HARMFUL TO SAFE MOTOR OPERATION DUE TO AN EXCESSIVE INCREASE IN LINE CURRENT.

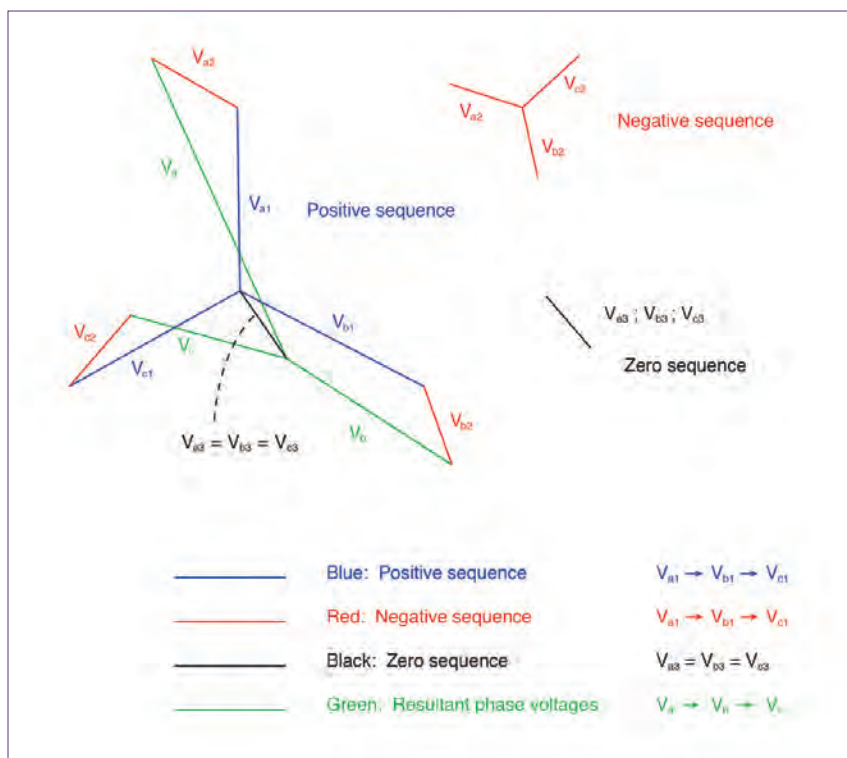


Figure 2: A set of unbalanced three-phase phasors.

This is a happy situation but what would be the case if with the same angles the blue phase was only 210 volts? The results would be:

- Positive sequence of 228.27 V, with corresponding line voltages of 395.38 V ($V_l = \sqrt{3}V_p$)
- Negative sequence of 9.57 V, with corresponding line voltage reduction of 16.57 V
- Zero sequence of 8.83 V

The zero phase is not present and the imbalance ratio is 4.19%. While this also doesn't look too frightening, it actually is.

The negative sequence and its negative influence

When an induction motor is on full load, slip is very small and the motor draws rated line current. When it starts from the locked rotor position, the current is something of the order of 6 to 8 times larger than the rated line current. Now assume there is a negative sequence component. The rotor is spinning in the positive sequence phase rotation order, but relative to the negative sequence, the slip is very large — in fact equal to 2-s, where s is the fractional slip on full load.

Let us take a specific example of a motor with a full load slip of 5%. In that case, relative to the negative sequence voltage the slip would be 195%. Just consider that for a moment; under locked rotor conditions slip is 100%. Consequently for the motor the negative sequence voltage is definitely akin to a starting status, drawing a high negative sequence current which adds to additional losses in the stator as well as the rotor.

In the above example with a negative sequence ratio of 4.19%, the negative sequence current would be equal to the ratio of start to full load current — let's assume 7 — multiplied by 0.042, adding close to 30% to line current. How do we arrive at that? The impedance of an induction motor is low at high slip, and high at low slip. Now, instead of locked rotor impedance we use Z_2 to designate the negative sequence impedance of the motor and Z_1 for the higher impedance at full load. The negative sequence voltage is V_2 and the positive sequence voltage is V_1 . Negative sequence ('starting') current as a ratio of running (full load) current is equal to Z_1/Z_2 . The negative sequence current I_2 is equal to V_2/Z_2 and likewise the positive sequence current is equal to V_1/Z_1 . Therefore:

$$\frac{I_2}{I_1} = \frac{V_2}{V_1} \times \frac{I_{start}}{I_{run}}$$

As can be seen from the above equation, and the foregoing numerical example, negative sequence voltage, the automatic result of phase imbalance, is harmful to safe motor operation due to an excessive increase in line current.

Monitoring voltage imbalance and harmonics

You may have seen in technical literature that voltage imbalance should be measured on line voltage and not phase voltage.

$$\frac{V_-}{V_+} = \sqrt{\frac{1 - \sqrt{3 - 6\alpha}}{1 + \sqrt{3 - 6\alpha}}}$$



Figure 3: Converter line current waveform under balanced conditions.

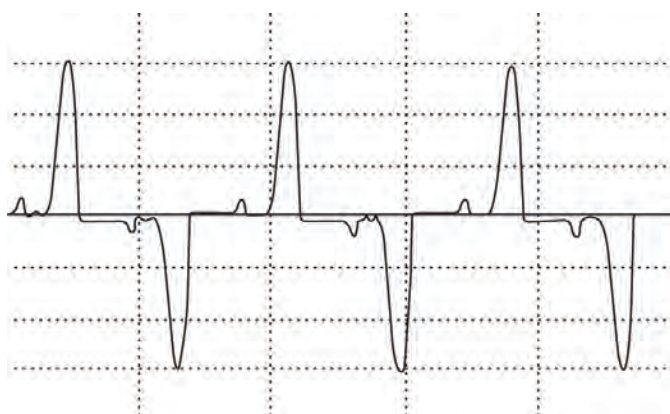


Figure 4: Converter line current waveform under an imbalance of 3.75%.



The reason is that unless angle information is provided as well as magnitude, the imbalance cannot be computed correctly. Line voltage incorporates both phase angle and magnitude information, being the vector difference between a pair of phase-to-neutral voltages. There is a somewhat fierce IEE formula (but accurate), which is reproduced below for getting the negative to positive sequence ratio (V_0/V_+) based only on line voltages, V_{ab} , V_{bc} and V_{ca} , where:

$$\alpha = \frac{V_{ab}^4 + V_{bc}^4 + V_{ca}^4}{V_{ab}^2 + V_{bc}^2 + V_{ca}^2}$$

However, rather than doing the maths, appropriate smart panel instrumentation is a much better solution, the more so if harmonic monitoring is incorporated. As has already been mentioned, the presence of negative sequence harmonics (5th, 11th, etc) can be equally harmful to motors.

Variable speed drives

Variable speed drives are so common that there is an argument that DOL stands for Delete On Line. However, the use of variable speed drives doesn't remove the problem of voltage imbalance. The common six-pulse, three-phase converter supplying the DC link of a drive in theory has the characteristic 'golden arches' line current (see Figure 3) with harmonics starting at the 5th. Note: the harmonic numbers (in theory) are given by $6n \pm 1$ where n is an integer. The practice is often very different. As unbalanced voltages creep in, one of the twin peaks collapses, and third and

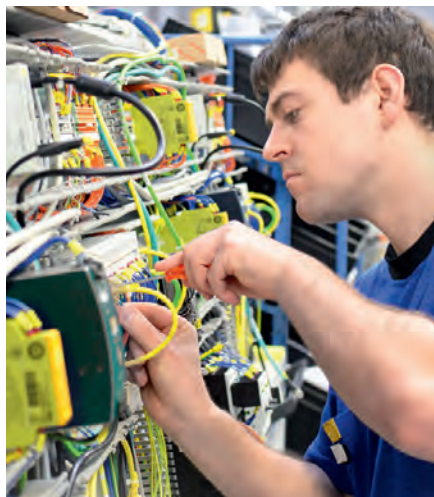
ninth harmonics present themselves — worse, the DC link voltage decreases so that motor torque also decreases (Figure 4).

Motor protection should also be considered. Although, as has been explained, current levels can increase under imbalance conditions, it may be wise not to rely on thermal trips but to employ negative sequence relays in combination with other motor protection gear. An alternative solution is the use of smart panel meters with the ability to monitor a host of power quality parameters including imbalance by means of symmetrical components, and a suite of logic functions for control purposes. An obvious one for protection purposes is an external trip signal to protection breakers — but equally to PLCs controlling task allocations.

References

1. Christie C V 1952, *Electrical Engineering: The Theory and Characteristics of Electrical Circuits and Machinery*, 6th edition, McGraw-Hill.
2. Fortescue C L 1918, Method of Symmetrical Co-ordinates Applied to the Solution of Polyphase Networks, *AIEE Transactions*, vol. 37, part II, pp 1027-1140.
3. Von Jouanne A 2001, Assessment of Voltage Imbalance, *IEEE Transactions on Power Delivery*, vol. 16, no.4, October 2001, IEEE.

Power Parameters Pty Ltd
www.parameters.com.au



Skilfully coupled

User-friendly - that's exactly what the new electronic circuit protector REX12-T is.

A smart design helps you combine single-channeled devices at record speed and **no tools or accessories required**. It all adds up to a tailor-made DC 24 V protection for your system.

Electronic protection by means of the REX12-T:

- saves time and cost through ease of mounting
- is the ideally rated fail-safe element
- provides transparent planning

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



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

**NEW
PRODUCTS**

SANITARY DRUM TIPPER

The latest TIP-TITE sanitary drum tipper allows dust-free transfer of bulk materials from drums to downstream equipment and rapid sanitising between changeovers.

Constructed of stainless steel and suitable for washdown, the tipper is pneumatically powered and certified for use in areas with hazardous conditions.

A hydraulic cylinder raises and seats the drum against a discharge cone, after which a second hydraulic cylinder tips the drum to an angle of 45, 60 or 90 degrees with a motion-dampening feature. At full rotation, the outlet of the discharge cone mates with a gasketed receiving ring fitted to the lid of any receiving vessel, creating a dust-tight seal and allowing controlled, dust-free discharge through a pneumatically actuated butterfly valve into the vessel.

The hydraulic power unit enclosure with sight glass to check gauges and valves is located on the frame exterior for accessibility during set-up, inspection and maintenance, and houses a pneumatic motor to drive the unit.

It is equipped with a roller conveyor that can be fed by an optional or existing infeed conveyor, allowing drums to roll into place by gravity.

Flexicon Corporation (Aust) Pty Ltd

www.flexicon.com.au



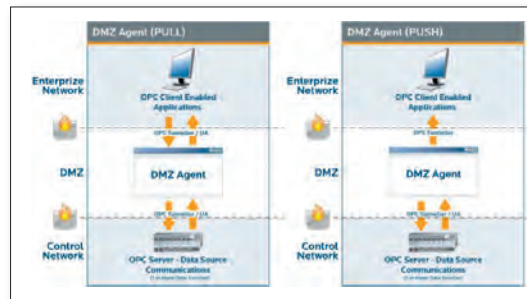
OPC ACROSS DMZs

MatrikonOPC DMZ Agent provides a secure, standardised solution for accessing real-time and archived control automation data across DMZs using off-the-shelf MatrikonOPC products.

Corporate IT departments implement DMZs to protect network assets by layering and isolating secure zones from those that are considered less secure. Network traffic is restricted between these layers via multiple firewalls. While DMZs work to secure the automation environment from the dangers present in the outside world, they prevent necessary operations and business applications from accessing key data using traditional methods.

DMZ Agent overcomes DMZ-related control data sharing issues by providing engineers and system integrators with two time-tested OPC architectures depending on design and corporate security policies: a pull solution and a push solution.

The DMZ Agent Pull solution enables permitted enterprise applications to securely initiate requests for OPC data located within a secure network. The DMZ Agent Push solution allows permitted enterprise applications to receive secure network data pushed from within a DMZ (one-way firewall configuration).



MatrikonOPC

www.matrikonopc.com

GAS ANALYSER

The ecom-J2KNpro analyser utilises electrochemical sensors to measure exhaust emissions, most commonly O₂, CO, NO, NO₂, and SO₂ gases and has an available NDIR bench for measuring CO₂, high CO, and CH₄. The robust filtering system along with the Peltier gas cooler and 9 V high flow pump ensures a clean sample and high flow rate, which is necessary for accuracy and repeatability. The sensors are monitored to compensate for temperature changes in harsh testing environments, and the CO sensor has a dedicated fresh air pump which is activated if a maximum concentration limit is exceeded, usually 4000 ppm.

Applications include emission testing on stationary engines, generators, compressors, boilers, burners, turbines, heating equipment, pumps, diesel engines, mining equipment (to control DPM), construction equipment and laboratory combustion equipment, as well as alternative fuels research and many other applications. The J2KN analyser is also used for fuel efficiency testing, combustion tuning, maintenance checks and emissions compliance reporting. The types of fuel burnt that can be tested on the J2KN series include natural gas, oil, diesel, coal, wood, biomass, butane, propane, biodiesel and other alternative fuels. Gasoline emissions may be tested with the ecom-J2KNpro industrial, but this requires the NDIR bench (for CO).

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au



GF Piping Systems

+GF+

Stay in Touch With Your Level

Non-contact radar level transmitter
type 2290

Guided radar level transmitter
type 2291

GF Piping Systems closes a gap with the new radar level transmitters type 2290/2291 for the chemical process industry and water treatment.

For more details visit our website or call.



Contact Us:

t: 02 9502 8000 or 1300 130 149

f: 02 9502 8090

australia.ps@georgfischer.com

www.georgfischer.com.au



DATA ACQUISITION COMPUTER

DEWESoft has designed the SBOX computer to be powerful, fast and rugged. The SBOX can pair with DEWESoft Sirius and transform into a modular, compact, standalone data acquisition system.

There are three models available — SBOXe, SBOXre, and SBOXfe — all three of which can run an EtherCAT interface and can be connected in a daisy chain with one single cable for power, data and synchronisation. The devices include an Intel Core i7 processor and have an integrated sync junction that enables Dewesoft X Software to automatically recognise the device when connecting it.

The main differences between the models are that the SBOXe is the standard model and all models come with an EtherCAT card; the SBOXfe is a fanless version designed for dusty, harsh environments; and the SBOXre is a rack-mountable version, fitting into SIRIUS rack units.

The DEWESoft SBOX Models utilise Intel Core i7 with either four 2 GHz or 3517UE two 1.7 GHz processors with a memory of up to 16 GB; removable SSD; with maximum power consumption of up to 55 W and an operating temperature depending on the model of -20 to 50°C.

They are also compatible with many interfaces and contain four USB 3.0 at the front; two USB 2.0 at the rear; two Gigabit Ethernet LAN; one WLAN; one DVI which is VGA and HDMI compatible.

Metromatics Pty Ltd
www.metromatics.com.au

SCADA SOFTWARE

InduSoft has announced the release of Service Pack One of InduSoft Web Studio v8.0, improving existing HTML5 and custom widget capabilities, introducing an add-on conversion tool for FactoryTalk applications, and enhancements to IoTView.

Adding to the interoperability of InduSoft Web Studio 8.0 SP1, the HTML5 capabilities have expanded to include horizontal trends. The custom widgets now allow users to host third-party applications within the InduSoft Web Studio environment without necessitating Microsoft-specific ActiveX and .NET controls. Engineers can easily create custom widgets using HTML/Jscript. Support for the new Import Wizard for FactoryTalk ME/SE greatly reduces the engineering time required for migrating applications from FactoryTalk to InduSoft Web Studio.

The scalable, platform-agnostic IoTView runtime, introduced in InduSoft Web Studio v8.0, has also been enhanced to improve data and connectivity. InduSoft Web Studio 8.0 SP1 includes math scripts and enhancements to database connectivity to execute transactions. These capabilities allow IoTView to collect data at an aggregation point close to the sensors and transmit only the data points requiring attention, all in real time, and then manipulate and transform the data into meaningful information before presenting it.

The InduSoft Web Studio v8.0 SP1 release is a natural evolution of the product's life cycle, and in this latest service pack version, it remains 100% compatible with applications designed using previous versions. The service pack also includes enhancements to the development environment to further reduce the development time for InduSoft Web Studio applications.

OEM Technology Solutions
www.oem.net.au



Automate | Control | Monitor | Report

Your complete Remote Access Service solution:
hardware, cloud, network

“Let Global M2M connect you to your machines”

Industrial VPN Router



www.ewon.net.au



www.globalm2m.com.au

DATA ANALYTICS SOFTWARE

Seeq Corporation has announced the release of R15, the latest version of Seeq, an application for engineers and operations analysts in process manufacturing to rapidly achieve insights from asset and operations data. R15 is designed to enable broader adoption of current Seeq deployments in the oil and gas, pharmaceutical, chemical, energy, and food and beverage industries.

Seeq R15 offers features and capabilities addressing the span of requirements for larger and broader deployments for existing users, as well as making Seeq easier to deploy for new users. These features include easier to use search, customised trending views, date manipulations and asset comparisons; as well as data cleansing and regression functions for modelling multivariate analysis, as well as improved variable and operator functionality for process calculations.

Seeq R15 has expanded process historian support to include Honeywell PHD, Wonderware Historian, Yokogawa Exaquantum Historian, and GE Proficy Historian. This adds to existing support for the OSIsoft PI System, Emerson Automation Solutions DeltaV Continuous Historian and Inductive Automation's Ignition SCADA system.

R15 also simplifies integration with relational database systems such as Microsoft SQL Server and its open-source alternative MySQL, as well as CSV file formats, to create batch and state context from manufacturing applications. It also now supports multinode deployments for high-availability deployments in distributed enterprise environments.

Seeq Corporation

www.seeq.com



TR Pty Ltd
ELECTRONIC RENTALS

**NO CAPEX Account
Process Required!**

Identify Production Line Issues with Confidence

Rent the Olympus i-SPEED LT High Speed Video Camera from TechRentals

Features:

- ✓ 2000 fps recording capability
- ✓ 800 x 600 sensor colour resolution
- ✓ Lens kit of 4, stand, and lighting accessories included
- ✓ Onboard editing



Watch the Olympus High Speed Camera in action

For more information, contact us today:

☎ 1800 632 652 ✉ rent@techrentals.com.au 🌐 www.techrentals.com.au

Techrentals

TR1683

DAQ SIGNAL CONDITIONING MODULES

A full line of microBlox isolated signal conditioning modules is now available from Acromag. Offering over 175 models, the microBlox uB modules can safely interface a wide variety of voltage, current, temperature, frequency and other field signals with a ± 5 V or 0–5 VDC output to host measurement and control systems.



Users can select modules with fixed ranges or wireless configuration via Bluetooth wireless technology on an Android or iOS mobile device. Acromag's free Agility app for smartphones and tablets simplifies setting custom I/O ranges and optional alarm functions. The app can also display input signal values and create sharable trend charts. uB modules snap securely into compact back panels (no screws) in any mix with 4-, 8- or 16-channel capacities. With 1500 VAC peak (350 VDC continuous) channel-to-channel and field-to-host isolation, the hot-swappable modules are suitable to front-end data acquisition systems or Acromag remote I/O for communication to Ethernet, Modbus or Profibus networks. High performance is assured with up to 0.05% accuracy and 130 dB noise rejection.

The microBlox module's small size and channel-by-channel scalability is suitable for embedded or portable applications such as test stands, defence systems and process control applications. Suitable for use in harsh industrial environments, the overmoulded modules resist shock, dirt and moisture with dependable operation from -40 to 85°C. Hazardous location UL/cUL Class 1 Div 2 and ATEX Zone 2 approvals are also available.

Metromatics Pty Ltd

www.metromatics.com.au

dry-tech®
The lubricant-free, low-cost way to swivel, rotate, oscillate, move and achieve linear motion ... construct sustainably with dry-running polymer bearing solutions from igus®.

the-chain:
Moving energy made easy for any motion. Simply construct using e-chains®, cables and components from igus®. For selection aids, service life calculations and configurations visit www.treotham.com.au

igus.com.au
plastics for longer life®
Treotham
info@treotham.com.au

treotham.com.au
Sydney (02) 9907 1788
Melbourne (03) 9555 4890
Brisbane (07) 3633 0010
Perth (08) 9303 2347
Auckland (09) 278 6577

HVAC
DYNAPAR Veeder-Root Eagle Signal Line Seiki Keyence Maple Greystone Novotechnik TWK AECO
PLCS
Time Count Rate Flow
Enhancers HMI's Controllers
ph: 1 300 553 500 enhance your sensors VEEDERLINE www.veederline.com.au

**disclaimer
notice**

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

AOG 2017 EVOLVING WITH THE OIL & GAS INDUSTRY



**NEW
NETWORKING
PROGRAM**



**FREE
3-DAY
CONFERENCE**



**LEADING
INDUSTRY
EXHIBITION**

REGISTER FOR FREE

AOGEXPO.COM.AU

SAVE \$20*

AOG

PRINCIPAL SPONSORS



Government of **Western Australia**
Department of **Commerce**



CITY of PERTH

**AUSTRALASIAN OIL & GAS
EXHIBITION & CONFERENCE
22-24 FEB 2017
PERTH CONVENTION EXHIBITION CENTRE**

*Free registration is for the exhibition and conference only. Conference places are allocated on-site on a first come, first served basis.



FREE CONFERENCE PROGRAM TO FEATURE AT AOG 2017

What: Australasian Oil & Gas Exhibition and Conference
When: 22–24 February 2017

Where: Perth Convention and Exhibition Centre
Web: www.aog.com.au

The annual Australasian Oil & Gas Exhibition & Conference (AOG) will showcase the oil and gas industry over three days with an exhibition, a free conference program and premium industry networking opportunities.

Celebrating its 36th year, the Australasian Oil & Gas Exhibition and Conference (AOG) is to be staged in Perth from the 22nd to the 24th of February 2017, and will this year feature three streams focusing on the opportunities and challenges in times of transformational change. Conference sessions will be held in specially constructed theatres on the exhibition floor, and all conference sessions are to be free.

Collaboration Forum

With key themes of innovation and efficiency, the 2017 AOG Collaboration Forum will focus on enhancing collaboration between operators, major contractors and SMEs, driving greater understanding and access to opportunities.

Major topics will include:

- Supplier enablement
- Technology and innovation
- Learning from other sectors

The Collaboration Forum is being organised by Accenture, Woodside Energy, National Energy Resources Australia and the Western Australia Department of Commerce.

Subsea Forum

In conjunction with the Society for Underwater Technology (SUT), Subsea Energy Australia (SEA) and Subsea UK, the Subsea Forum

at AOG in 2017 will focus on how the Australian Subsea industry adjusts to the challenges and opportunities in the current market. Key topics include:

- Subsea system design
- Subsea operations
- Subsea extension
- Suspension and decommissioning of subsea systems
- Subsea collaboration, innovation and standardisation
- Norwegian subsea technology (in conjunction with INTSOK)

Knowledge Forum

From instrumentation, control and automation to asset management, corrosion and much more, The Knowledge Forum at AOG 2017 will bring together the leading organisations in the industry to educate, inspire and inform. Conference sessions will be conducted by the following organisations:

- Instrumentation, control and automation: Institute of Instrumentation, Control and Automation
- Non-destructive testing and condition monitoring: Australian Institute of Non-Destructive Testing
- Asset management: Asset Management Council
- Naval architecture: Royal Institution of Naval Architects
- Safety: IFAP and Safety Institute of Australia
- Industry employment outlook: AMMA
- Corrosion: The Australasian Corrosion Association
- LNG as a marine fuel: Maritime Industry Australia Limited
- Digital oilfields: Society of Petroleum Engineers

Melbourne

22-24 November

Melbourne Convention & Exhibition Centre

**NEW
VENUE!**

Events for critical
communications users
and industry

Utilities | Government | Enterprise | Transportation | Resources | Public Safety

CONFERENCE HIGHLIGHTS



Kevin Vinsen

Research Associate Professor
International Centre for Radio Astronomy
Research



Crispin Blackall

Director Global Enterprise Product Engineering
Telstra



Bill Schrier

Senior Advisor
FirstNet



Station Officer Graham Tait

Systems Officer, Operational Communications
Fire & Rescue NSW

PLUS: 1500+ users and industry experts | **100+** exhibitors | **75+** speakers
... and so many more reasons that you need to attend and connect with your peers and
the 100's of industry experts waiting to offer you the solutions you need.

**FREE EXHIBITION
ENTRY**

8 PRE-CONFERENCE TRAINING WORKSHOPS

- Understanding radio over IP
- Keeping the spectrum clean — ACMA activities and compliance priorities
- Implementation of location services within a radio dispatch environment
- Fleet management cradle to grave utilising OTAP
- Mission-critical communications redundancy
- Integrated operations: beyond IT/OT convergence
- Critical communications, where to from here
- Building a radio network from the ground up

Digital Partner



Platinum Sponsors



Delegate/Visitor Bag Sponsor



Gold Sponsors



Conference Guide Sponsor



Supporting associations & media organisations



Lanyard Sponsor



Media Partner



Association Partner



In conjunction with the **ARCIA Industry Gala Dinner**
23 November — MCEC, Melbourne

Visit www.arcia.org.au to book your tickets

AS I SEE IT



TRAINING: ARE THE FUNDAMENTALS BEING LEFT BEHIND?

Australia finds itself in a very curious position in the global family. Blessed with an abundance of natural riches, it seems we keep forgetting that mass manufacturing is part of a major contribution to a nation's wealth. Perhaps innovation is cheaper than manufacturing? But that means that our education and training system also needs to provide the right basis for this type of work and the necessary infrastructure. The proliferation of smart devices and the ability to collect data in ever greater amounts not only requires a better understanding of analysis methods to arrive at meaningful information, but also requires increasingly smarter, smaller and reliable sensors. The profession of instrument scientists and technologists is in a state of change, with greater demands for different control algorithms and automation methods. We are experiencing exciting times in the changing world of the fourth industrial age where we will see further advances in the traditional approach to process control that we may not even have thought of.

Even as we acknowledge that changes in technology require an adaptive approach to extract the best outcomes from those changes, we still don't educate many that need to be trained in the fundamentals of control and automation. The processes may be understood, but too often the art of deciding which technology to implement and which sensor or instrument is really right for the application is left to the vendor sales personnel. Who trains them in systems thinking and applications? Technicians often have to cope with systems they have little understanding of, especially when PLC and more complex programming tasks are required. Networking, integration of platforms and the management and validation of data collected (in any form) are becoming more and more dominant in our landscape of instrumentation, controls and automation disciplines.

There is some confusion about technician qualifications. Who can really choose

appropriately from the nearly 200 competency items identified for our profession at the technician level? And is engineering education adequately supporting these competencies? Talking to lecturers and trainers deepens the concern about the future of the industry and the development of the required skills and competencies. We see that education politics, naming of technical institutions and funding models change as often as a new minister arrives on the scene. This cannot be beneficial for the profession in the long term. While the federal government promotes innovation, we need to consider our manufacturing — and therefore our skills — future. Failing to plan is equivalent to planning to fail (to use a well-worn platitude).

A strategic approach and plan to deal with the requirements of our changing industrial landscape is needed. It would provide the direction and certainty for the many that are involved in this stimulating profession. The professional and representative organisations such as the Institute of Instrumentation, Control and Automation have something to say in this — but even so there may be little appetite for appropriate action at the Ministerial levels. In the meantime, IICA provides to the interested a variety of internationally renowned training courses catering for a variety of needs. Will this be enough though in the long run?

Ernst Krauss is the current Vice President of the IICA. He holds the status of a Fellow of the IICA, is a certified Fellow in Asset Management and has lifelong experience in oil and gas, mining and general industries in instrumentation, control and electrical engineering, both overseas and in Australia. His current interest and activities focus on the whole of life asset management, where technical, organisational and operational competency converge to provide capability to effectively manage large or small production or service systems.



Westwick-Farrow Media

A.B.N. 22 152 305 336

www.wfmedia.com.au

Head Office

Cnr. Fox Valley Road & Kiole Street,
(Locked Bag 1289)

Wahroonga NSW 2076

AUSTRALIA

ph: +61 2 9487 2700 fx: +61 2 9489 1265

Editor

Glenn Johnson

wjnpt@wfmedia.com.au

Publishing Director/MD

Geoff Hird

Art Director/Production Manager

Julie Wright

Art/Production

Tanya Barac, Odette Boulton, Colleen Sam

Circulation Manager

Sue Lavery

circulation@wfmedia.com.au

Copy Control

Mitchie Mullins

copy@wfmedia.com.au

Advertising Sales

Sales Manager

Nicola Fender-Fox – 0414 703 780

nfender-fox@wfmedia.com.au

Sandra Romanin – 0414 558 464

sromanin@wfmedia.com.au

Tim Thompson – 0421 623 958

tthompson@wfmedia.com.au

Subscriptions

For unregistered readers price on application.

If you have any queries regarding our privacy policy please email

privacy@wfmedia.com.au



September 2015 total CAB audited circulation (Aust + NZ)
6,095 readers (69% personally requested)



Contact the editor

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

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

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

FREE

to industry and business professionals



The magazine you are reading is just one of twelve published by Westwick-Farrow Media. To receive your free subscription (magazine and eNewsletter), visit the link below.



wfmedia
connecting industry

www.WFMedia.com.au/subscribe



**FROM IDEA TO
IMPLEMENTATION,
EVERY PART MATTERS.**

**Choose quality, performance
and value without compromise.**

Decisions have consequences. Making the right choices can improve the efficiency and productivity of your entire organisation.

Because every decision matters, every part matters. That's why RS Pro gives you everything that matters – quality, performance, choice and exceptional value for money.



Find out more
au.rs-online.com/RSPRO

