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In the retail industry, warehouse management and control systems have become critical operating components in the race for end-to-end supply chain efficiency. See this month’s cover story on page 20 for more on how Fortna’s control system utilising automation from Beckhoff is keeping Mr Price competitive.

**FEATURES**

- **Cover story**
  - Beckhoff in control at Africa’s largest retail distribution centre
- **Food, beverage & pharmaceutical**
  - Yokogawa South Africa, Instrotech, Deebar, Festo, Endress+Hauser, Gail Norton Instrumentation Agencies
- **Packaging & bottling**
  - Westplex, Krohne SA, Countapulse Controls
- **Process measurement**
  - Instrotech, Automation & Control Solutions, EOH, ASSTech Process Electronics & Instrumentation, Instek Control, Comtest, Endress+Hauser, WIKA Instruments
- **Enclosures, cabling & accessories**
  - Yokogawa South Africa, RS Components SA, Rockwell Automation
- **IT in manufacturing**
  - Absolute Perspectives, Adroit Technologies, ARC Advisory Group, Yokogawa South Africa
- **Electrical power & efficiency**
  - DEHN Africa, Zest WEG Group Africa, Siemens Digital Factory and Process Industries and Drives, Adroit Technologies, Magnet
- **Control systems**
  - FLIR South Africa, Siemens Digital Factory and Process Industries and Drives, Omron Electronics, RS Components SA, Beckhoff Automation, Countapulse Controls
- **Valves & actuators**
  - Metso South Africa, ASCO Numatics, Macsteel Fluid Control
- **Condition monitoring**
  - Comtest, Emerson Automation Solutions, R&C Instrumentation, Phoenix Contact, Omniflex Remote Monitoring Specialists, SKF South Africa
- **Wireless & telemetry**
  - SICK Automation Southern Africa, RET Automation, Yokogawa South Africa
New threat to plant safety emerges

Since the Stuxnet strike hit the headlines back in 2010, the security of industrial control systems has been called into question. Motivation for an attack can range from the relatively unsophisticated revenge attempts of a disgruntled employee, to a calculated act of cyber sabotage implemented by a warring nation against the critical infrastructure of a rival. In these latter cases, the skill and ingenuity of the ‘black hat’ programmers is formidable enough to leave any defence vulnerable.

A situation compounded by the increasing levels of interconnectedness that characterise the IoT era, along with its call for more ‘open’ system interfaces.

The Stuxnet worm, and those which followed, targeted the plant control systems. Now, it seems, the threat has evolved even further. Cybersecurity specialists FireEye recently reported on an attempted malware attack at a petrochemical plant in the Middle East, which targeted the facility’s safety systems.

According to the post (https://tinyurl.com/ydfrjpme), the hostile malware is a framework called Triton, designed to interact with the SIS platform. Details on how the hackers gained access to the system are sketchy, but it is believed this was remotely done through an SIS workstation. Once the system had been breached, an attempt was then made to reprogram the SIS controllers.

As it turns out this was a mistake. Thanks to a security measure implanted in many controllers after the Stuxnet incident, the SIS system entered a fail-safe state when the application code between redundant units did not stand up to a validation check. The result was a safe shutdown of the plant with no damage to either personnel or equipment, but it did prompt the asset owner to initiate an enquiry.

After piecing together the evidence, FireEye investigators concluded that preparation of Triton would have required substantial cybersecurity and engineering expertise. Since there was no apparent monetary goal, and the target was a critical infrastructure operator, they concluded that the most likely ‘threat actor’ was a rival nation state.

Whether the threat is from a rival nation or a disgruntled employee is not the point, the scary part is that safety systems as a class just became targets for a cyber attack. Paradoxically, what made them vulnerable are the very features demanded by end users these days – remote accessibility and configuration.

Will cybersecurity turn out to be the stumbling block of the Fourth Industrial Revolution? It’s too early to say. What we do know is that in the consumer sector it did not stop the banks from successfully putting their businesses online. Admittedly the risks are different, but the consequences are every bit as disastrous to the brand.

What the banks did not do was go digital all at once in a ‘big bang’ approach. Perhaps industry can learn from this: when it comes to critical infrastructure, do not put everything online just because you can. First, evaluate the business case through a comprehensive SWOT analysis. If it turns out that the rewards far outweigh the risks, and the risks are manageable, then there is a strong case for going digital. Most importantly, follow the advice of the equipment supplier when it comes to cybersecurity best practices, which, it seems, was not done to the letter at the plant described above. Nick Denbow has more on the Triton story in this month’s European Report on page 14.

Wonderware X-Change 2018

While on the topic of following the advice of your equipment supplier, this year’s Wonderware Southern Africa annual user conference – X-Change – returns to the picturesque Champagne Sports Resort in the Drakensberg. The 2018 event will address the recent addition of Schneider Electric Software solutions to the organisational portfolio.

Under the theme ‘Define your game plan for digital transformation’, the conference aims to show delegates how digital technologies can be used to enable operational and business goals. For any organisation that needs to improve its overall productivity through better insight across its value chains, the Champagne Sports Resort looks well worth a visit from 15-18 April. More details on page 6.

Steven Meyer
Editor: SA Instrumentation & Control
steven@technews.co.za
SA Gauge - Reliable Under Pressure
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Yokogawa Electric Corporation has announced that it will deliver a control system for a flue gas desulphurisation system that is to be installed at the Ugljevik coal-fired power plant in northeastern Bosnia and Herzegovina. The plant has a capacity of 300 MW, sufficient to supply a quarter of the total electrical generation capacity for the Republic of Srpska, which is one of the constituent entities of Bosnia and Herzegovina. Since it burns brown coal with a high sulphur content, the emissions from its flue stack contain high levels of sulphur dioxide. Installation of the flue gas desulphurisation system is expected to improve the environment and help satisfy environmental standards, which is required for joining the EU.

The main product delivered by Yokogawa will be a Centum VP integrated production control system for the monitoring and control of the flue gas system. Delivery will take place by August 2018.

North American automation market breaking records in 2017

The North American automation market set new records through the first nine months of 2017, according to the Association for Advancing Automation (A3), a global advocate for the benefits of automating. Results found records set in the areas of robotics, machine vision, motion control and motor technology.

“The market for robotics and automation continues at a healthy growth rate,” said Jeff Burnstein, president of A3. “It is evident that the investment companies are making in these automation technologies is having a positive impact on productivity and competitiveness, while saving and creating new jobs in North America.”

The hottest industries were metals (54%), automotive components (42%), and food and consumer goods (21%).

Integro partners with SICK to enhance vision integration solutions

Integro Technologies announced it has become a SICK Authorized Vision Integration partner serving the United States. As an Authorized Integration Partner, Integro Technologies’ staff is trained on SICK AppSpace, the open platform for programmable vision solutions and sensors. It enables multiple technologies to be combined to create solutions for customers that are fully integrated into the manufacturing line and meet the challenges of Industry 4.0.

The cooperative partnership is intended to broaden Integro Technologies’ systems portfolio, resulting in automatic inspection applications for customers. SICK vision solutions are used for quality inspection, robot guidance, measurement and code reading applications and partners with qualified integration companies to better serve its customers. Among its many solutions is a portfolio of 2D and 3D machine vision products, including vision sensors and vision systems.

Michael Brown’s Practical Process Control Training Courses and Loop Optimisation Services

Courses:
These well known courses are unique and invaluable to new comers as well as experienced practitioners and process engineers in the field of industrial regulatory control optimisation. The courses offer a new and very practical approach to this subject, which very few people really understand properly.

Courses are available on demand for six or more delegates and are suitable for instrumentation and control technicians and engineers, and for plant process engineers. Many chemical and mechanical engineers have attended the courses as well as metallurgists.

Even people with many years of experience in this field have found the courses a real eye opener.

Optimisation Services and Consulting:
Michael Brown has had 35 years of experience in control loop optimisation, and in that time has successfully optimised controls in many different types of plants, including pulp and paper, power stations, chemical and petrochemical, oil, steel, mining and metallurgical recovery, cement, brewing, glass, dairy, food, and sugar, both in South Africa and many overseas countries.

His work has proved invaluable to plants and has resulted in greatly improved performance and ROI.
**Hannover Messe training tour 2018**

This amazing training opportunity will kick-off at various Endress+Hauser production centres in Germany, France and Switzerland. The topics of discussion will include developments and innovation in various flow principles, fieldbus technology, as well as advances in pressure and level transmitters.

We continue to the Basel University and learn more about nanotechnology development and the various practical uses. We then continue to our production centre for temperature, registration and system products in the heart of Bavaria in Nesselwang. After which we continue to the world’s leading trade fair for industrial technology at Hannover Messe.

**Tour programme**
- Production Centre Maulburg – Level, Process and DP Pressure and Tank Gauging
- Production Centre Flowtec – Flow
- Production Centre Process Solutions – Solutions for Process Applications
- Production Centre Wetzer – Temperature, Registration and System Components
- Hannover Messe Industrial Technology Trade Fair

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**Date**
14 to 26 April 2018 (including travel time)

**Information**
Su-Anne Willemsen
Marketing Communications Manager
suanne.willemsen@za.endress.com
Telephone: +27 11 262 8080

**Cost**
R44 000 (incl VAT). Partners are most welcome to join the parallel partner’s programme, exploring more hidden gems during the days. The inclusive cost is R74 000 per couple (incl VAT).

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BMG and NSK strengthen distribution agreement

BMG and NSK have consolidated a longstanding partnership, with the recent signing of a new distribution agreement that enhances the original contract and augers well for the companies, stakeholders and customers. BMG was appointed in 1991 by NSK, Japan, as exclusive distributor in South Africa for its extensive range of bearings. Through the restructured agreement, all sales will now be channelled through NSK’s South African operation.

“BMG’s NSK range, one of our leading bearings brands, extends from precision miniature bearings used in machine tools and electronics applications, to giant-size bearings used in the steel and mining industries,” says Keith van Wyk, BMG’s distribution director. “NSK has been at the forefront of bearing design and development for many decades and BMG is proud to represent this prestigious brand. Through the strengthened agreement, BMG and NSK South Africa are consolidating services and working strategically together on increasing awareness of the NSK brand and identifying opportunities for growth in key market sectors within Africa and also abroad.”

BMG will increase availability of stock out of NSK’s European distribution centre in Tilburg, Netherlands, and values engineering and marketing support from the NSK team in the UK and Germany. Both companies have made a substantial investment in increased warehousing facilities for greater stock availability and improved lead times. Training facilities for staff and end user customers have also been upgraded.

BMG’s R400 million investment to upgrade the existing Droste Park facilities into a leading edge distribution centre – BMG World – centralises functional and support operations onto one site. This enables it to continue to provide high levels of operating efficiencies and delivery service, in line with the continued growth of the business.

BMG’s bearing division, the cornerstone of the business, has restructured its management:

Werner de Bruyn is business unit manager and Rouff Essop is operations manager. The company is committed to providing 24-hour customer support for production efficiency and reliability centred maintenance through more than 148 BMG branches and a wide distribution network, locally as well as into Africa, enhanced by advanced technical and design support across all functional disciplines.

For more information contact
Werner de Bruyn, BMG, +27 (0)11 620 1500, wernerb@bmgworld.net, www.bmgworld.net

Define your game plan for digital transformation at X-Change 2018

Wonderware Southern Africa’s 26th annual User Conference, X-Change 2018, will return to the picturesque Champagne Sports Resort, from 15-18 April 2018. X-Change has been a success for a quarter of a century because it has always delivered three consistent values: success for a quarter of a century because it has always delivered three consistent values: success for a quarter of a century because it has always delivered three consistent values: success for a quarter of a century because it has always delivered three consistent values: success for a quarter of a century because it has always delivered three consistent values: success for a quarter of a century because it has always delivered three consistent values: business and networking opportunities, the key to improved operational benefits and an unequalled insight into the technologies and approaches that drive it all.

This year’s X-Change will address the recent addition of Schneider Electric Software solutions to the portfolio and will now also feature industry-specific tracks from mining, metals and minerals, food and beverage, oil and gas, water and wastewater, as well as industrial manufacturing industries.

Technology drives opportunity

Industries and businesses around the world are faced with an enormous amount of pressures across multiple dimensions. Declining commodity prices create pressure in terms of the investment abilities of companies, while heightened regulatory compliance creates challenges for industries and businesses they have never faced before. The modern workforce is shifting in terms of how work is performed while the modern enterprise strives to retain as much institutional knowledge as possible, and improving safety continues to be paramount across all facets of the enterprise.

Digital transformation merges technology innovation with domain expertise. This enables not only the contextualisation of new and existing data but also delivers actionable insights and information the enterprise can execute upon in an effort to close the loop towards continual process improvement.

To illustrate the point that such technologies are business enablers, a dozen presentations by end-users will illustrate how Wonderware and Schneider Electric Software are helping them achieve their operational and business goals. But this is only a fraction of the dozens more presentations that will address key issues across most industrial domains.

What’s in it for you?

In short, a game plan to improve productivity and return on capital, enable insights across enterprise value chains, enhance competitiveness, improve customer experience, and cut the hype.

X-Change provides in-depth information sharing, education and networking opportunities in a power-packed three day event. Attend product roadmaps, solution and industry-specific tracks, and deep-dive technical breakouts. X-Change also features two days of demos, displays, and complimentary hands-on training courses in the Collaboration Expo.

For more information contact
Jaco Markwat, Wonderware Southern Africa, +27 (0)11 607 8303, jaco.markwat@wonderware.co.za, www.wonderware.co.za
ifm celebrates 10 years in South Africa

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After twenty years growing from strength to strength in Ferndale, RJ Connect has moved to an A-Class building in Bromhof, Randburg. The new building has ample space for the growing team, and is focused on customer service and satisfaction.

Delegates will appreciate the cutting edge training facility, which is able to accommodate more people, as well as making use of the new assembly room, executive boardroom and spacious sales office.

The team shared this special occasion with valued clients and enjoyed welcoming visitors to the space, which offers new opportunities for growth through enhanced customer experiences and building long-term relationships.

**For more information contact RJ Connect, +27 (0)11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za**

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**SICK Automation upgrades luggage ID scanners at OR Tambo International Airport**

SICK Automation recently upgraded luggage identification scanners at OR Tambo International Airport, the largest and busiest airport in Africa.

The upgrade included replacing SICK’s recently discontinued range of CLV 490 scanners with its next generation CLV 690 laser-based barcode scanners that offer improved read rates. The upgraded scanners ensure reliable and accurate luggage barcode scanning, no matter the luggage shape, height or orientation.

“The original scanners were installed between 2008 and 2010 and were still operating to specification,” comments Danie Labuschagne, logistic automation manager, SICK Automation Southern Africa. “But as the range had been replaced with the newer models, spare parts availability was becoming more difficult. And with the fast pace and need for accuracy at any airport, let alone Africa’s busiest, having the newest technologies and ample spare parts drove the need for the upgrade.”

The new scanners are mounted onto aluminium frames along the airports’ luggage conveyor belts to scan and identify luggage in accordance with the International Air Transport Association (IATA) standard. The identification data captured is communicated to the airport’s higher-level control system.

SICK replaced a total of 310 barcode scanners at Terminals A, B and CTB at the airport. In order to minimise any disruption to the airport’s operations during the upgrade, the scanners were installed in one-day phases throughout the various terminals.

“Many of the world’s airports use SICK scanners for luggage identification,” adds Labuschagne. “This market-share enables us to deliver an effective, highly technical solution that we know operates reliably and efficiently at the world’s busiest airports.”

SICK Automation Southern Africa was contracted by system integrators Krier Technologies on behalf of Aviation Co-ordination Services (ACS). The OR Tambo International Airport upgrade was completed in March 2017.

**For more information contact**

Danie Labuschagne, SICK Automation Southern Africa, +27 (0)11 472 3733, daniel.labuschagne@sickautomation.co.za, www.sickautomation.co.za
Afrivalve, the trading name for eDART Slurry Valves, has announced that it has increased its BEE compliance to level 2.

In order to meet customer requirements, particularly those in the mining sector, eDART has enhanced the participation of two of its senior managers in the company by bringing them in as 51% partners.

“The mining sector in particular requires a good compliance level by its suppliers and also look for a 51% ownership to satisfy the Mining Charter objectives,” said Mike Sessions, CEO of eDART.

The two senior managers who now form part of the new vision for Afrivalve and eDART are Jacob Mtolo who is the Afrivalve sales manager for local business and has extensive experience in instrumentation and knowledge of the valve industry, and Mohammed Shaik, the financial manager who has been involved with the company for many years.

“We are very pleased that we have the opportunity to partner with capable managers who can add significant value to our business independently of the BEE factor,” concluded Sessions. “Our new BEE rating will give us direct access to many customers with whom we have previously had to work through third-party companies, which will increase the value we can add to our clients’ businesses and give us the means to grow our company.”

Afrivalve has seen substantial growth in the slurry valve and process sampling business over the last few years. In addition to the eDART slurry control valves and samplers it now offers C-Tech knife gate valves and Redroc pinch valves both of which are manufactured in-house, as well as a complete range of AVI industrial valves.

For more information contact Richard Rule, eDART International & Projects, +27 (0)11 823 6620, richardr@edart.co.za, www.edart.co.za
Information from Siemens: new publications on updates to standards

Siemens has published two technical texts to provide customers with the latest information on the application of European directives and international standards. The reference work ‘Control Panels Compliant with IEC Standards and European Directives’ has been updated in accordance with the new version of the safety standard IEC 60204-1 and now includes a range of practical planning tips. In addition to this, a new white paper deals with the guidelines in the Low Voltage Directive 2014/35/ EU for risk analysis and assessment of industrial control panels.

Whether operating plants, building control panels or equipping machines, nearly all these activities are supported by several standards which, amongst other things, ensure plant safety and product quality. These standards, whether issued and approved by federal, European or international bodies, are regularly updated or amended in order to keep pace with the rapidly advancing state of the art. Siemens is offering its customers documents on important updates which deal with and explain the latest developments and demonstrate these through examples.

The focus is on the significant changes to the standard IEC 60204-1 and the European Low Voltage Directive 2014/35/EU which affect panel builders.

Conforming to international guidelines

The guideline ‘Control Panels Compliant with IEC Standards and European Directives’, which runs to over 300 pages, provides users with information on what they should be aware of when planning, manufacturing and operating electronic low-voltage switchgear assemblies in accordance with the relevant IEC standards and European directives. It provides wiring examples and other important practical information and focuses specifically on the standards IEC 60204-1 and IEC 61439-1/-2.

Protecting people and animals

The significantly slimmer white paper risk analysis and assessment of industrial control panels provides information for panel builders on the updates and ramifications of the European Low Voltage Directive 2014/35/EU. It also provides practical examples illustrating how analysis and assessment can be carried out. The directive 2014/35/EU ensures that electrical equipment corresponds to the required safety level for the protection of people and animals and associated property. It applies to all devices which operate at a nominal voltage between 50 and 1 000 VAC or 75 and 1 500 VDC.

Both publications are available to download now at www.siemens.com/eu-directives.

For more information contact Jennifer Naidoo, Siemens Digital Factory and Process Industries and Drives, +27 (0)11 652 2795, jennnifer.naidoo@siemens.com, www.siemens.co.za

Police take down plagiarism warehouse in Vietnam

Asian product pirates are as creative as they are unscrupulous with copies of known brand names. WIKA is also affected, which is why the company has taken legal action against the perpetrators. This requires uncompromising action, as demonstrated in the incident of the pressure gauge copies that were produced in China and emerged in Vietnam. This case was awarded the Plagiarius trophy 2017.

Thanks to its widespread customer and distributor network, WIKA is notified relatively quickly of possible product piracies. This was also the case in Vietnam, where a dealer in Ho Chi Minh City was offering alleged WIKA pressure gauges, which turned out to be fake.

External storage

This prompted WIKA to perform a test purchase in order to prove the dealer’s guilt. First, he disappeared for ten minutes, probably in order to fetch the goods from an external warehouse. In order to determine the storage site, a second test purchase was performed in which a person entrusted by WIKA followed the dealer. Given the severity of the case, WIKA decided to have the storage site raided by police. This had to take place rapidly, in order to prevent a possible clearance of the facility. The Vietnamese Economic Police were persuaded of the necessity to act quickly and raided the place. The result was more than 1000 confiscated instruments and the institution of legal proceedings against the dealer.

The suspect’s connection to a large dealer network kept suspicion alive and so, six months later, another test purchase was made. Usually, Asian dealers lose interest in distributing imitations after the first contact with the police because their fear of loss of face is too great. All the greater the surprise then that in this case the raid had been insufficient: the dealer was now offering ‘VIKA’ instruments. Moreover, his intention was to register VIKA as a trademark in Vietnam.

Written apology

WIKA immediately ordered another raid and requested the deletion of the trademark VIKA. However, the second step required an expert opinion that the label VIKA and the WIKA imitations represented an infringement against the trademark rights, which was successful. In the meantime, the dealer in question has apologised in writing and promised to stay away from imitations in the future.

For more information contact WIKA Instruments, +27 (0)11 621 0000, sales.za@wika.com, www.wika.co.za
Strategic procurement at Endress+Hauser

Digitalisation has profoundly changed the way transactions are conducted in the business world, making it extremely easy and convenient to get information. Digital procurement solutions help organisations to generate new insights and strategies, uncover new sources of value, increase efficiency and achieve the process excellence, to assure supply and successful risk mitigation.

Digital procurement solutions are enabling the future by providing access to previously unavailable data, bringing order to massive data sets, driving more complex analysis and better supplier strategies, and enabling more efficient operations. With improvements in data, analytics, computing power, and visualisation, digital procurement also has better evidence-based options for decision making, which can improve both the value and accuracy of strategic decisions and the speed of execution.

The future of procurement in the digital age

Strategic sourcing is becoming more predictive, transactional procurement is becoming more automated, and supplier relationship management is becoming more proactive. For organisations looking to embrace digital procurement solutions, the path has never been easier than Endress+Hauser’s tailor-made strategic procurement solutions suitable for all individual needs:

- e-Catalog contains prices, part codes, delivery times and technical data, particularly useful for the fast repeat ordering of everyday standard products.
- Shopping cart interface uses the Endress+Hauser Online Shop configurator to build part codes, obtain up-to-date prices and lead times, then simply transfer this data, error-free, into the user’s procurement system via a shopping cart interface (e.g. open catalogue interface).
- ERP to ERP (enterprise resource planning) helps reduce costs, manual errors and lead times by automating procurement process. This solution provides an efficient way of handling all transaction data for quotes, orders, order confirmations and invoices.

All these strategic procurement solutions create value for customers through digital services and visualisation of information. The new and improved Endress+Hauser platform will be ready in February 2018.

For more information contact Deshini Govender, Endress+Hauser, +27 (0)11 262 8000, deshini.govender@za.endress.com, www.za.endress.com

BMG extends its offering of Fenner power transmission products

Fenner, a leading brand in BMG’s extensive range of power transmission components, encompasses shaft mounted speed reducers (SMSRs), transmission belts, pulleys and accessories, as well as shaft fixings, chain drives and couplings.

“BMG takes great pride in supplying these highly acclaimed Fenner products, which are enhanced by Fenner’s global pledge to quality assurance,” says Mark Barbour, ElectroMechanical business unit manager, BMG. “This commitment guarantees that the quality of Fenner products always meets exacting internationally recognised industry standards.

"Key components in BMG’s Fenner range are highly flexible SMSRs that provide an efficient method of reducing speed in diverse applications, including conveyors, mixers and mills, as well as cranes and hoists.

“Fenner SMSRs, which have a smaller inventory of parts than conventional models, ensure a good power/weight ratio within compact dimensions. Benefits over other drive systems include simplicity, minimal spares requirements, ease at which you can change the speed, ideal backstop position and the use of standard motors.”

The latest Fenner SMSR series – the PowerPlus range – offers a 50% increase in power to weight ratio over previous versions and is capable of handling powers between 0,25 kW and 250 kW. These units have a more compact design for easier handling and a wider range of bore sizes.

The Fenner Taper-Grip bush locking system transmits 300% more torque and accommodates shaft tolerance to h11. This locking system allows the SMSR to be mounted directly on the driven shaft, instead of requiring foundations of its own and eliminates the need for flexible couplings and external belt take-up arrangements.

The Taper-Grip system also simplifies installation and removal of the gearbox and enables the transmission of gear unit loads without a key. This fully interchangeable unit is resistant to fretting corrosion and has a significantly improved shaft grip.

BMG is thus uniquely positioned to meet the exact gear drive and motor requirements of contractors, designers and the end-user in diverse industries. A team of highly skilled technicians offers a technical advisory and support solution service and a substantial stockholding ensures a quick and efficient delivery throughout the southern African region.

For more information contact Mark Barbour, BMG, +27 (0)11 620 1611, markb@bmgworld.net, www.bmgworld.net
BECKHOFF

Who will benefit from this training? Automation Engineers

TwinCAT 3/TwinCAT 2 – Programming, Commissioning & Maintenance
Cape Town 6-8 Mar 2018
Johannesburg 6-8 Mar 2018
Durban 13-15 Mar 2018
Port Elizabeth 13-15 Mar 2018

For more information contact Andrew Reinhold, Beckhoff Automation, +27 (0)11 795 2898, training@beckhoff.co.za, www.beckhoff.co.za

TC1001 – Process Measurement and Instrument Configuration 1
Sandton 5-9 Mar

TC1002 – Process Measurement and Instrument Configuration 2
Sandton 12-15 Mar

TC1003 – Universal Training Simulator
Sandton 5-15 Mar

For more information contact Nico Marneweck, Endress+Hauser, +27 (0)11 262 8004, nico.marneweck@za.endress.com, www.za.endress.com

Endress+Hauser

Who will benefit from this training? Instrument Technicians and Engineers

TC1001 – Process Measurement and Instrument Configuration 1
Sandton 5-9 Mar

TC1002 – Process Measurement and Instrument Configuration 2
Sandton 12-15 Mar

TC1003 – Universal Training Simulator
Sandton 5-15 Mar

For more information contact Nico Marneweck, Endress+Hauser, +27 (0)11 262 8004, nico.marneweck@za.endress.com, www.za.endress.com

FESTO

Who will benefit from this training? Mechatronic Engineers

PN122 – Advanced Pneumatics
East London 14-16 Mar 2018

HY511 – Hydraulics (1) Basic
Durban 27-29 Mar 2018

PN111 – Pneumatic (1) Basic
Johannesburg 27-29 Mar 2018

For more information contact Lucian Kirk, Festo, +27 (0)11 971 5626, didactic.za@festo.com, www.festo-didactic.co.za

SMC

Who will benefit from this training? Mechatronic Engineers

TC-PNEU-E – Electro-Pneumatics
Johannesburg 7-9 Mar 2018

TC-PNEU-B – Basic Pneumatics
Cape Town 14-16 Mar 2018

TC-PNEU-B – Basic Pneumatics
Johannesburg 27-29 Mar 2018

For more information contact Riaan van Eck, SMC Pneumatics South Africa, +27 (0)11 100 5866, rvaneck@smcpneumatics.co.za, www.smc pneumatics.co.za

VEGA

Who will benefit from this training? Automation Engineers

Processing Solutions for Level, Pressure and Nucleonic
Johannesburg 6-8 Feb 2018

For more information contact Chantal Groom, VEGA Controls SA, +27 (0)11 795 3249, chantal.groom@vega.com, www.vega.com

MECOSA

Who will benefit from this training? Automation Engineers

Mecosa training course for Radiation Protection Officers
Radiation Protection Officers
Johannesburg 27-28 Feb 2018

For more information contact Michael Garnham, Industrial Data Xchange, +27 (0)11 548 9960, academy@idx.co.za, www.idx.co.za

PHOENIX CONTACT

Who will benefit from this training? Automation Engineers

SIP1 – Surge and Lightning Protection
Johannesburg 8 Mar

SCP51 – Signal Conditioning & Power Solutions
Johannesburg 22 Mar

IWP1 – Industrial Wireless & Profi cloud
Johannesburg 19 Apr

For more information contact Sheree Britz, Phoenix Contact, +27 (0)11 801 8200, sbritz@phoenixcontact.co.za, www.phoenixcontact.com

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Contact: jane@technews.co.za for details
Malware over the Internet has replaced the large gunboat that was dispatched in previous times – say 200 years ago – to send a message to the heart of a rival nation, indicating that relationships were becoming a little frosty. Then submarines and ICBMs were introduced, as less vulnerable to counter-attack, and providing hidden strength to be activated when necessary. The same applies to malware, in that once it is in place the weapon can be hidden and remain dormant until required. However, with any new missile system or weapon, the routing, targeting and performance of the latest versions have to be tested, and often this testing can be observed and monitored.

For any nation or group with an evil intent against another, this gives a major opportunity to cause chaos or damage to the infrastructure or manufacturing operations of a target country. This was seen in 2010 with Stuxnet, the malware targeted at Siemens controllers in Iranian nuclear centrifuge installations. The source of the virus (officially) was never traced, but it was thought to have been from Israel, possibly with support from the USA. So Iran saw the effectiveness of this approach, and then developed the Shamoon virus, which caused major damage to all networked PCs at Aramco in Saudi Arabia in 2012. A further variant of Shamoon was unleashed in 2016/17, targeting ordinary computer systems around the Persian Gulf, as well as in Saudi Arabia.

Malware at dawn the new weapon of choice
Following these events, many cybersecurity service businesses and departments appeared, in addition to those which were developing anti-virus systems to protect computers from hacking by fraudsters and criminals. Both of these types of company monitor any new attacks and intrusions, and normally report that state sponsored hacking is known to have originated from Israel, Iran, Russia, USA, and North Korea. Indeed some of the most active hacking has been from a Russian group known as Sandworm, particularly disrupting networks and systems in the Ukraine starting in 2014. Malware called ‘Industroyer’ was used in 2016 to cause a power blackout in Kiev, by modifying the ABB configuration files in the electricity supply grid network systems.

Two such cybersecurity service businesses are FireEye and Dragos, based in the USA. In December 2017 they reported on a new attack (actually seen several months before) delivering malware into an unnamed petrochemical plant control system in the Middle East. Others have reported this malware was most likely to have been developed in Iran and targeted at a Saudi Arabian installation. The FireEye investigation team from their Mandiant subsidiary found that the plant safety system, a Triconex SIS, had caused an unexpected safety shutdown. Triconex is a company within Schneider Electric, following their acquisition of the Invensys Group: their triple-redundant safety systems protect major hazardous installations such as petrochemical plants. They also are the ultimate shutdown safety system for many nuclear power plants around the world, including most of those in China.

Safety systems could become the prime target
FireEye called the malware they found Triton, also known as Trisis. The implication of their report was that the Triton attack framework gained remote access to an SIS engineering workstation, sought out the Triconex controllers, and tried to inject new commands into their operations. It seems that the workstation (on site) was in program mode at this time, hence opening a potential window. There was no indication that the malware used any vulnerability in the Triconex system or its program code. In fact the triple redundant safety system reacted properly: the new single instruction did not pass the built-in validity checks, and so Triconex shut down the plant operations safely, as is the requirement of such a safety system.

FireEye interprets that this attack, which shows persistence, the lack of any clear monetary goal, and the technical resources necessary to create such an attack framework, as suggesting the origin is a well-resourced ‘nation-state’ actor. Either this current attack is reconnaissance development testing of part of what would need to be a significantly expanded multi-point approach to penetrate and control Triconex, or at a minimum, it is designed to be economically disruptive to the target plant. Other commentators have suggested that Triton could prevent the Triconex SIS from carrying out its safety function, and drive the plant to destruction. Whilst this is unlikely, and not supported by current knowledge, the malware is undoubtedly aimed at the safety system, and Triconex is the omnipresent safety system used in most of the hazardous plants across all countries, whatever the origin of the plant control system.

Industrial control systems – for petrochemical plants, nuclear and other power stations, water treatment plants, power grids – are standardised across the world, so that they can accept inputs from equipment from many manufacturers: this is good, because there are no monopolies. It is also bad, because anyone can learn how to access these systems. While there are maybe ten major DCS suppliers worldwide, the SIS supplier base is much smaller – there are two or three suppliers. Of these, Triconex is by far the largest supplier, making them a very tempting target for anyone intent on world domination!

Nick Denbow’s European report
Nick Denbow spent thirty years as a UK-based process instrumentation marketing manager, and then changed sides – becoming a freelance editor and starting Processingtalk.com. Avoiding retirement, he published the INSIDER automation newsletter for 5 years, and then acted as their European correspondent. He is now a freelance Automation and Control reporter and newsletter publisher, with a blog on www.nickdenbow.com
From the President’s desk

A quest for smooth transition

Someone once said: “The first responsibility of a leader is to define reality. The last is to say thank you. In between the leader is a servant.” My ‘thank you’ moment has not truly arrived.

In December 2017, the SAMC leadership and council followed the directive of our constitution and confirmed then vice president, Rob MacKenzie, as the SAIMC president for 2018. However, Rob and the SAIMC subsequently learnt that he will relocate to Switzerland to take up a new function within the management team at E+H. While this constitutes a loss to the SAIMC, it is also indicative of the talent it takes to make SAIMC what it is today. As many others have done, Rob will continue to contribute towards the great work of South African engineers in the global automation community and of course he will continue to promote the values and vision of the SAIMC.

To Rob: A goodbye is not painful unless you are never going to say hello again. Having worked with a great professional like you was a lifetime opportunity. We, SAIMC, would like to tell you that you have left a legacy that will be cherished for generations to come. Like those who have gone before, you have left us with your own unique footprint, which we will endeavour to take to the shore of the unknowns.

Against these key changes, the council wishes to make the following announcements:

New president
Given the quest for smooth transition, the SAIMC council will announce its new president at the AGM on 9 March at the Park Inn, Sandton, starting at 18:00. In the interim, I will continue to serve in his capacity as president.

Strategic planning session 9 March at the Park Inn, Sandton
On 9 March, the SAIMC will hold a strategic planning session to review the existing five-year business plan. This will take place at the Park Inn hotel in Sandton, commencing at 08:30. All SAIMC stakeholders, individual members, patrons and potential patrons and business partners are invited to take part in this strategic session. Given the recent developments within and external to the SAIMC, coupled with the foundational work done thus far, we believe that outcomes of this industry wide business formulation will further SAIMC’s strategic intent and will ensure the continuation of the strong performance trajectory that our stakeholders have come to expect from us.

Yours in automation,
Oratile Sematle.

Response to the SAIMC from Rob MacKenzie

Dear Mr President, council and members of the SAIMC,

Thank you for the kind words, I would like to offer a short response.

It is with some mixed feelings that I have accepted a very exciting post in the Endress+Hauser organisation globally. There are many great things that come out of this – as Oratile has said, it is once again a recognition of the level of engineering expertise and management that we have in South Africa, I am not the first to receive an international post and certainly will not be the last. It is also a great educational and development path for me to follow after having just completed ten years as the CEO of the local Endress+Hauser organisation.

There is of course also the other side – I specifically avoided the words negative or downside as these are not a part of my vocabulary – but, I will leave behind my children who are now at university, of course many friends and colleagues, a South African economy that I have been delivering value to the SAIMC. We still have many challenges in the automation world in southern Africa, and we have made tremendous strides over the last sixty years that we have been delivering value to the automation community in South Africa. There are many qualified colleagues, I hope that I can call many of them friends, who I leave behind in the council who will continue this path – but I would like to make a special mention of three, Oratile Sematle, Vinesh Maharaj and Johan Maartens. I want to keep this short so I will only say thank you for your friendship, support and camaraderie over these last years I have been on the committee, it has been a pleasure to serve with you.

To all of the committee and branch committee members – keep up the great work. Keep fighting for what we believe in and know that I will always be a member and supporter of the SAIMC.

My last word to all members and automation practitioners: continue to fight to keep southern Africa at the forefront of automation technology. Do not give up on new technology – don’t allow the nay-sayers to tell you “we do not have the skills to implement advanced control systems and networks.” IIoT is the future of automation, even in Africa – lead the way!

With kind regards,
Rob MacKenzie.
Durban branch

Annual dinner

One of the highlights of the year is always the annual dinner which was held last year at uShaka Marine World, the fifth largest aquarium in the world. On the night of 25 November 2017, the corridors were filled with excited adults dressed in their finest party wear, warmly welcomed by chairman Hennie Prinsloo who was eager for everybody to enjoy the evening. The venue was transformed into a water wonderland with a magical atmosphere where welcome drinks were enjoyed amidst a buzz of exclamations and excitement as yet another beautiful fish or octopus glided past in the subtly lit tanks. With every other nook and cranny lit by candles and lanterns, it was a splendid way to start the evening. Many thanks once again to the table sponsors and to ifm electronic for sponsoring the welcome drinks.

MC Mark Calvert did a sterling job of introducing the proceedings and housekeeping rules (no fishing allowed) and the evening got underway with Hennie giving an overview of the Durban branch’s achievements for 2017. Council representative COO Johan Maartens followed him and extended the scope to the SAIMC as a whole. The Durban branch committee had been working undercover to surprise Hennie with an award for ‘Best Chairman Ever’. Mark reiterated the committee’s feelings when he stressed that without Hennie’s leadership, guidance, enthusiasm and commitment, the Durban branch would not have achieved half of what it did this year.

With the formalities out of the way guests were invited to visit the buffet tables for their main course of roast beef, chicken curry and a Mediterranean pasta with all the trimmings, and the verdict of ‘great food’ was unanimously agreed upon. Guests were then entertained by the evergreen Gee Jays, whose wit and musical prowess were a big hit. (Note: the committee felt it would be a little insensitive to include fish on the menu, so stuck in good SAA fashion to chicken or beef.)

Patron member awards were given to new Durban branch sponsors: (middle four left to right) Alex Macedo (Instroworx), Brad Maher (Elonics), Antony Hittler (IFM Electronic) and Anton Schilz (Loadtech). Jane van der Spuy (left) was given her certificate for Senior Membership and of course Chairman Hennie Prinsloo is on the right, proudly looking on.
Secunda branch

The branch hosted its annual year-end function at Graceland Casino and Country Club on Friday 17 November 2017. This was an event which everyone looked forward to and proved a great way to strengthen ties with vendors, suppliers, sponsors and all members in the instrumentation and control industry. It was a showcase and celebration of the branch accomplishments of last year.

The venue was transformed into a Moroccan streetside restaurant that set the perfect backdrop for the amazing Moroccan themed plated menu prepared by executive chef Johan van Zyl. He transported us to this foreign land with dishes that included slow cooked Moroccan lamb shank, Duka rubbed charred chicken and then ended the meal with an Arabian trio of sweets.

After Dinner, South African mentalist Gilan Gork entertained the guests with a series of intellectual games in which he read people’s behaviour and responses, in some cases leading the participant to the answer. He is truly an expert in his field which ensured that this was a night to remember.

Another highlight of the evening was the handing out of accolades:
- The Branch Patron Member award was accepted by Christelle Schoeman from Honeywell.
- Bhekani Khumalo from Sasol received the SAIMC Apprentice of the Year award.
- Willem Meintjes from VUT received the SAIMC Student of the Year award.

We would like to thank all the sponsors and guests who contributed to the success of this prestigious event.
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Beckhoff in control at Africa’s largest retail distribution centre

In the retail industry, warehouse management and control systems have become critical operating components in the race for end-to-end supply chain efficiency. Under such pressure, it is impossible for any leading retailer’s distribution centre (DC) to stay competitive without a little help from the latest in automated storage and distribution systems. Mr Price is such a retailer and its new DC in Hammarsdale, KwaZulu-Natal, is one such state-of-the-art facility, thanks in part to a warehouse execution system (WES) developed by Fortna and branded FortnaWES.

Fortna control systems utilising Beckhoff Automation

Fortna has been in the business of streamlining supply chain operations since it began as a forklift provider in 1946. Today, it focuses on assisting some of the world’s largest brands to transform their distribution strategies into a profitable competitive advantage.

“Internationally, we work with top-tier companies across several market segments,” explains Marc Austin, managing director for Fortna EMEA, “to help them design and optimise their global distribution networks. Our in-house expertise extends from supply chain strategy, DC operations, and material handling and storage, to automation and warehouse execution software solutions.”

Distribution frontrunners today rely on warehouse execution and control systems that are able to optimise and manage the workflow through their DCs. The solution must be equipment agnostic to integrate with subsystems from many different material handling suppliers, and it must be built using an architecture that supports industry standards which can scale to meet the growth needs of the business.

“In order to meet the requirements for interoperability and scalability, Fortna took a strategic decision to standardise the automation layer of its solutions on Beckhoff’s PC-based control platform and the EtherCAT fieldbus,” outlines Austin. “We were impressed by the modular hardware approach, and the fact that we can run all the equipment interfaces over standard Ethernet cables makes network design quick and easy. On the software side, the TwinCAT automation suite allows us to implement the simultaneous real-time control functionality that we need to run on multiple real-time industrial controllers.”

The Beckhoff solution bundles the following components which allowed Fortna to simplify the procurement, design and maintenance of its controls platform:

• Embedded controllers that can be mounted inside control panels alongside other electrical components.
• Robust real-time kernel provided by TwinCAT.
• I/O software stack with support for a variety of fieldbus technologies.
• Flexible coding environment (C++, C#, .net) as well all the IEC 61131-3 PLC languages (Ladder Logic, Structured Text etc).
• Seamless integration of physical I/O devices using EtherCAT.
• Windows embedded OS (native driver support for a large number of devices) allows for easier deployment and maintenance in the production environment.
• Integrated HMI/graphics package within TwinCAT provides HTML5-based rich UI screens.

“The Beckhoff solution was the most ‘Open Standards’ of all the control platform offerings evaluated by Fortna,” adds Fortna software project manager, Daniel Opland. “In fact, one of the main drivers behind our choice of Beckhoff was their ability to work with a wide variety of I/O bus systems, which is crucial in retrofit situations.”

The solution of choice for an ambitious Mr Price project

Locally, the retail group Mr Price is one of Fortna’s key customers. “Our relationship with Mr Price began about seven years ago,” reveals Austin, “through our involvement in the automation for the Riverhorse Valley DC, one of the main Mr Price warehouse facilities at that time.”

“As our retail business grew, we realised that these legacy warehouses were reaching the end of their useful life,” adds Mr Price logistics director, Werner Pelser. “This is when we got together with the consulting group at Fortna and the specifications for the ultra-modern DC infrastructure at Hammarsdale were drawn up and approved.”

At 60 000 square metres (under roof), the
new multi-million rand warehouse is one of the largest automated general retail DCs in Africa. “This is one of the most complex distribution projects completed in South Africa to date,” explains Opland. “It was designed to the exact requirements of the Mr Price logistics team and their business needs.”

Operational overview

Elapsed time for order fulfillment is a measure of competitive advantage in the logistics business, Pelser explains: “The faster we can route goods accurately from the receiving depot onto the transport to our 1600 stores around the country, the more profitable our entire retail operation becomes.”

Put into perspective, from the first time a box is loaded onto a conveyor and its barcode is scanned, the combination of FortnaWES and the Beckhoff control platform transports it accurately across the conveyors that criss-cross the Hammarsdale DC, and deliver it undamaged, to the correct truck, in less than four minutes.

“The speed and precision of the Fortna system utilising Beckhoff automation is compelling to watch,” says Pelser thoughtfully. “We have a mix of conveyor types all running at different speeds. Managing those changeovers smoothly and without interruption is a critical part of the transport process. We depend on fast motion control capability from our system, one of the strengths of the Beckhoff control platform.”

Things get even more interesting when the contents of an incoming box must be routed individually to fill an order. Then they must be opened and the items placed separately in the trays of a split tray sorter, whose two halves open like the bomb doors on a military aircraft, to let the contents fall into the packing crates waiting below. This high-speed continuous loop arrangement is used for its spatial efficiency, since the items are discharged into crates placed directly below the moving trays.

“This really tests the ability of the WES and the controls to work together,” says Mike van der Walt, the branch manager of Beckhoff’s Durban office. “First, the WES must send the order details for each crate to the sorter’s control system. For instance, it may need to be filled with T-shirts of various sizes and colours for dispatch to a particular retail outlet. Then, items are placed by hand into the sorter trays as they move past and the FortnaWES software instructs where to route them. Finally, when that tray arrives above the appropriate crate, the doors must open so that the shirt can fall into it. Simultaneously, a running tally must be kept of the inventory in each crate, so that once an order is filled, it can be labelled and moved to the transport conveyors for routing to the next available truck.”

“Thanks to the open nature of the Beckhoff network, it is easy for us to build interfaces from our WES to the sorting, conveying, scanning and labelling equipment from a variety of different suppliers,” adds Opland. “This combination of fast control and standardised interfaces gives us the freedom to design complex systems, like the one at Hammarsdale, using standard off-the-shelf components.”

Results and conclusions

“For this we rely on our partner Beckhoff to provide the key hardware components that underpin our FortnaWES solutions with an architecture that is equipment agnostic, a crucial requirement when it comes to the design and maintenance of systems like the one we have just installed for Mr Price.”

“That and local support,” concludes Pelser. “Knowing that we have regional access to technical experts from both Fortna and Beckhoff makes us extremely confident in the ability of this new system to keep us operationally competitive. Logistics is a dynamic business, but through our partnership with these two technology leaders our position at the sharp end of retail is assured well into the 2020s.”

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Sugar plant control

Visibility and insight with Yokogawa’s DCS.

Umfolozи Sugar Mill (USM) is a leading producer of high quality brown sugar, which is sold locally into the Southern African Customs Union (SACU) as well as deep-sea bulk sugar exports through the South African Sugar Association. In striving for the highest quality of sugar, one of USM’s quality objectives is continuous improvement of the efficiency, quality and food safety of their operations through regular reviews and improvement initiatives. The latest Yokogawa Centum VP DCS and Release 6 of the control system software, was installed and successfully commissioned to replace an obsolete control system in the plant, thereby ensuring production of sugar to the highest quality.

The mill is situated between the world heritage isimangaliso Wetlands Park, on the KwaZulu-Natal North Coast and the Hluhluwe Umfolozi game reserve in the heart of Zululand, and produces approximately 135 000 tons of sugar per annum.

Selection and implementation

USM identified its existing control system as a risk to operations after support and the spare parts to maintain the system became unavailable. In order to avoid system failures resulting in costly downtime to sugar production, USM embarked on a control system selection process. Yokogawa was chosen as the successful vendor and commenced with the Centum VP R6 Control System Migration Project. The system consisted of two new Centum VP field control stations (FCSs), with one FCS dedicated to the frontend of the sugar mill, and the second dedicated to the backend. The majority of the subsystem communication interface was on Profinbus DP.

The project was implemented in two phases:

1. Phase 1 dealt with the backend of the plant including the automatic pan boiling recipe, crystallisers and sugar drying control.
2. Phase 2 dealt with the frontend of the plant, which comprised the cane preparation area, mixed juice to syrup control, boiler control and power house control.

Both phases included the replacement of the previous control system’s I/O units. In addition, the operator interfaces equipment also required an upgrade to the latest operating system supported by Microsoft.

The project was executed in a collaborative manner with the client. USM played a significant role to identify, improve and also assist in the design and implementation of some of the latest technologies in terms of control systems and state of the art grey scale concepts, which were applied to the new control system. A number of ground-breaking innovations were proposed by the USM project leader, which challenged Yokogawa’s experts to configure the system in new and creative ways.

Solution description

The solution required the replication of the current controls from the obsolete system to the Yokogawa DCS platform. A number of control function blocks were specifically developed for the project and further enhanced with USM’s assistance, one of which was the motor control block and a second was the trip sequence. Various other significant enhancements were made to the operator interface (e.g. grey scale graphics), which assists USM to operate, navigate and determine fault conditions, and the origins thereof, more easily. The end result is a system which is having a direct positive effect on USM’s sugar production output and plant efficiency.

With short timelines for implementation, commissioning and changeover of the project, the introduction of the new Network IO (NIO) system allowed for easy I/O allocation and flexibility in the engineering, implementation, testing and commissioning of the system. The hardware and software could be detached from each other for testing and installation purposes, so that they could run in parallel development streams. Furthermore, the NIO system reduced the costly effect of change implementation on the system, where I/O types have to be interchanged or moved within an area.

In conjunction with USM plant specialists, a comprehensive set of documents on the existing control strategies and wiring layouts, were developed, according to the exacting requirements of the customer and Yokogawa’s international standards. The software and hardware was developed and tested against these documents. A comprehensive customer FAT, with highly skilled Yokogawa engineers, was executed which resulted in a successful plant commissioning within the required timelines. The project was a resounding success due to the commitment, dedication and out-of-box thinking of the USM technical team.

Results

The migration project ensured a stable, reliable and common platform for the entire plant control system. New enhancements on the motor control and trip sequences now assist USM in fault finding and controlling the plant more effectively. Inter FCS communication provides USM with the opportunity to increase the level of automation of the plant at minimal cost, as the various plant sections can directly pass information between one another, making it readily available for display and decision making across the site. Plant upsets, or changes in production rates experienced in the backend, can also be communicated through the frontend to reduce or increase feed to the plant. Similarly, any disruptions to operations in the frontend can quickly be communicated to the backend for the appropriate response to be taken.

“Yokogawa’s support throughout the sale, installation, engineering and commissioning period of the project was remarkable and contributed to a very successful project handover and extremely smooth start-up,” concluded Ravi Vandayar, USM technical manager and project leader.

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Pressure gauges with diaphragm seals

Diaphragm seals are partitions for pressure gauges that prevent material that is being measured from penetrating the measuring system. In industry, pressure sensors or pressure gauges cannot always be directly connected to the process connection. For measuring pressure in the food industry, the use of diaphragm seals are mostly indispensable. With the right choice of diaphragm seal systems, it is possible to solve measuring problems that can often not be overcome with a pressure gauge alone.

Kobold’s DRM range of diaphragm seals are designed specifically for such purposes. They are tailor-made to meet industrial requirements, and are available with all industry-standard connection types and fit perfectly with Kobold pressure gauges. In each case, an appropriate solution can be chosen from a wide range of designs, shapes and materials.

Kobold diaphragm seals allow measurements to be taken even with aggressive, highly viscous, solidifying or crystallising process media. They also protect the measuring devices against high temperature and pressure fluctuations, pressure peaks or vibrations.

Depending on the design, they can be used for measurements at process temperatures of up to 350°C and 1600 bar. The use of diaphragm seals is also recommended where there are special hygiene requirements and where specific media-appropriate materials are required. Kobold’s specifically-engineered and practice-oriented diaphragm seal system components make ‘dead-zone-free’ assembly an easily achievable goal. As the capillary tubes can be several metres long, the measuring devices can now be placed at a safer distance from harsh industrial environments.

Typical applications are in media enriched with solids, crystallising/polymerising/HMh viscosity/corrosive/toxic and environmentally hazardous measured media, as well as very low or high measured temperature media; hygienic requirements for the food and pharmaceutical sector and batch changing without product residues in the measuring system.

For more information contact Instrotech, +27 (0)10 595 1831, sales@instrotech.co.za, www.instrotech.co.za

Innovative approach to machine safety

Food and beverage manufacturers use a series of packaging machinery to label, bottle and package their products before they are dispatched for distribution and final consumption. One of the latest trends in the market is the growing use of robotic packaging systems. Fully automated robotic packaging machinery provides flexibility with respect to throughput in volume and consistency. Although these systems are more consistent than a typical human worker, even machinery is prone to break down and requires maintenance to ensure that production runs at optimal performance. In these instances, operators may need to gain access into these machines, but only once each automated system has entered a safe state of operation.

A flexible approach to machine safety

As a result, many producers use the tGard range from Fortress Interlocks, particularly on packaging machinery such as palletisers, as it offers a flexible approach to machine safety.

Customisable as standard, all tGard units are tailor-made to suit the customer’s individual safety requirements. A configuration of various safety products can be constructed including electrical safety gate switches (with or without guard locking), mechanical trapped key interlocks and pushbutton controls which can all be integrated into a single device. Similarly, with its unrivalled choice of control options including; e-stops, push buttons, LED lamps and selector switches, customers can create simple machine control stations, replacing the need for engineers to construct their own DIY pushbutton boxes which can be a very time-consuming activity.

Safeguarding palletisers is of significant importance to food and beverage manufacturers due to the inherent dangers associated with performing maintenance on these systems. There are several reported cases of fatal injuries caused as a result of firms failing to implement basic safety measures. The main danger associated with palletisers is the lack of visibility. For example, these incidents occur when an operator enters the machine, typically to clear a blockage, and a colleague inadvertently restarts the machine unaware that anyone is inside. Such unnecessary fatalities can be avoided by incorporating safety keys into the interlocking device. These keys are retained on the operator’s person while they remain on the inside of the machine to effectively protect against inadvertent machine restart.

Robust solutions offer better reliability

However, food and beverage manufacturers regularly implement cost-saving exercises in order to produce products as efficiently as possible. This also applies to the machinery and associated safety systems installed in their production facilities. Prior to installing tGard, many companies would use plastic alternatives that would frequently need to be replaced. tGard’s compact metal bodied construction offers a more robust solution at a price point that allows customers to use a stronger product without breaking the bank. Furthermore, each unit has a total of only four fixings and can be supplied with a quick disconnect, making installation effortless.

Whatever the application, tGard is one of the interlocks of choice in food and beverage manufacturing applications.

For more information contact Deebar, +27 (0)11 873 4332, ask@deebar.co.za, www.deebar.co.za
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- iTherm QuickNeck – cost and time savings thanks to simple, tool-free recalibration

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People for Process Automation
Festo understands the challenges of the food industry: hygienic and efficient automation is a must for machine and system builders and producers. Having to search for different component suppliers who can meet these requirements and matching the individual parts from different manufacturers is no longer necessary. Single sourcing saves time and money. As a full-range supplier, the company offers everything from a single source.

“Festo has been a reliable automation partner in the global production of high-quality food for over fifty years,” explains Alexander Wagner, vice president food and packaging, Festo. “Our mix of pneumatic and electrical technology helps to create efficient production operations.”

Festo applies its wealth of experience in factory automation to process automation as well. “We cover all the individual levels of the automation pyramid, from the operating to the field level,” adds Wagner. “We can therefore offer not only individual components, but also ready to install systems for all kinds of tasks and applications in the food industry.”

A world first: digital pneumatics
The Festo Motion Terminal (VTEM) is the first pneumatic automation platform to be controlled by apps. Now, the functions of a pilot valve can be changed via software without changing the hardware. Thanks to the fast activation of new functions via apps, machine developers can create a basic machine type and then select the relevant apps to equip it with different functions and features in accordance with customer requirements. The apps replace over 50 individual components.

Reliable and efficient
The pneumatic pinch valve VZQA provides hygienic, reliable and high-quality dispensing of food: the N/O variant with a silicone diaphragm comes with a declaration of conformity in accordance with EU Directive no. 1935/2004. This pinch valve variant is thus approved for applications involving direct contact with food products.

Decentralised control increases productivity
Festo’s automation solutions allow users and designers to create decentralised installation concepts without a control cabinet in harsh and intensively-cleaned environments in the food and beverage industry. Situated close to the application for lower energy losses and high cycle rates, these can be either a solution without a control cabinet, with the CleanDesign valve terminal MPA-C, offering the ideal degree of protection IP69K, or with the valve terminal VTUG in a control cabinet with a multi-pin plug, for all standard fieldbus systems or IO-Link.

Flexible applications
There is an ever-increasing demand for modular components which can be converted quickly and easily depending on the requirements. For example, the sturdy and powerful angle seat valve VZXA for the fast and reliable control of media flows. Its carefully designed product architecture and patented interface enable valve bodies and actuators to be freely combined. This provides even greater flexibility for any application.

The quarter turn actuator DFPD from Festo is another example of robust process automation. Based on the rack and pinion principle, this actuator offers combinations which are modular, sturdy and versatile. This makes the actuator suitable for many of the requirements associated with food and beverage production.

For more information contact Kershia Beharie, Festo, 086 003 3786, kershia.beharie@festo.com, www.festo.co.za
Proline Promass Q 300/500

The specialist for challenging applications with superior accuracy for mass, volume flow and density determination.

Whether in custody transfer or meeting stringent product quality requirements, superior measuring accuracy is essential in many industrial applications. Historically, high accuracy levels were only achievable under ideal circumstances, meaning stable process conditions and true single-phase homogeneous fluids. In the real world, however, these ideal conditions do not often exist. The Promass Q Coriolis flowmeter has been developed exactly for such applications in the food as well as the oil and gas industries.

Promass Q guarantees unmatched accuracy for mass flow, volume flow and density determination under frequently changing process conditions for:

- Highly accurate fluid density and concentration determination for product quality in the food industry.
- Highest accuracy and repeatability for custody transfer in mass or volume units in the oil and gas industry.

Multi-frequency technology for fluids with entrained gas

Measurement errors, no matter whether they are due to desired or unintentional air entrainment, are now a thing of the past. Promass Q, with its revolutionary multi-frequency technology (MFT) allows a real-time and active compensation of measuring errors due to fluids containing suspended bubbles or even micro bubbles.

The MFT allows an accurate measurement of various gas entrained fluids such as:

- Ice cream, cream cheese, milk, honey, jam, etc.
- Viscous heavy crudes, gas-saturated fluids, etc.

Additional benefits include:

- Exceptional density measurement performance.
- Wide useable flow range.
- Superior repeatability.
- Low sensitivity to changing process pressure/temperature.
- Small and light.

Transmitter technology for seamless system integration

Promass 300/500 makes no compromises in performance and accuracy. Digital signal processing starts right at the intelligent sensor and is the base for a truly multivariable measuring device: Mass flow, volume flow, density and temperature can be measured with one single sensor. With its variety of digital protocols (EtherNet/IP, Modbus RS-485, Profinet, FF, WirelessHart) as well as freely configurable analog outputs, Promass Q 300/500 fulfils all expectation for seamless system integration.

Heartbeat Technology: feeling the pulse of a process

The onboard diagnostics and Heartbeat Technology ensure maximum product and process safety, allowing sensor, measuring tubes and electronics to be verified without process interruption. In the case of a sensor or electronic problem, text remedy instructions are provided. The data handling concept (HistoROM) makes the exchange of spare parts easy and reduces downtime, while calibration data and transmitter parameters are stored and automatically reloaded after a maintenance event.

Wireless access to all device data

The Proline 300 dual chamber housing eliminates the need to open the electronic housing during commissioning. For parameter changes or trouble-shooting the web server allows the user to connect with the device through a standard laptop computer either via cable or wirelessly with any WLAN enabled device, without any additional tools or software. Furthermore, a fully graphical display with touch control, either built-in or remote, is available for full field access.

For more information contact Frans van den Berg, Endress+Hauser, +27 (0)11 262 8000, frans.vandenberg@za.endress.com, www.za.endress.com

Telco sensors for refrigeration and storage

Mobile racking enables compact storage while keeping the stored pallets individually accessible. Where storage space is expensive, for example in cold stores, mobile racking is the perfect solution. Telco Sensors makes sure safety is guaranteed by an infrared beam system, mounted on each mobile rack and at the outer sides of the complete installation.

The light transmitter (LT) and light receiver (LR) are installed so the beam runs parallel along the bottom edge of the storage rack, approximately 10 cm in front of it. If there is any object or person present, the beam will be blocked and the Telco amplifier (PA) will activate the output and the rack controller will deactivate the motors immediately. The rack will continue its movement as soon as the beam has been re-established.

The Telco 9000 series Spacemaster transmitter and receiver offer a solid state relay output as an alternative to the NPN/PNP transistor type. They also eliminate cross talk between 4 operating frequencies (channels), for 0-70 m self contained sensing.

For more information contact Gail Norton Instrumentation Agencies, +27 (0)31 701 4861, telco@telcosa.co.za, www.gailnortoninstrumentation.co.za
Product quality, verification and package inspection

In addition to improving material handling, logistics efficiency, product quality and package safety and integrity, machine vision can also be implemented on the processing side to reduce scrap, improve productivity and quality control, as well as enhance brand image.

For example, vision systems can sort food and beverage products by colour or shape. It can detect defects, verify proper assembly, detect fill levels, count and provide guidance for robotic pick and place or palletising operations to achieve improved manufacturing and packaging flexibility.

Another application is orienting bottles based on shape when they enter the machine in random positions. Machine vision can identify correctly facing bottles and allow them to pass through. Incorrectly facing bottles are detected by the vision sensor which signals an actuator mechanism to rotate the bottle to the correct orientation.

Process control and supply chain management
The better and more precise the track and trace system, the faster users can identify and resolve problems. If profit margins are narrow, reduced manufacturing and supply chain costs can often be the difference between profit and loss.

Traceability
• Improves management of work in process.
• Reduces inventory.
• Optimises availability and use of production tools.
• Minimises distribution of non-conforming products.

Cognex offers the widest range of vision and ID products available from a single source to provide a solution for every application and budget.

Application examples
• Verify presence of caps and safety seals on bottles.
• Colour sorting and inspection.
• Automate production with the ability to sort products or orient them for filling or packaging.
• Detect presence of inserted or attached leaflets on packaging.
• Check for missing, incorrect, or damaged product.
• Inspect for particulates or flawed product in bottles and other packaging.
• Check label position.

For more information contact Westplex,
+27 (0)11 787 0473,
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www.westplex.co.za

Magnetic flowmeter stability

Electromagnetic flowmeters are popular and proven devices for flow measurement of electrically conductive process fluids and for volumetric filling machine applications. Of prime importance to a mag meter’s accuracy and long-term performance is the condition of the metering section of the flow sensor.

Unlike in most processes, mag meters in filling machine applications are frequently subject to widely varying conditions during normal operation.

As a result, they are viable candidates for evaluating their long-term performance in an accelerated use environment. Therefore PTB, a German research and approvals agency, in association with Krohne, undertook an extensive project to study the long-term measurement stability of mag meters in filling machine applications.

Overview
Faraday’s law is the basis of a mag meter’s measuring principle. The design generally features an electrical isolating liner on the inner wall of the measuring tube. Linings such as PTFE, PFA or polypropylene or for hygienic reasons, PFA (perfluoroalkoxy) are used. Pressure bearing ceramic pipes are also used. PFA is known to absorb moisture, it can flow under pressure and temperature, which means that it changes structure and shape which, in turn, affects the interior diameter of the measuring tube. Changes in the inner diameter of the measuring tube lead to measurement errors. This can lead to problems, especially when extreme precision or repeatability are at stake. This only takes effect after the devices have been in use for longer periods of time and through the corresponding frequent cleaning processes using liquid or steam as are common in the food industry.

The effect is particularly significant when it comes to mag meters used on filling machines for filling PET bottles. In this case, an extremely high degree of repeatability is required and the quality of the filling process is directly visible in each individual bottle.

That is why, in a joint research cooperative with the Physikalisch-Technischen Bundesanstalt (National Metrology Institute) (PTB), Krohne tested the measurement stability of filling mag meters. Meters with PFA liners and with ceramic measuring tubes were both tested. The PTB was interested in this test because for more than 20 years mag meters with ceramic measuring tubes have been the norm in the normal PTB measuring systems as well as in many other calibration test stations.

Results
Results from PTB testing conclude that when compared to PFA lined mag meters, the filling mag meters with ceramic measuring tubes have the following advantages:
• Ceramic meters have a temperature coefficient three times lower than the change in the flowing media temperature.
• Their long-term stability result is at least three times better.
• Repeatability depending on flow speed response is two to three times better.

These results make it clear that when it comes to the long-term behaviour of filling mag meters, there are qualitative differences between measuring tubes with plastic lining and those with ceramic measuring tubes.

The ceramic measuring tube remains mechanically stable despite the stress of heat and steam of rapid filling process changes and this can be seen in the constantly high repeatability, which results in constant filling quality.

Interested readers can find the full report at http://instrumentation.co.za/+J1160

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Modern packaging plays an important role in preserving, protecting and selling a host of products, from items small enough to need tweezers to be picked up to those that need a forklift to be moved. Packaging also comes in a confusing array of materials, which can be costly if incorrectly selected or processed.

Countapulse Controls offers a broad range of opto-electronic sensors that have been developed to ensure packaging lines operate at peak efficiency for the packaging industry. Made by the respected German instrumentation manufacturer Leuze Electronic, the sensors are purpose-designed for the feeding, packing, dosing, detecting, labelling, sealing and other operations that go into the makeup of any packaged product.

Sensors for demanding requirements
Countapulse Controls’ managing director, Gerry Bryant, points out that the variety of materials used for packaging, as well as the surface properties and the specialised printing used in the industry require the highest standards of instrumentation and machinery.

“Modern, high-production packaging uses cutting edge technology, and sensors applied to these applications have to be capable of meeting the demanding requirements,” he says.

Leuze is one of the leading developers and manufacturers of opto-electronic systems, which use light in various spectra for sensing, monitoring and controlling products and equipment in the production line.

This includes standard opto-electronic sensors, colour sensors, label detectors and sensors for workplace safety. Also in the range are sensors for foil and glass detection, CCD sensors, forked photoelectric sensors and sensors for differentiating between glass and PET.

These can be effectively applied to hasten and improve quality control in any number of processes. In feeding and conveying, for instance, solid granules, loose goods, paste products, fluids or mixed items are transported, accumulated and passed on. Opto-electronic sensors are used to position products on conveyors, recognise their shapes, measure them for filling and sealing and even check the quality of printing and labelling.

“The many ways used to package products nowadays show the dynamics and bandwidth of the various packaging technologies. Leuze has expended considerable research and development effort in producing its range of opto-electronic sensors, using concepts aimed at improving speed, accuracy and performance in the packaging line,” explains Bryant.

The complexity and depth of sensors available on the market can be confusing, and for this reason Countapulse Controls often assists customers to evaluate an application for either the fitment of new sensors or the retrofit of replacement units.

“While the Leuze sensor range is broad enough to offer units of the right type and size for virtually any operation in the line, we have found that in some instances we have sourced alternative sensor solutions for the customer,” concludes Bryant. “This is not unusual at all, and with the depth of expertise that resides within Countapulse Controls it is easy to apply best practice sensor technology to any application.”

For more information contact Gerry Bryant, Countapulse Controls, +27 (0)11 615 7556, bryant@countapulse.co.za, www.countapulse.co.za
Kobold has capacitive level indicators, type NMC, specifically designed to measure liquid levels in tanks. They consist of a measuring probe and a connecting head with a plug-in evaluation module. Depending on the operating conditions, different probes are available:

- **NMC-N**: Standard version with metal tanks inserted, their walls undertaking the task of a second electrode. It is applicable for fluid foods as well as for different waters.
- **NMC-S**: The two probe sensor for non-metal tanks for operation in aggressive media.
- **NMC-T**: Especially for operation in non-metal holding tanks and media of lower conductivity, the designed probe consists of an interior probe and a surrounding pipe of stainless steel serving as a reference electrode.
- **NMC-H**: The electronics of one stick probe of stainless steel is thermally insulated by a special intermediate piece so that the sensor technology can easily handle up to 125°C.

**Working principle**
The measuring system is based on the capacitive measuring method. The probe and the tank wall, or the second electrode, form the plates of a capacitor; the medium in the tank is the dielectric fluid. The capacity depends on the medium. The more the medium touches the measuring probe, the higher the capacity. This change is detected by the plug-in evaluation module and transformed into a percentage display or a 4-20 mA signal. As there are no movable parts, the unit operates almost wear-free. Lengths of PTFE coated measuring probes of stainless steel can be freely chosen up to 4000 mm. Problematic apertures at holding tank base or at the side can be avoided by virtue of a simple and secure assembly from top. Fields of application include:

- Water or water-like liquids.
- Liquid food.
- Chemicals and aggressive liquids.
- Oils.

For more information contact Instrotech, +27 (0)10 595 1831, sales@instrotech.co.za, www.instrotech.co.za

The Rosemount 5408 non-contacting radar level transmitter uses enhanced technology and human centred design to deliver accurate, reliable measurements on both liquid and solid materials. Using two-wire FMCW technology the instrument deploys a continuous echo to maximise radar signal strength and produce a more robust and reliable measurement. Delivering ease of use at every touch point, the 5408 uses an intuitive software interface to guide the operator through installation, commissioning, proof-testing and maintenance. Safety certified to IEC 61508 for SIL 2 applications, the Rosemount 5408:SIS reduces cost of risk, increases efficiency and protects people and the environment.

**Application examples**
The 5408 and 5408:SIS are ideal for level measurements over a broad range of liquid and solids applications. The transmitters are virtually unaffected by changing density, temperature, pressure, media dielectric, pH, and viscosity. Furthermore, non-contacting radar level is ideal when internal tank obstructions are a limiting factor.

Reactors: the 5408 is ideal for the most challenging applications, including reactors where there can be agitation, foaming, condensation as well as high temperatures and pressures.

Open atmospheric applications: measures reliably in open applications, from short range sumps or ponds to long range dams.

Bulk solids: the ideal solution for small to medium sized silos with rapid level changes. The narrow beam avoids internal obstructions while still keeping good level measurement.

Storage and buffer tanks: provides accurate and reliable level measurement for both metallic and non-metallic vessels containing almost any liquid (e.g. oil, gas condensate, water, chemicals).

Blenders and mixers: withstands the rigors of blenders and mixing tanks. Easy to install and commission, it is also unaffected by virtually any fluid property change.

Still pipe and chamber installations: an excellent choice for level measurement in tanks with still pipes. It may also be used in chambers, but guided wave radar is generally the best fit for these applications.

Safety applications: the RS408:SIS is the ideal choice for safety functions such as overfill prevention, level deviation monitoring or dry-run prevention.

For more information contact Automation & Control Solutions, +27 (0)11 249 6700, rfq@aveng-acs.com, www.aveng-acs.com

Non-contacting radar level transmitter
Yokogawa’s New Coriolis Flowmeters Offering Total Insight:

Six new dedicated transducers and two specialised transmitters

Coriolis flowmeters deliver highly accurate performance in measuring mass and volume flow, density and concentration and temperature.

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Density-compensated multivariable level transmitter

Improving the accuracy and reducing the cost of boiler drum level measurement.

The traditional approach has been to use a conventional differential pressure (DP) transmitter with external water-filled ‘wet’ legs connecting both the high and low pressure sides of the transmitter to the drum. A pressure transmitter is also used to measure the steam pressure in the drum. The use of DP transmitters for drum level is ideal because of their low cost, ease of installation and high reliability. However, the output of a conventional DP transmitter in this application will have inaccuracies caused by changes in static pressure, the densities of the water in each leg, and the densities of the steam and water in the drum. Although water is normally thought of as an incompressible fluid, high pressure causes density changes independent of those created by temperature variations.

Foxboro’s solution

The Foxboro IMV31 density-compensated level transmitter provides a new approach to drum level measurement. While maintaining all the advantages of DP transmitters, it uses multiple measurements and onboard level calculations to provide a more accurate measurement. This eliminates the need to make similar level calculations in the control system. The IMV31 is based on Foxboro’s proven multivariable transmitter technology, which was originally developed for flow measurement.

The heart of the IMV31 is its ability to conduct onboard level calculations based on multiple measurements and fluid density calculations. The IMV31 transmitter has a pressure sensor and a differential pressure sensor, as well as two internal temperature sensors. It also has the ability to power and monitor an external RTD temperature sensor.

The instrument calculates four unique fluid densities, based on measured pressures and temperatures and uses this information along with the DP measurement to calculate an accurate density-compensated drum level. The densities of the water and steam are separately calculated, based on the pressure measurement and drum temperature. Although there is an RTD input, the transmitter can be configured to use the saturation temperature corresponding to the measured drum pressure in the calculation of water and steam densities. The densities of the water in each external wet leg are similarly calculated based on the measured pressure and temperatures.

Because the transmitter measures pressure and differential pressure, it has the unique ability to self-compensate for static pressure effects on the DP measurement, a feature not available on conventional DP transmitters.

IMV31 results

Regardless of the size of the drum and the saturation pressure, the IMV31 significantly improves the accuracy of drum level measurement over conventional DP transmitters and automatically provides dynamic compensation for varying pressures and temperatures.

The following two examples show the diversity and results that can be achieved:

Application 1

A 20 bar boiler with an 800 mm drum (-400 to +400) where level is measured from the midpoint of the range (0 mm) down to -400 mm or up to +400 mm. Using a conventional DP transmitter without density compensation, the following errors can be expected during critical start-up conditions when the drum pressure is at 3,5 bar:

• At -400 mm, the indicated level would be 6 mm high (0,84% of span).
• At 0 mm, the indicated level would be 30 mm low (3,7% of span).
• At +400 mm, the indicated level would be 30 mm low (8,2% of span).

The density-compensated IMV31 can reduce these errors to ±0,3% of span or less than ±2,5 mm.

Application 2

A 70 bar boiler with a 1500 mm drum (-750 to +750) where level is measured from the midpoint of the range (0 mm) down to -750 mm or up to +750 mm. Using a conventional DP transmitter without density compensation, the following errors can be expected during critical start-up conditions when the drum pressure is at 6,9 bar:

• At -750 mm, the indicated level would be 50 mm high (3,3% of span).
• At 0 mm, the indicated level would be 110 mm low (7,3% of span).
• At +750 mm, the indicated level would be 275 mm low (17,9% of span).

The density-compensated IMV31 can reduce these errors to ±0,3% of span or less than ±5 mm.

The benefits include:

• Accurate level measurement of ±0,3% of maximum level.
• Increased reliability due to fewer transmitters and related equipment.
• Reduced cost of equipment, installation, and wiring.
• Improved process integrity from fewer field devices and connections.

Business value

Regardless of the size of the drum and the saturation pressure, the IMV31 multivariable transmitter significantly improves the accuracy of drum level measurement over conventional DP transmitters and automatically provides dynamic compensation for varying pressures and temperatures.

For more information contact

Paulo de Sousa Gomes, EOH, +27 (0)87 803 9779, paulo.desousagomes@eoh-pas.co.za, www.eoh-pas.co.za
Why shop around? We offer complete process control solutions and services.

Whether you are a player in chemical, oil and gas, refining, pulp and paper, mining and metals, power, food and beverage, pharmaceutical or any other industry, we are able to supply.

Performance, innovation and quality top our agenda. Our offering includes:

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- Analysers (Liquid and Gas)
- Process Automation Systems (DCS)
- Safety Instrumented Systems
- Burner Management Systems
- Asset Management Software and Engineering
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Complete Process Control Solutions
French supplier Kimo has designed a new range of Kistock temperature/humidity dataloggers for use in all applications requiring control – over a specific period or continuously – of ambient conditions for air-conditioning and heating, control of refrigeration chains, monitoring of sanitary networks, manufacturing processes and storage and transport.

Highly accurate, the instruments can record from 12 000 to 100 000 measuring points from up to four external probes (hygrometry, thermocouple K-J-T, NTC, ammeter clamps, 4-20 mA, 0-10 V).

The units can be configured using Kilog software such as starting mode, display, LEDs, setpoint alarms, intervals and recording periods. With the monitoring function on Kilog, the user can choose two different recording intervals, one for values measured between predefined setpoint alarms and one for values measured beyond the setpoint alarms. All defaults occurring during a recording period can be viewed without stopping the measuring process.

To secure the installation, these Kistock dataloggers have an integrated anti-theft system with no padlock.

Once datasets are downloaded – either on PC or via a data collector – they can be processed as graphs or charts to enable merging of several datasheets, dynamic zoom, adding up of calculations functions. In addition to recording functions, Kistock also allows on-demand measurements.

For more information contact
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Bacteria settles among any structure (pipelines, tanks, machinery) in contact with water in a very short time, if appropriate preventative measurements are not applied. The term biofilm refers to the layer of micro-organisms (bacteria, diatoms, fungi, etc.) that grows on any surface in contact with water or other liquids. It has been demonstrated that biofilm can grow even in extreme conditions, causing damage that can range from Legionella contamination to microbiologically influenced corrosion (MIC).

The ALVIM real-time online Biofilm Monitoring System is able to detect bacterial settlement during its first phase (down to 1% of surface covered by micro-organisms such as Legionella pneumophila) and, based on these data, manually or automatically adjust and optimise cleaning and biocide treatments to keep biofilm growth under control.

Important advantages of the ALVIM technology include:
• Discriminates between biofilm and other kinds of deposits or fouling (e.g. calcium carbonate, etc.); this is extremely important, since these two different kinds of fouling requires different treatments.
• Has a very high sensitivity, i.e. detects the biofilm initial colonisation phase as soon as the first bacterial spots appear on a surface.
• Early-warning detection of bacterial biofilm growth by measuring the natural electrochemical activity of bacterial biofilm, indicating its real presence and extent at any given moment.
• Optimisation of cleaning treatments.
• Easy to install and operate.
• Virtually maintenance-free probe.
• Real-time, continuous biofilm monitoring.

With hygienic connection to the process, a flat surface in contact with the liquid and high resistance to chemical treatments, this sensor is designed for applications where hygiene is critical.

For more information contact Instek Control, +27 (0)12 998 6326, info@instek.co.za, www.instek.co.za
PROCESS MEASUREMENT

An affordable solution
Today’s automated calibrators and state-of-the-art piston gauges have a high cost of entry, but a simple and cost-effective solution to cover a wide range of pressure calibrations is the deadweight tester. For many years, deadweight testers have been trusted as accurate and reliable standards for calibrating pressure gauges, transducers, transmitters and portable calibrators. Due to their fundamental method of pressure measurement using calibrated piston cylinders and masses, they offer unmatched measurement stability and reliability. Due to excellent deadweight tester stability, owners often extend recalibration intervals beyond one year, reducing the cost of ownership.

Why deadweight testers?
A key advantage of deadweight testers is that all of the hardware required to generate pressure and precisely control and measure it can be contained within the instrument. On-board hand pumps are offered on Fluke Calibration deadweight testers to generate vacuum or air pressure, or to prime higher pressure hydraulic systems. Precise control of higher pressures is accomplished using a built-in fine control screw press. No external readouts or power supply are needed for deadweight tester operation. Deadweight testers also inherently regulate a stable test pressure once the piston is floated, solving a problem that operators of some manual pressure calibrators encounter. Deadweight testers also measure accurately over a wide range of pressure. The uncertainty of deadweight tester measurements is a percent of the measured value (% of reading). By including multiple piston cylinders, a single deadweight tester can calibrate units under test with full scale ranges that vary by a ratio of 100:1 or more. For example, a P3025 pneumatic deadweight tester can measure from vacuum to 3500 kPa. A P3125 hydraulic model measures from 100 kPa to 110 MPa.

The business case for calibrating in-house
A deadweight tester can be purchased at a very reasonable upfront cost, often less than a third of a sensor-based calibrator with comparable specifications. Purchase of a deadweight tester can offer a favourable payback by calibrating as few as 25 pressure devices per year. Some additional economic factors to consider are:

•  Calibrating in-house reduces the downtime when sending devices out.
•  Shipping charges can be avoided by calibrating in-house.
•  Owning a pressure standard makes calibrating devices multiple times per year practical when the application calls for it.
•  Commercial labs can offer more comprehensive services to their customers with fast turnaround by acquiring pressure capability.

Fluke calibration quality
While seeking an affordable solution, calibration professionals must still ensure they are using a reliable instrument that will be convenient to use and offer years of reliable service. Fluke Calibration deadweight testers come with accredited calibration and offer features and refinements that offer practical benefits over lower performing industrial solutions:

•  Dual piston models allow coverage of a very wide pressure range without changing pistons.
•  A high quality fine control screw press makes it easy to control pressure precisely in both increasing and decreasing direction.
•  Hand-tightened O-ring based connection allows connection of units under test without tools or thread tape.
•  Visible fluid reservoir on hydraulic models allows users to monitor the level and condition of test media.

Fluke Calibration deadweight testers include pressure generation and test connection hardware to allow operators to get started quickly. With little or no training, operators are able to perform calibrations efficiently. But as always, Fluke Calibration application experts are there to support with installation and operation assistance to make the most of an investment.

For more information contact Comtest, +27 (0)10 595 1821, sales@comtest.co.za, www.comtest.co.za

Cost-effective pressure calibration
Dust and buildup on the antenna? No problem!

The future is 80 GHz:
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VEGAPULS 69 is designed specifically for level measurement of bulk solids. Even in dusty conditions, it always provides precise readings. Dust in the silo or buildup on the antenna have no effect.

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Copper has been used by humans from as early as 8 000 BC. It was the first metal to be smelted from its ore 5 000 BC, the first to be cast into a shape 4 000 BC, and the first to be purposefully alloyed with another metal, tin, to create bronze in 3 500 BC.

In the middle ages, the oxidised layer of copper was naturally leached by water, depleting the upper layers of oxidised ore and revealing the rich copper laden solutions. This prompted miners to dig deeper, heap the ore and leach it out. This is known as hydrometallurgical production, the extracted solvents can be electro-won, and almost pure copper anodes produced.

The pyrometallurgical method uses pulverisation, flotation, smelting and converting to produce anodes. The copper that is produced by precipitation in the leaching process can be added to the smelting process for further processing to anodes. During this cementation (iron precipitation) copper is produced by running the pregnant leach solution through a pile of scrap iron or steel. An electromechanical process takes place and the copper precipitates onto the iron/steel, which in turn dissolves into the solution. It detaches as flakes or powder.

The pregnant leachate that is produced from the process, will contain the leaching agent, either water or H2SO4 for oxide ores. Acid cure and acid-ferric cure are used for mixed ores. Some plants use an acid/kerosene mix. The process has to remove and recover the copper from the leachate, and remove impurities. This process has to be controlled, and as we know, when we measure, we can control.

Ores that have been mined, crushed and dumped on impervious pads, are usually sprinkled or sprayed with the leaching solution, in the heap leaching process. Flooding or trickle systems can be used for dump leaching. The pregnant liquor is then fed to a solvent extraction plant, which can be optimised by various methods.

Maximum extraction with minimum wastage
Endress+Hauser suggests that by measuring the pH, conductivity and interface levels, the process can be managed and optimised for maximum extraction, and minimum wastage.

Most important in the solvent extraction is detection and monitoring of the depth of the organic phase. The copper is trapped in the top layer. Automation is the norm in modern plants, since this does away with manual dipping, and the subsequent errors that it can produce. To this end, with the aid of Sensorfusion, Endress+Hauser has taken the reliability and accuracy of its guided wave radar and capacitance level, and combined them into one device, which will simultaneously provide a reliable and accurate measurement of the top and interface levels, even in emulsion layers.

To assure the correct metal extraction, plants need to measure the conductivity of the settling chamber. This measurement will ensure that it has control of the transition stage from organic to aqueous. If not correctly controlled, this may cause ‘mud’, and as a result plant downtime and wastage of additives. The Indumax CLS50D sensor and a CM44x is used for this measurement. The CLS50D is an inductive conductivity sensor that can withstand high temperatures and has high chemical resistance. It has the added advantage of having Memosense digital technology.

To control the addition of solution, and the returned aqueous raffinate, we need to know the pH values. For this we use the CPF81D PH sensor. It is a robust, low maintenance sensor with Memosense digital technology.

Uranium, gold, palladium and platinum are commodities that can go through a similar process, but with differences in the refining stages.

For more information contact Pieter Andjelkovic, Endress+Hauser, +27 (0)11 262 8000, piet.andjelkovic@za.endress.com, www.za.endress.com
The T32 is the flagship of WIKA’s temperature transmitters and a bestseller, too. The instrument of serial number 1 000 000 was recently manufactured. As one of the first temperature transmitters worldwide, the T32 has complied with all requirements of the standard for functional safety to IEC-61508, also known as SIL (Safety Integrity Level). The WIKA in-house development was certified as part of a full assessment by TÜV Rheinland as independent body.

For successful SIL certification, the development process for the T32 had to follow exactly the V model of IEC-61508. In addition, it was mandatory to implement an extensive diagnostic functionality for detecting critical error states in instrument operation, which allows the plant manager to bring his process to a safe state in case of malfunction. The function comprises, among other things, monitoring the sensor lead resistances, sensor monitoring, continuous microcontroller self-diagnostics, and hardware monitoring. The functionality is rounded off by very good long-term stability and excellent EMC characteristics.

The development process required for SIL certification in accordance with the V model was consistently implemented at WIKA for the first time as part of the T32 project. Compared with conventional product development, the standard requires much higher levels of documentation and product validation expenditure.

Excellent quality figures
In retrospect, this additional expenditure has paid off by giving excellent quality figures.

For the SIL generation of the T32 (the third overall), for years the return ratio has been in the single figure ppm range, and its long-standing, proven reliability, even in demanding industrial environments, has impressed customers.

For more information contact WIKA Instruments, +27 (0)11 621 0000, sales.za@wika.com, www.wika.co.za
Yokogawa has announced that it has developed an N-IO standard field enclosure and a control system virtualisation platform. The enclosure is a weatherproof remote I/O cabinet that stores I/O devices used by the Centum VP integrated production control system and the ProSafe-RS safety instrumented system, and the virtualisation platform enables the control of multiple virtual devices on a single server. By reducing the amount of time and effort to engineer a new system, these solutions help to both speed up project execution and reduce total cost of ownership. The N-IO standard field enclosure is scheduled to be released in February and the virtualisation platform in May.

As global competition intensifies and the market environment changes manufacturers want to be able to set up production facilities ever more quickly. Yokogawa is responding to this need using the agile project execution concept. Agile project execution is an innovative approach to utilising standardised technology and flexible project execution processes that keep automation off the critical path during project execution. The result is a lower cost of installation and maintenance, and the lowest TCO, while reducing the risks of project execution and delivery.

For improved agility in project execution, Yokogawa developed the N-IO (Network IO) field I/O device for Centum VP R6.01 and ProSafe-RS R4.01.00. Equipped with a module that can handle multiple I/O signal types, the N-IO device caters for both analog and digital I/O signals, which account for the majority of I/O signal traffic. With this device, the signal type for each I/O point can be configured solely through software settings. This eliminates the need to replace I/O modules and wiring when changing sensor types and wiring layouts during engineering, and when changing sensor types during a plant revamp, which significantly reduces workload and speeds up project implementation.

To realise the agile project execution concept Yokogawa has now developed the N-IO standard field enclosure and a control system virtualisation platform. The enclosure is a remote I/O cabinet that stores the N-IO device, a key component of the Centum VP and ProSafe-RS systems, and the virtualisation platform enables the operation of multiple virtual machines on a single server. Together with its N-IO and Automation Design Suite (AD suite) integrated engineering environment, Yokogawa uses virtualisation technology to reduce plant construction costs and speed up project implementation. This helps to eliminate the risk of project delays and ensure on-time delivery.

Main features

N-IO standard field enclosure
Many conventional cabinets for storing I/O devices are designed to be installed in air conditioned instrumentation rooms. For outdoor use, it is necessary to design special dustproof and water resistant cabinets. The N-IO standard field enclosure is a dustproof and water-resistant remote I/O cabinet that can be installed outdoors. By allowing the configuration of signal types through software settings, this enclosure eliminates the need for further design modifications. As such, it can be delivered directly to customers without further modification, for faster project implementation.

Control system virtualisation platform
Multiple PCs for operation, monitoring, and other purposes are typically used when configuring a control system and the cost of procuring and maintaining these computers is substantial. Yokogawa’s control system virtualisation platform enables a single server to perform the work of multiple virtual PCs, thus reducing the number of computers required to configure a control system. With this platform, both the hardware and software required to build a virtual environment are provided. By means of this virtualised server environment, it is possible to update and make modifications to hardware and software as required.

In preparation for system installation, Yokogawa carries out the engineering and conducts the factory acceptance test (FAT) of the software on a machine different from the one that will actually be used. Yokogawa delivers the hardware directly to the customer, and then installs the completed software. This speeds up implementation and prevents project delays.

For more information contact Christie Cronje, Yokogawa South Africa, +27 (0)11 831 6300, christie.cronje@za.yokogawa.com, www.yokogawa.com/za
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RS Components has announced availability of the Molex range of MediSpec MPC (medical plastic circular) cable and panel-mount plug connectors, designed to meet the stringent requirements for medical devices. The connectors are ideal for medical applications including dental, disposable devices such as sensors and catheters, electrophysiology, imaging, patient monitors, surgical equipment, and telehealth systems for remote patient monitoring. In addition, due to its high-performance specifications, the range is suited for use in other industries and applications, including instrumentation, test and measurement, avionics, data acquisition and entertainment equipment.

The Molex MediSpec MPC Interconnect System provides a high-performance, yet affordable alternative to typical medical circular connectors. The circular connectors also have lightweight plastic housings made from medical-grade PPSU, which can withstand sterilisation processes commonly used in the medical industry including ethylene oxide, gamma radiation and chemical, as well as the use of autoclaves.

Connectors are available in two diameter sizes: the D1 specification accepts up to eight circuits; and the D2 accepts up to 17 circuits. The plastic plugs feature an easy-to-use push/pull mating mechanism with a locking sleeve for a quick, simple and secure mating connection. The locking latch provides cable un-mating forces of 50 N minimum for D1 types, and 85 N minimum for D2 types.

The terminal retainer assemblies are factory-fitted to provide a protective barrier against dust and moisture in all areas, including unpopulated pins. The selective pin count and pin loading capability enables flexibility of design in contact usage and avoids wasting pins. The stamped and formed contacts for the MediSpec connectors also offer a reliable electrical interface, excellent electrical performance, low contact resistance, and the ability to withstand 10 000 mating cycles. Single-use disposable versions are also available with polycarbonate housings.

For more information contact RS Components SA, +27 (0)11 691 9300, sales.za@rs-components.com, www.za.rs-online.com
Industrial automation customers can now improve safety without sacrificing productivity using the Allen-Bradley Guardmaster Lifeline 5 cable-pull switch from Rockwell Automation – a solid-state, cable-pull E-stop in the industry with microprocessor-based technology.

Traditional cable-pull switches are prone to nuisance trips and unreliable operation due to temperature-based changes in cable tension. The solid-state operation of the Lifeline 5 offers an electronic monitoring system to compensate for thermal expansion and cable sag.

“Because the Lifeline 5 is a solid-state switch there is not the mechanical wear often associated with traditional switches,” said Christo Buys, business manager for control systems, Rockwell Automation sub-Saharan Africa. “This means increased uptime and more reliable safety function over a longer lifecycle.”

The Lifeline 5 switch provides constant access to the E-stop function, stopping a machine hazard with a simple pull of the attached cable. The patented, microprocessor-based solution simplifies setup and allows for more efficient maintenance and troubleshooting. The easy-to-see LED indicators assist in cable tensioning for quick, precise setup while providing switch status and diagnostics during operation.

Available in die-cast aluminium or rugged, stainless-steel housings with IP66 and IP67 environmental ratings, respectively, the Lifeline 5 switch helps optimise productivity by combining maximum reliability with diagnostics that can help prevent unplanned downtime. The die-cast aluminium model also offers an optional, integrated E-stop button for even greater application flexibility.

For more information contact Christo Buys, Rockwell Automation, +27 (0)11 654 9700, cbuys@ra.rockwell.com, www.rockwellautomation.co.za
What is the future of blockchain in manufacturing?

By Gavin Halse, Absolute Perspectives.

Blockchain technology has recently come into focus with Bitcoin’s prominence as a viable cryptocurrency. In manufacturing circles, it is probably fair to say that there is some uncertainty as to exactly what future impact blockchain may have on manufacturing systems. A number of cloud solution providers are making significant investments in cloud-based blockchain infrastructure. At the same time, the enterprise software giants are working to accommodate blockchain technologies into certain processes within their core ERP and supply chain products. Middleware, integration and analytics software vendors are building new architectures that can integrate multiple blockchain technologies with existing line of business applications. These new architectures support real-time processing and event management based on the underlying secure blockchain data. The result of all these investments will be an increasingly rich set of tools and techniques that will ultimately enable new manufacturing solutions.

While the landscape is still shifting, manufacturing decision makers are likely to be sceptical of the current industry hype and will be seeking to understand the fundamental principles on which blockchain is based. They will want to find ways to leverage the technology in areas that create competitive advantage, or where their business might be under threat.

What is blockchain?
Blockchain is a distributed database, whereby transactions are securely encrypted and replicated across many computers in multiple copies of a ‘ledger’. Once data is written to the chain it is committed into ‘blocks’ and these blocks are in turn committed to the ‘chain’. Owing to the architecture, once data is written it becomes nearly impossible to change, making it a very secure system for storing digital assets (value).

Examples of blockchain platforms are Ethereum (probably the best known for business to business applications), Hyperledger (an open collaborative cross-sector blockchain project led by IBM) and Corda (a distributed ledger for financial-grade applications).

A blockchain might be implemented publicly, within a consortium of participating partners, or as a proprietary solution within a single organisation. The most high-profile example of a public blockchain is Bitcoin. Cryptocurrency use blockchain technology to provide a way for storing and moving value securely between transacting parties.

 Characteristics of a blockchain 1.0 solution
Blockchain technology might have some uses in manufacturing where the requirement needs one or more of the following characteristics:

• Proving ownership – for example verifying ownership of assets such as money, physical items or intellectual property.
• Attestation – verifying something that happened in the past (e.g. IoT data, a particular version of a legal contract at a particular date, etc).
• Provenance – proving the origin of assets (for example tracking components through the supply chain into assembled items).

Blockchain 2.0 and smart contracts
The three characteristics above form the basis of Blockchain 1.0, which is basically just a passive storage of data in a very secure way. But innovation has not stopped and Blockchain 2.0 has evolved to incorporate additional capabilities. Blockchain 2.0 now has the ability to also embed business logic within the chain itself. This logic can be embedded in a distributed app platform (known as DAP), sometimes referred to as a ‘smart contract’.

A smart contract will have pre-agreed logic and rules which are triggered by certain conditions in the blockchain. For example, a smart contract might accept a cryptocurrency based payment from the customer and then hold back transfer of these funds to the supplier pending a valid goods receipt transaction being recorded elsewhere in the chain. Previously this role would have been fulfilled by one or more banks. Smart contracts, once agreed and implemented, can effectively replace many functions previously done by third parties, avoiding cost and bypassing the traditional middleman.

Latency and performance considerations
Using blockchain technology appropriately is important. The latency and technical overhead associated with writing to the chain probably makes it unsuited for real-time manufacturing applications, such as process control. However, using a blockchain system to record stock movements from IoT sensors where latency is less of an issue is very feasible.

Blockchain-as-a-service (BaaS) in the cloud is now a reality. According to Microsoft, it is now possible to set up a distributed blockchain infrastructure on Azure in just 20 minutes. This makes experimentation and rapid deployment of solutions very easy.

Blockchain as a manufacturing system?
Within manufacturing it is still hard to see where blockchain technology might create the...
most value. In the short term, we might see crypto-currencies, crowd-funding and simple trading applications emerging that have limited impact. None of these are likely to be immediately transformative to manufacturing, but they might start to impact the macro and regulatory environment. Over time we can expect to see blockchain used in manufacturing for process transformation, supply chain tracking, asset sharing, track and trace, warranty management and more. Ultimately, the end game will be when the technology itself recedes into the fabric of the overall manufacturing operation and we could move into a situation where ‘supply chains’ become ‘demand chains’ and the manufacturing process itself becomes distributed in line with the Industrie 4.0 vision.

Getting started
How should a company get started in blockchain technology and where should the focus be? First, it is important to recognise that the innovation trigger (blockchain) is relatively new and there will be many concepts being tested in the market by start-ups and established companies alike. Like the world of software ‘apps’ we can expect a proliferation of specialised solutions that address specific problems. Over time, many of these blockchain ‘apps’ will morph into something else, most will simply disappear. The manufacturing IT manager/CIO needs to prepare now for this very volatile environment. This will require selecting a flexible vendor agnostic platform, implementing solution development and integration techniques that are agile in nature, quick to deploy, and equally quick to destroy.

CIOs and business decision-makers need to be very aware of emerging blockchain enabled consortiums in their industry. These might emerge in areas such as logistics management, exports, trading, auditing, insurance, financing, etc. These consortiums might eventually dominate an industry segment, or they might simply disappear over time. A strategic long-term analysis of these will be very important to the business. Here, the CIO can take on an education role and make sure the business decision-makers are well informed about the practical application of the emerging blockchain solutions in their industry.

The reality of the future is that there will likely be many blockchains and these will need to be incorporated and orchestrated where they create value for your own organisation. It is no longer too early to be planning your own response to these emerging blockchain technologies.

Guided operator solutions
At parts assembly production sites, where parts are picked from stock, it is almost inevitable that picking mistakes will occur. As parts become more complex and their component types increase, the problem of picking mistakes grows. With Mitsubishi Electric’s Guided Operator Solutions, such mistakes can be eliminated, helping to reduce waste, improve quality and boost productivity.

Poka Yoke
Poka Yoke is the Japanese term used for mistake prevention. Statistically, it has been found that human error when picking parts is one of the most significant causes of mistakes in assembly operations. Typical problems include picking the wrong parts with a similar shape or name, picking and assembling parts out of sequence, or simply missing a part from a sequence.

While product inspection can prevent faulty goods being shipped to customers, it does little to prevent those defects from being introduced into the product in the first place. While for some companies a certain level of waste or rework will be accepted, for others there will be the desire to eliminate mistakes earlier in the production process before real value has been added to the product. To solve these issues Mitsubishi Electric developed its integrated Guided Operator Solutions, based on the principles of Poka Yoke.

Tangible benefits
The costly impact of quality issues is largely recognised for manufacturing companies that engage in assembly tasks. Mitsubishi Electric’s Guided Operator Solutions not only significantly reduce the risk of these quality issues occurring, but they also can be deployed in a diverse range of industry sectors where the benefits can be identified by both managers and operators.

In a typical application, where personnel are required to pick a number of different parts or products from bins in sequence, the chances of the worker correctly picking the parts with 100% reliability every time are small. In the worst case, a mistake introduced into the product will go unnoticed until further up the production line – if at all.

However, with Guided Operator Solutions in place, the automation system guides the worker to the correct parts bin, perhaps by simply lighting an indicator next to the correct picking location, or by opening a shutter and requiring an operator acknowledgement of the successful pick of the correct part. Picking becomes not only inherently more reliable, but also faster, so both quality and overall productivity improve.

Totally integrated solution
Often assembly tasks must fit into the wider operational environment of the plant. This is essential to avoid the issues of over and under production. It is also important to consider the resource planning for parts used in the picking operations.

To permit connectivity to multiple picking applications within the plant, dedicated bridges connect stations over CC-Link and CC-Link IE networks. High-speed data communication enables synchronisation of tasks, but also allows assembly cells to be distributed according to the needs of the production site. Furthermore, direct integration of MES technology permits the Guided Operator Solutions to be connected to high level organisational systems so that output and resource planning are controlled in real time.

Guided Operator Solutions, sometimes known as pick to light solutions, were originally deployed for the automotive sector. However, with Mitsubishi Electric’s wide array of ergonomically designed terminals it is possible to deploy these solutions in many other industry areas that include logistics, semiconductor and life science sectors, which rely on processes such as parts replenishment, production cell picking and kitting for subsequent manufacture.

For more information contact Adroit Technologies, +27 (0)11 658 8100, info@adroit.co.za, www.adroit.co.za
Combine edge and operational data to maximise IoT value

By Michael Guilfoyle, ARC Advisory Group.

For industrial companies engaged in digital transformation, analytics are key to turning large volumes of data into business value to enhance operations and improve the customer experience. Facing intense financial pressure and competition in rapidly changing global markets, companies need to think very carefully about where that data is and how best to leverage it. In some instances, data and analytics need to be processed centrally, such as in a cloud, to drive strategic decisions. In other situations, operational decisions will need to be made instantaneously, meaning that centralised solutions cannot provide the analysis.

Decentralised analytics, otherwise known as ‘edge’ analytics or computing, occur at or near the edge of the operational network. This is quite common in some consumer-facing industries. However, until recently, analytics at the industrial edge was not possible due to a mix of cost, complexity, security and technology barriers.

That is changing. Digitisation is occurring in all industrial environments. In brownfield infrastructure, intelligence is being added via devices such as sensors and gateways. In new infrastructure, we are seeing digitisation through embedded software and preconfigured intelligent equipment.

As this change has taken place, ARC has observed the market focus swinging away from centralised Big Data and analytics toward edge data management and analytics. This makes sense to some degree, as the growth of edge IoT devices and related data has skyrocketed and will continue to do so.

However, edge analytics that rely too heavily on data generated only by equipment and devices overlook some of the most valuable data and insight available to industrial companies: operational data, a portion of which is also generated at, or near, the operational edge; plus process knowledge.

Cloud and edge redefine analytics

In industrial settings, hierarchical structures have traditionally been employed to capture, access and communicate data across an organisation. Operations personnel, whether in a field environment or on the plant floor, can certainly attest to processes and technology designed to capture, share, and use the data. Yet, limits on the use of the data were considerable, constrained rather tightly at times by business silos and technology.

This data structure precedes the Internet. As the Internet becomes a ubiquitous part of business and operating environments, this traditional data structure is being replaced.

Organisations are now beginning to see the value of a more comprehensive view of data and analysis. This improved view includes centralised processing, such as in the cloud (or even on premises on a server), and extends seamlessly to and from the operational edge.

As business leaders wrestle with the ‘data explosion’, they see cloud computing as the solution for associated volume, speed and complexity issues.

The cloud can bring massive computational power to solve problems since it provides a viable solution for combining complex and large data sets – both structured and unstructured – with advanced analytics techniques.

Examples include applying machine learning to acoustics data to predict asset failure, integrating text analysis for process optimisation, or using image analysis for product assurance.

In reaction to the growth of the cloud, the concept of the ‘edge’ of an organisation has been defined as the furthest extensions of a businesses operating environment, whether physical infrastructure, distributed operational points, or customer engagements.

Edge analytics extends data processing and computing close to or at the data sources, which include equipment and devices. In industrial operations, analytics executed at the edge typically support tactical use cases for efficiency, reliability, unplanned downtime, safety and customer experience.

Often overlooked IIoT elements

When thinking about the data for edge analytics, a common misperception is that they only consist of streaming data, time stamped based on the input source. They are often referred to as Industrial Internet of Things (IIoT) data. The thinking here is that a combination of connection, automation, edge analysis and workflow automation are key to getting value from the data.

While true, this only paints a portion of the picture within the context of IIoT strategies. What is missing is an understanding of the value of operational processes and their related data, some of which may be generated at the edge. Because these data are often generated and captured by subject matter experts (SMEs), they typically contain high-value information.

Operational data

Operational data, particularly those generated at the edge, are often underutilised, if used at all. Unless a formal process exists, these data are rarely ‘systemised’ into a source that can make them available as part of the overall pool of operational data.

Process knowledge

In addition to operational data, SMEs understand (and often design) operational processes and best practices. These high-value workers have specific knowledge of how to operate equipment, execute maintenance and ensure safety procedures. For example, crude oil engineers have expertise around impact of crude types on equipment failure during the refining process. This intellectual property is invaluable of course and organisations are fearful it will leave the business as workers retire or move on.

Technologies are now available that can mathematically model and capture that expertise as part of the analytics. In doing so, this process knowledge can be augmented with operational and IIoT data. This blending of knowledge and data can be used to drive the optimised decisions flows and equipment performance necessary for maximising IIoT strategies.

For more information contact Paul Miller, ARC Advisory Group, +1 781 471 1141, pmiller@arcweb.com, www.arcweb.com
Yokogawa releases web-based operations platform

Yokogawa has announced the release of FAST/TOOLS R10.03, the latest version of a web-based real-time operations management and visualisation software solution that scales perfectly from a small and hybrid SCADA to an integrated enterprise operations and engineering framework—thus enabling higher levels of application portability, modularisation, and standardisation that will help customers derive maximum value from their investments over the entire system lifecycle.

Driven by factors such as IoT, Big Data, analytics, and the Cloud, a digital transformation is underway that is leading to the convergence of information, operational and engineering technologies (IT, OT and ET) in unmanned, remote-controlled, and other operations that go way beyond what has traditionally been possible with DCS and SCADA solutions. To benefit from near real-time transaction processing and other capabilities that already are well established in the IT domain, a growing effort is being made to achieve seamless integration and convergence with the OT domain. As production and delivery cycles shorten and require greater flexibility, the instant sharing of real-time data on operational capacity and conditions for the purpose of production/maintenance planning and forecasting become critical factors for a company’s bottom line results. A modern open SCADA platform should be able to bridge the legacy gaps between the IT and OT domains by leveraging OPC Unified Architecture (OPC UA), extensible mark-up language (XML), and direct database interfaces. By simplifying operations, automating activities, and enhancing the user experience, capex can be reduced.

Recognising that most enterprises will take a hybrid approach in their management and control solutions, Yokogawa continues to pursue innovations that will ensure its customers are able to transform their data into meaningful information and get the most out of their investments. This release includes new functions that provide greater transparency by integrating multi-tier architectures and enabling global access to and sharing of a variety of resources.

Main features
FAST/TOOLS R10.03 offers significant enhancements that improve operator efficiency, data processing, application usability, security, and configuration, thus enabling customers to tailor their applications to best fit their work methodologies. It supports the digital industrial ecosystem with open information models that simplify and enhance sub-system integration and diagnostics and enable leaner and flatter architectures. This is done through (cloud-based) virtualisation solutions that are managed as a single system.

1. High-performance ISA101-based HMIs
To help customers implement a more effective HMI strategy a symbol library has been developed that is based on the concepts embodied in the ISA101 standard, designed to promote a consistent approach in the development and implementation of effective HMIs for manufacturing applications, particularly in the process industries. Based on this, end users, automation suppliers, and system integrators can create more effective HMIs that lead to higher productivity and a safer operating environment.

2. Information model (objects in objects)
The requirement for enterprise-wide process automation solutions is driving the need for ways to make sense of an ever increasing volume of data. For that purpose, Yokogawa has implemented an information model (tree) that allows for process hierarchies and has expanded its solutions by enabling objects within objects. This reduces engineering costs by simplifying the use and re-use of templates.

3. Enhanced DCS integration
System integration is a key development strategy that provides users the best experience from an operations, engineering, and maintenance perspective. As boundaries continue to blur in the automation landscape, Yokogawa is driven to bridge environments and create the ultimate hybrid approach by emphasising integration. With significantly enhanced DCS integration tooling made possible through the support of additional function blocks and hierarchical naming, further support is provided for the transparent integration of Yokogawa’s DCS (the Centum integrated production control system) at the enterprise and SCADA levels.

4. New table component function
As part of its vision to help people unlock actionable insights from data, Yokogawa has included a new table component function that converts historical data, audit trails and other data sets to a user-friendly tabular format. This allows operators to perform quick cross-category spreadsheet queries of data. Transparency is improved by allowing these tables to be queried and directly reported in native graphics.

Yokogawa will keep working to improve its entire range of solutions and services, including FAST/TOOLS, with the aim of ensuring safe and highly efficient operations over the entire lifecycle of its customers’ facilities.

For more information contact Christie Cronje, Yokogawa South Africa, +27 (0)11 831 6300, christie.cronje@za.yokogawa.com, www.yokogawa.com/za
Protect productivity during SA’s lightning season

South Africa’s summer season brings with it the possibility of lightning strikes. The massive voltage fluctuations caused by these can damage sensitive equipment, as well as cause data loss on computers, servers and storage devices. To combat this, DEHNcord surge arrester offers reliable protection from lightning interference in a flexible and space-saving package.

Hano Oelofse, DEHN Africa technical director, notes that Type 2 surge arrestors are devices designed to discharge the currents generated by indirect lightning strikes, which can cause induced or conducted over-voltages on the power distribution network. They are installed in the main distribution switchboard.

He explains: “The DEHNcord Type 2 surge arrester, available in single-pole, two-pole and three-pole versions, can be fitted in installation systems such as the terminal compartments of end loads, cable ducts or flush-mounted systems. The compact design allows it to be installed wherever the performance of a standard Type 3 surge protective device for terminal equipment reaches its limits. The lighting protection offered by DEHNcord helps to offset the possibility of lost productivity and costs for the repair or replacement of equipment after an unprotected lighting strike.”

It can also be used at the transition from lightning protection zone (LPZ) 0B to 1 or higher. DEHNcord meets the requirements of EN / IEC 61643-11. It has a short-circuit current withstand capability Isccr of 25 kA(rms) in case of mains-side over current protection, and a total discharge current of 20 kA (8/20 µs). Other features include:

- Single, two or three-pole surge protective device with monitoring system and disconnect.
- Visual fault indication.
- Types with disconnection of the load circuit in the event of a fault and protection of the control phase.
- Compact design also for outdoor use.
- Can be fitted in junction boxes, flush-mounted systems, cable ducts and flush-type boxes.

“Despite the compact design, the device houses a visual mechanical operating indication, as well as disconnecting the load as soon as it is tripped,” concludes Oelofse. “DEHNcord can be adapted to existing installation systems to ensure reliable protection of terminal equipment at minimum expense, takes up little space and saves installation time. When space is restricted in the cable duct, DEHNcord is the ideal solution thanks to its flexible terminals.”

For more information contact Hano Oelofse, DEHN Africa, +27 (0)11 704 1487, hano.oelofse@dehn-africa.com, www.dehn-africa.com

Approved miniature circuit breakers from Zest WEG Group

A full range of approved miniature circuit breakers, offering protection against overload and short circuit in electric conductors, is available from Zest WEG Group. The WEG MDW and WEG MDWH miniature circuit-breaker line comply with the tripping characteristic curves B and C, according to standards IEC 60898 and IEC 60947-2. These miniature circuit breakers have been developed to be used in low voltage circuits with direct or alternating current from 2 to 125 A and short-circuit breaking capacity up to 10 kA. The full range includes all accessories in both 5 kA and 10 kA, making it possible for the Zest WEG Group to supply customers with complete solutions for specific projects. These breakers can be used in both commercial and domestic applications.

For more information contact Kirsten Larkan, Zest WEG Group Africa, +27 (0)11 723 6000, info@zestweg.com, www.zestweg.com
Sinamics V90 drive with bit encoder

The user-friendly servo drive system Sinamics V90 from Siemens is particularly suited as a solution for highly dynamic applications. The system comes not only in the form of a high-inertia variant with 400 V for applications requiring smooth operation, but also as a 200 V version with low inertia motors where highly dynamic performance is required. Fitted with either pulse train or Profinet, the motion/process and diagnostic data can be transmitted in real time between Sinamics V90 and Simatic PLCs. The low inertia motor now features an additional absolute single-turn encoder with a resolution of up to 21 bits, allowing it to determine unequivocal position values and so ensure the great positioning accuracy in the applications.

The presence of the additional absolute single-turn encoder eliminates the need for advance referencing, as the values are available immediately after system start. The position tracking function allows users to generate a virtual multi-turn encoder value from a single-turn encode, and the position value to be stored in the drive. All of this takes place in running operation. It accelerates set-up times and reduces the time required for start-up after a machine stop. The Sinamics V90 is available in eight sizes and the SimoticsS-1FL6 in seven motor shaft heights, and covers the output range from 0.05 to 7 kW for operation with single and three-phase supplies.

Furthermore, the design of the Simotics S-1FL6 high-inertia motor has been updated. The connections on the motor side are now angled, and connections on the cable side are standard connections. This makes the design of the motor more compact and the connectivity more convenient. It is particularly suited for motion control applications such as positioning and winding.

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Energy saving from Mitsubishi variable speed drives

Fans and pumps offer the most potential for energy saving using variable speed drives.

<table>
<thead>
<tr>
<th>Motor</th>
<th>Start-up current (Amps) – DOL</th>
<th>Start-up current (Amps max) – VSD</th>
<th>Running current (Amps) – DOL – 50 Hz</th>
<th>Running current (Amps) – VSD – 50 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan 110 kW</td>
<td>1300</td>
<td>195</td>
<td>195</td>
<td>111</td>
</tr>
</tbody>
</table>

In terms of return on investment, the annual savings with the plant running eight hours per day, five days per week for 49 weeks of the year was estimated at R70 000 per annum, i.e. a payback of less than one year.

Dave Wibberley, managing director of Adroit Technologies concluded: “Having researched and verified data such as this is extremely valuable to potential users as it is customer to customer research and not just vendor marketing speak. We believe Mitsubishi has the best energy saving and quality product on the market. We have shown it time and time again under both harsh environmental and power conditions.”

For more information contact
Adroit Technologies, +27 (0)11 658 8100,
info@adroit.co.za, www.adroit.co.za
New to Magnet’s range of Schneider low voltage motor starting solutions, are the EasyPact TVS motor starters, designed for motor control and protection for simple applications.

The new E range, an extension of the current range, includes contactors, thermal overload relays, control relays and motor circuit breakers designed and precision-engineered to give OEM’s and panel builders, a motor starter solution that offers high performance, safety of personnel and a competitive price.

“This range ensures compatibility and easy installation in new or existing motor control panels,” explains Brian Howarth, managing director, Magnet Group. “Direct mounting of the thermal overload underneath the contactor minimises cabling and installation time, also enhancing reliability of the system and saving panel space, which all contributes towards cost saving.

An important feature of this system is that it has been designed for application optimisation, which means users are able to select only the components that are needed for each specific project. A clear reference system ensures easy product selection for every application, and because fewer components are required, design is simplified and stocking requirements are reduced.”

Features and benefits
The EasyPact TVS range encompasses nine sizes of contactors that cover a broad range of current ratings from 6-630 A. These are used in conjunction with thermal overload relays (0.1- 630 A), industrial control relays with 4 NO/NC contacts, and a newly designed motor circuit breaker (0.1-32 A).

Utilisation categories are Class AC-1 for loads with power factor at least equal to 0.95 (resistive load, heating and distribution) and AC-3 for squirrel cage induction motors, with contactor breaking taking place when the motor is running.

Thermal overload relays protect AC circuits and motors against overloads, phase failures, long starting times and prolonged stalled rotor conditions. The thermal relay controls the current driven by the motor and if this current exceeds the setting, the auxiliary contacts will change state, causing the motor to stop.

Thermal-magnetic 3-pole protection motor circuit breakers are designed for connection by screw clamp terminals to ensure a secure, permanent and durable clamping, which is resistant to harsh environments, vibration and impact.

Magnetic elements for short circuit protection of the motor have a non-adjustable tripping threshold, which is equal to about 13 times the maximum setting current of thermal trips. Thermal elements for overload protection include automatic compensation for ambient temperature variations. For protection to personnel, all live parts are safeguarded against direct finger contact to IP20.

The EasyPact TVS range ensures coordination between protection and control components, which means there is a safe and fast restart after a short circuit. To ensure suitable protection of electrical components against fire, product damage or power loss, Magnet recommends installation of this system in a spacious CRN steel enclosure.

Severe conditions including dust, humidity and high temperatures can expose personnel and equipment to serious risks.

The EasyPact TVS motor starter system, which is suitable for applications including HVAC, lighting in buildings, cooling or extraction fans, small pumps and mixer applications, manufacturing and conveyor belts, conforms to stringent international quality, safety and environmental specifications.

For more information contact Samantha MacDonald, Magnet, +27 (0)31 274 1998, samantha@magnetgroup.co.za, www.magnetgroup.co.za
CONTROL SYSTEMS

For companies involved in waste management, spontaneous fires are a fact of life and the critical issue is therefore to detect an outbreak as efficiently as possible and prevent it from spreading. For one such company in Sweden, FLIR thermal imaging cameras have played an essential role in this effort since 2016.

Jönköping Energi turns some 160 000 tons of waste per year into heat and electricity, sufficient to cover the annual needs of 25 000 households. Preventing and controlling fires is not only a matter of safety but also of economics.

“We have trucks bringing in waste not just from the surrounding area but from all over Europe that is dumped in a waste bunker, mixed by automatic cranes and stored awaiting transportation to the boiler,” explained plant manager, Magnus Olsson. “These waste piles can be a dangerous mix. Spontaneous combustion from biological products or other heat sources is a continual threat that needs to be monitored 24/7. Apart from the environmental consequences and obvious safety risks, an outbreak of fire can be very costly. That is why it is so important to have a reliable early warning system.”

Historically, the plant relied on aspiration-based smoke detection that pulled in air from the environment to analyse it for the presence of smoke, but its main failing was speed. For the system to generate an alarm, smoke had to make physical contact with the sensor, which was installed high up in the ceiling of the waste bunker. By the time this happened a fire could have already taken hold.

**Infrared technology provides the solution**

To provide the sixth sense it clearly needed, Jönköping Energi switched to a system from Termisk Systemteknik based on FLIR thermal imaging. For fire detection, infrared is a superior technology because it senses the surface temperature of material. In effect, it ‘sees’ the source of the fire in its infancy, before it has the chance to develop.

The chosen system comprises two FLIR A615 thermal imaging cameras in protective housings mounted on pan and tilt systems, one at each end of the bunker. They are controlled via Termisk’s dedicated TST Fire software so that when a hot spot is detected by one camera, the other camera is trained on it too.

The software calculates the co-ordinates of the hotspot based on the combined thermal images and an alarm is generated. From the waste bunker control room, operators can then direct the water canon to the hotspot to extinguish the fire.

“This system has proved to be very accurate as it is able to measure temperatures to a fraction of a degree,” confirmed Claes Nelsson of Termisk Systemteknik. “Thanks to the high resolution of the two FLIR cameras – 640 x 480 pixels – the entire bunker can be monitored in high detail. This enables the control room operators to detect really small hot spots. The FLIR A615 is one of our preferred FLIR cameras for this type of application as it operates with a Gigabit Ethernet interface so it integrates very well with our software.”

Compliance with GigEVision and GenICam standards allows the FLIR A615 to be integrated with a wide variety of similarly compliant equipment and is supported by a choice of third-party software such as TST Fire. Trigger and synchronisation capabilities enable it to control, or be controlled by a host of other types of equipment. When used with wireless and fibre optic line adaptors this high performing camera can be used almost anywhere, including over long distances.

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Batch size one production

Bürkle based in Freudenstadt specialises in the field of press lines and coating technology, supplying turnkey production plants to its customers. To comply with the requirements of one customer requesting a fully automated, fully order-controlled production plant for door leaf blanks, Bürkle opted to use an automation concept from Siemens which enabled it to achieve the efficient, completely order-driven production of small and ultra-small batch sizes at its factory in Mastholte. The underlying concept deployed is helping smooth the company’s route towards Industrie 4.0.

Efficient batch size one production which is fully automated, order-controlled and ensures maximum material yield might sound a bit like wishful thinking. But Bürkle has now implemented an automation concept which enables individual plants to be built for flexible production. The solution comes from Siemens, and encompasses the ET 200SP OpenControllers (Central Processing Units/CPUs pre-installed in the factory) and the Engineering Framework TIA (Totally Integrated Automation) Portal.

Door leaf blanks started the ball rolling

“For us, it is easier to be able to implement all the different automation tasks from the smallest machine module to the large-scale station consistently in the TIA Portal,” says Andreas Lammert, head of electric design at the Mastholte location. “Using OpenControllers, we’re able to implement plant sections which are functionally highly complex using compact standard technology, without the need for additional engineering tools.”

Windows-based but still Windows independent

The OpenControllers encompass both a Windows-based IPC (inter-process communication) section and a PC-based variant of the Simatic S7-1500, which is optionally available as a failsafe variant. As a Profinet-capable master unit for the distributed I/O ET-200SP, the OpenControllers can be connected both to the management level and the IT and field level. The PC-based Simatic runs as a software PLC independently of Windows and with its own real-time operating system on a separate processor core. Breakdown of the production orders into individual batches of just one door leaf each is carried out by the plant’s host computer, a Microbox PC 427D. The production parameters for the batches released by the operator are then forwarded by the host computer to the individual machine stations for evaluation and implementation. The Windows-based part of the OpenController hosts the visualisation of the different stations and collates the operational and quality data for the host computer. All of this takes place without placing any additional stress on the actual machine control system, as the automation architecture supports the clear structuring of complex plants into hardware and software. This also simplifies the implementation of specific safety functions such as the emergency stop or protection against unwanted access to parts of the control system by means of Enhanced Write Filters (EWF).

Ideally equipped for Industrie 4.0

“The automation structure in place here allows us to implement complex customer requirements more simply and economically than before,” says a delighted Andreas Lammert. Even small to ultra-small batch sizes are now a viable proposition. “This is why our new OpenController-based automation concept provides optimum support for all those companies keen to get into shape now for Industrie 4.0 and to keep pace with an increasingly dynamic market.”

For more information contact Jennifer Naidoo, Siemens Digital Factory and Process Industries and Drives, +27 (0) 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za
Omron Corporation has announced the global release of its new CK3E programmable multi-axis controllers and industrial PC platform (PMAC). Omron, together with Delta Tau Data Systems (DT), developed the PMAC controllers based on leading motion control technology from DT. PMAC achieves sophisticated fine-tuning control, including high-speed synchronous control of various factory automation (FA) devices, thanks to built-in EtherCAT connectivity which is used for production lines and equipment all over the world. Its development environment allows users to program their own motion algorithms and motion control functions, such as trajectory calculation and position compensation, in C and original programming languages.

In order to satisfy the diverse consumer needs and deal with short product life cycles, the current trend to aim for innovative manufacturing by leveraging the latest precision machining technologies and robotics at production sites is spreading. Builders of semiconductor manufacturing equipment and machining tools are concentrating resources on development of innovative and competitive core technology. In these circumstances, machine builders are increasingly requiring globally available controllers whose long-term supply stability and quality are guaranteed and which can be used as alternatives to board controllers that are costly to develop basic functions and maintain.

Moreover, manufacturers who develop manufacturing equipment with robots are expecting robust and reliable controllers that can execute customised motion control. Omron offers two types of PMAC programmable multi-axis controllers to meet these demands.

**CK3E programmable multi-axis controller:**
- Multi-axis control with a fast cycle time of and EtherCAT master functionality. Flexible system configuration and high-speed synchronous control of FA devices connected via EtherCAT.
- Compact design (28.6 mm thickness) to save space in machines and control panels.

**Industrial PC Platform NYS1_A:**
- Up to 128 axes of control and advanced data handling. Multi-tasking of Windows applications and customised motion control (motion algorithms, kinematics, position compensation, etc.).
- PLC-level environmental resistance. Hypervisor software for uninterrupted machine control even if Windows is down.

For more information contact Omron Electronics, +27 (0) 11 579 2600, info.sa@eu.omron.com, www.industrial.omron.co.za
New generation of Barth mini-PLCs

RS Components has announced the launch of the STG-800 range of mini-PLCs from Barth Elektronik, programmable via popular Arduino software.

RS is the global distributor for the STG-800 mini-PLC range, which provides hardware-oriented microcontroller programming with low current consumption in a small form factor. The units deliver a best-fit solution for a whole range of smaller applications that simply do not require overly powerful PLCs. They are suited to use in a wide range of applications, including industrial and building automation, automotive and maritime technology, technical education/university and white goods.

Barth now provides a free software patch for the latest Arduino IDE (integrated development environment) to support all models in the STG-800 range. The three STG-800 mini-PLCs are based on a 32-bit ARM Cortex processor, which delivers a step change in performance. In addition to the Arduino IDE, the PLCs can be programmed via the established miCon-L software, as well as allowing open-source C-programming with the KEIL µVision software suite. All the PLCs offer 10 I/O and a CAN interface, enabling communication with external devices.

The STG-800 offers five digital inputs, three configurable for 0 to 30 VDC analog inputs with a 12-bit ADC, one as a 25 kHz-input event counter, one as a 40 µs-input pulse and frequency counter, five solid-state power outputs (up to 1.5 A), four high side, and one low side that can also support a 16-bit 1 Hz to 25 kHz power PWM output. The STG-810 model adds an IrDA (Infrared) port for communication with the PG-65 parameter programmer, which delivers a step change in performance. In addition to the Arduino IDE, the PLCs can be programmed via the established miCon-L software, as well as allowing open-source C-programming with the KEIL µVision software suite. All the PLCs offer 10 I/O and a CAN interface, enabling communication with external devices.

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Connecting EtherCAT with TSN networks

With the EK1000, Beckhoff has expanded the EtherCAT I/O system with a new bus coupler. The device enables the communication of EtherCAT segments with remote EtherCAT controllers via heterogeneous Ethernet networks. Through support of TSN (Time-Sensitive Networking) functions, the coupler enables delays caused by switches in Ethernet networks to be minimised and the wide range of EtherCAT I/O terminals and other EtherCAT devices to be used in TSN network environments.

The EtherCAT TSN Coupler combines the advantages of the EtherCAT world with those of TSN networks. EtherCAT is ideally suited to combine the numerous small data packets of digital and analog inputs, which typically occur in industrial environments, into a complete process image. TSN on the other hand, enables the definition of data streams in heterogeneous Ethernet networks for a real-time capable, prioritised transmission of such data streams across the network infrastructure. As a result, control systems can address multiple EtherCAT segments in real time via TSN across Ethernet networks. To this end, no modifications are required in the EtherCAT slave devices.

The EtherCAT TSN Coupler, placed as the first device within an EtherCAT segment, provides two Ethernet interfaces. One of these 100 Mbit/s ports connects the coupler with the Ethernet or TSN network. The second port can be used for optional integration of additional remote EtherCAT devices. The EK1000 ensures the transfer of telegrams from the TSN to the EtherCAT port with minimised delay.

In this way, proven EtherCAT features such as distributed clocks and extreme Fast Control (XFC) or communication with EtherCAT-enabled drives are now also available within TSN networks. In networks without TSN extension, the bus coupler can also be used for integrating an EtherCAT network with a standard Ethernet network.

For more information contact Michelle Murphy, Beckhoff Automation, +27 (0)11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za
Countapulse Controls has survived by instituting technological innovation in the face of socio-economic uncertainty. In its more than 60 years in business, this leading supplier of sensing solutions has created a sustainable business model by anticipating and exceeding market demands. Since introducing Hengstler mechanical counters to South Africa in the 1950s, the company has witnessed drastic advances in sensing and monitoring technology.

Managing director Gerry Bryant says that it is critical for companies to keep abreast of developments in sensing technology. “However,” he emphasises, “all this technology is worth nothing if the technical support is not available. The sharing of applications knowledge plays a crucial role in increasing productivity and reducing downtime, especially as many companies no longer have internal technical support divisions.”

An aggravating factor for customers is the emergence of a plethora of online shops offering sensing and monitoring technology at bargain basement prices.

“While the low prices might be an attraction, the lack of pre and after sales technical advice is a liability as hi-tech items require instruction for maximised benefit,” cautions Bryant. “It is unlikely that this level of guidance and support will be available in an online shopping forum.”

In the complex process and manufacturing environments, utilising sensing, monitoring and measuring instruments that have not undergone due diligence and that do not have a good reputation behind them risky. The failure of such products causes production line issues and safety cannot be guaranteed.

Bryant says that the wise alternative to online shopping is one-on-one technical instruction and support: “A reputable supplier will leverage the years of hands-on experience and expertise resident in its technical staff. OEM training provides the supplier’s team with specialised knowledge and skills pertaining to specific instrumentation. By focusing on tried and tested matching of products to applications, suppliers are able to ensure best fit in all instances.”

He adds that the company’s hotline is one way of investing its experience and capabilities back into the industry and that this product and applications knowledge is delivered as a value-added benefit to our customers.

Bryant maintains that when one considers the customer’s application, it is important to understand that selecting sensors is not as simple as matching a model number to a requirement.

“One needs to carefully assess the operating environment,” he concludes. Parameters that should be considered include the range of the sensor, the speed of the automatic process, the background conditions and type of product, auxiliary equipment and the circuits within the process. By adopting a structured approach to selecting the most appropriate sensors or flow monitors for a given application, customers will experience enhanced operational advantages.”

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Condition monitoring is the science and practice of monitoring key information to alarm, predict and prevent problems. Familiar examples include the monitoring of the tyre pressure on a car, or monitoring the vibration of large motors in industrial facilities. Alerts and alarms provide some specific diagnostics that lead to a corrective action (i.e., for a car, pump the tyres with air), which leads to improved results and operation (i.e., fuel efficiency, reduced tyre wear and safer driving in wet weather).

The potential for improvement is great. Most industrial facilities are only leveraging a small fraction of the available process and equipment data, while many problems lie hidden in plain view. Large, expensive equipment can receive a lot of attention, while smaller, less expensive equipment is not monitored as closely. However, it should be, as up to 30% of control valves, for example, can improve process performance with minor repairs or upgrades.

**Sensing drives more condition monitoring capability**

Sensors are everywhere. For example, a new car today can be equipped with small cameras to detect passengers in seats, and pinch sensors on the door jamb. Sensors can detect pedestrians or cars moving into the car’s path, and a multitude of other events. This level of sensing was not possible 10 years ago.

In many downstream plants, the levels of sensing technology used has also skyrocketed. Far from the old 4-20 mA world, smart instruments and valve positioners have added sensors for temperature, air pressure, vibration, etc. to all corners of the plant. When used properly, the monitoring of these added sensing points can identify the true root cause of problems faster and more accurately than a team of engineers. Therein lies the potential for a great step forward in Overall Equipment Effectiveness (OEE). But first, we need to find a low cost, simple way to gather the right information, filter it, and suggest the proper corrective action to the right person.

**Low cost condition monitoring for existing plant facilities**

Fortunately, most hydrocarbon processing facilities are already connected to this vast array of sensor information via fieldbus and other smart networks. The data comes into the control system, and is sometimes passed along to an Asset Management System (AMS). But often, it is not.

A low cost approach will extract the data via Open Platform Communication (OPC) object linking and embedding (OLE) for process control, and feed it into software systems that have been designed for diagnostics and alerts. Almost every modern control systems offers an OPC server, or can feed data into an OPC-capable process historian. Diagnostic solutions, such as Metso’s PlantTriage system, can perform the diagnostics and alerting for a small fraction of the cost of an unplanned shutdown or quality incident.

Even traditional ‘dumb’ 4-20 mA instruments can give enough data to provide important diagnostic clues to condition monitoring systems. For example, the noise levels emitted by a flow meter can change over the equipment’s lifetime. Certain patterns in the noise level can be indicators of imminent sensor failure. As a result of monitoring the
Noise level for these patterns, this can give an advance warning as to when to conduct a scheduled repair and replacement of the meter, and so contribute towards avoiding a catastrophic failure during production.

All this newly available data can be overwhelming. One of the most important aspects of condition monitoring is the concept of filtering through the data for targeted action. In a refinery, for example, there are typically 2000 or more control loops. Each control loop has an instrument, a controller, and a valve or variable-speed pump and, after installing smart instrumentation, there will be tens of thousands of data points. The condition monitoring system must be able to analyse and filter the information, providing targeted advice to specific personnel.

Examples of condition monitoring improving OEE

Paying attention to valves

In this first example, condition monitoring has identified a significant new valve problem. Through technical and economic filtering, this issue was highlighted as the most important issue throughout the plant. A technician received notification of the issue and performed a field inspection of the valve. On inspection, the technician discovered that the valve actuator bolts had worked loose from the valve and in fact, the actuator was barely attached to the valve.

If the problem had not been addressed then, the actuator would have fallen to the floor, meaning the valve would have failed and the plant would have suffered an unplanned shutdown, directly affecting OEE. Instead, the issue was resolved immediately by tightening four bolts and applying some sealant/surface adhesive. Low cost resolutions such as this are typical and simple to execute especially if plant personnel are paying attention to the right conditions.

Process conditions detected indirectly

In this example, a plant was experiencing unplanned shutdowns as a result of material build-up in process equipment. When detected, the build-up could be easily resolved by temporarily bypassing the equipment and flushing the lines. However, direct detection of the plugging was not possible. This issue was resolved by observing the variability of flow measurement. Once plugging had started to occur, a downstream flow meter began to show erratic measurement.

In this case, a customer alert was established in order to monitor the variability of the downstream flow measurement. As a result, operators now receive an alert before plugging reaches a critical state. Line flushes are then carried out, again avoiding another costly and unplanned shutdown.

A simple fix brings stability and quality

After many years of experience working in hundreds of plants worldwide, Metso found that process stability is affected by many small factors. Process instability can have wide-ranging impacts on energy costs, the environment and quality. In this example, a high degree of variability was traced to a control valve issue. Condition monitoring ruled out tuning and upstream process issues, so efforts were concentrated on the valve. Once the issue had been identified, the solution was to replace the valve trim during the shutdown, resulting in smoother operation, tighter control, less valve damage and improved process quality.

Condition monitoring and the Internet of Things

For some, the distinction between ‘condition monitoring’ and ‘the Internet of Things’ (IoT) can be confusing. In fact, the IoT may provide a platform for future condition monitoring applications. Yet despite this, many processing plants continue to have significant concerns regarding cybersecurity when connecting live process data to the Internet. However, until those concerns can be properly addressed, the use of ‘on premises’ systems with secure web interfaces for reporting will continue to help bridge the gap.

Conclusion

Condition monitoring can be an effective and low cost solution to making improvements in OEE. Modern control system platforms can allow a plant and its operators access to deep and rich information from its instruments, valves, turbomachinery and other process components. Capturing these OEE improvements, however, not only requires gathering the raw data, but filtering out what is useful, providing diagnoses, and delivering accurate and targeted information to the appropriate personnel to ensure that a corrective action is taken. In this way, low cost and targeted actions can help to increase production, prevent unplanned shutdowns, and improve product quality.

For more information contact
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There are those who view solenoid valves as merely a commodity, and there are those who are interested in long-term reliability. Unfortunately, however, low cost and high reliability may be divergent ambitions when it comes to valves. Engineers seeking operational longevity and high-quality performance should think beyond initial purchase price, as any other strategy is likely to cost far more in the long run.

The technology
The overall reliability of any system in a process plant cannot exceed the reliability of the final link in the control chain. In many cases this final link is the remotely-operated valve that starts or stops the process. Often, these valves are piloted by a ‘simple’ solenoid valve.

A solenoid valve is essentially a device for electrically interrupting or diverting the flow of fluid in a pipe. There are many different types, but all operate on the fundamental principle of an orifice being covered or uncovered to allow, stop or divert flow.

Applications are varied, ranging from valve actuation control for standard on/off and control valves, the control of specialist valves such as high integrity pressure protection systems (HIPPS) and emergency shutdown (ESD) valves, through to the direct control of fluids in applications like fire deluge control or the control of utilities such as steam, water and air. Solenoid valves are also widely used in pneumatic systems and controls. In all cases, reliability of operation is paramount.

The problem
Driven by cost pressures, some engineers and purchasers buy solenoid valves based on price. They specify a solenoid valve that will do its job but mistakenly believe all valves are created equal, thinking that very little can go wrong with these seemingly simple devices that typically comprise of a coil, plunger and sleeve. On that basis people may see the solenoid valve as a commodity item. The reality, however, is far different: a highly-engineered solenoid valve may come with a higher purchase price, but its lifetime costs are far lower than other commodity counterparts. To support the false economy theory, consider a conventionally engineered solenoid valve. These tend to use O-rings as valve stem packing to prevent leakage; a design that has many flaws. The sealing ability of the O-ring reduces over time due to the deterioration of the rubber, subsequently enabling fluid to pass. Contaminants in the fluid or fluid residue are then able to accumulate on the valve stem, causing increased friction. Some designs require a breathing hole to ensure smooth valve stem movement. However, a breathing hole exposes the valve internals to contaminants from the atmosphere, which can also build up on the stem. All of these facts can lead to slower response times and potential failures. In ESD and HIPPS situations, every fraction of a second is vital. In order to overcome this increased
friction, some suppliers will use a stronger spring force so that as the friction increases the valve will still operate. In order to overcome this spring force, a high FFR (Force Friction Ratio) is required, subsequently demanding a higher power solenoid. As the power increases more heat is generated. An increase in temperature can negatively affect the lifetime of the solenoid. In addition to the potentially reduced lifespan, a higher powered coil may also affect installation costs as thicker wiring may be required, or engineers may have to have fewer valves on the same control loop.

Failed solenoid valves result in downtime, with all of its inconvenience and cost. Moreover, what if the solenoid valve is found to be seized in an ESD situation? In extreme cases, it could prove fatal.

The Emerson solution
Emerson’s ASCO 327 Series is a universal, 3/2, direct acting (balanced poppet) solenoid valve available in multiple variations of materials, power, flow and certification. The valve is suitable for a wide variety of applications, such as actuator piloting, compressor unloading and utilities control, and also as part of a broader offering of engineered solutions that includes actuator control packages, redundant control systems and bypass panels.

With its unique design and strong safety accreditation, the 327 Series is a proven safe, reliable and adaptable solution that can withstand even the most demanding environments in the process industry. The valve is explosion proof and exceeds the stringent requirements of the oil and gas sector.

The robust build quality of the 327 ensures reliable operation, while the non-breathing design, unique seal construction and extended coil life make these advanced solenoid valves inherently reliable to ensure the long-lasting safety of the application. Furthermore, each valve coil is designed and manufactured in-house by Emerson.

There are many features of the 327 that are designed to reduce engineering time and commissioning costs. For instance, the valve’s unique under-pressure manual operator (MO) can be removed without isolating the valve or shutting down the instrument air system.

Further benefits include low-power options that reduce the size of power supplies and cabling, NACE compliant materials that cut corrosion risk, epoxy H Class coils for extreme long life expectancy, inherent vibration resistance, and the presence of a permanent air gap – even when energised – that reduces any risk of sticking caused by residual magnetism.

The outcome
To help outline the benefits of selecting high-quality, reliable solenoid valves, consider an ESD valve piloting application at an oil refinery. For a typical ESD application, the solenoid valve is energised to open the process valve during normal operation. Thus, in the event of an emergency, the solenoid valve must de-energise and close quickly to shut down the process valve. As this type of solenoid normally operates in standby mode for long periods, O-ring ageing and increased friction will slow down its closing response.

To measure the closing response time of a solenoid valve after a period in standby mode, a dormancy test was conducted. The result showed that the ASCO 327 was much faster than many competitor products, which incidentally had a larger spring return force. Therefore, ASCO valves demonstrate more consistent and reliable behaviour over time than other similar products.

For more information contact ASCO Numatics, +27 (0)11 796 7600, rfq.asconumatics.za@emerson.com, www.asco.com
VALVES & ACTUATORS

Schubert & Salzer expands GS4 series

Sliding gate valves now optimised for pressures up to 160 bar.

Sliding gate control valves are handy, compact, light and ultra-precise. They control liquid, vaporous and gaseous media in a fast, precise and economic manner. The heart of all sliding gate valves is the two slotted discs that slide and seal against each other. The fixed disc, which is secured in the housing perpendicular to the direction of flow, has a certain number of transverse slots. The second disc, with the same slotted arrangement, is moved vertically against the first, thus changing the flow cross-section. The applied pressure difference forces the moving disc against the fixed disc and consequently, the sliding gate valve seals without the need for a metal seat.

These excellent design characteristics can also be found on the new GS4 sliding gate valve range, which is specifically optimised for higher pressures. Depending on the size, the GS4 range is available in nominal pressures:
- PN 160 (ANSI 900) up to a nominal size of DN 80.
- PN 100 (ANSI 600) up to a nominal size of DN 150.

The operating temperature range is from – 200 to 550°C. In addition to stainless steel 1.4571 as the standard body material, special alloys such as Hastelloy, Inconel, Duplex or Super Duplex, are optionally available.

Comparable to the GS1 to GS3 series, the sliding gate valves of the GS4 range are also characterised by an extremely small and compact design complete with a comparably low weight. The PN 100 GS4 valve with a nominal size of DN150, including the actuator and positioned, only weighs 200 kg. A comparable traditional globe style valve weighs approximately 400 kg. This weight advantage not only reduces the required installation space; it is also noticeable in terms of material use and easier handling.

As a result of the seat arrangement which is guided perpendicular to the flow, sliding gate valves from all series only require low actuation force in order to operate. For instance, the sliding gate valve with a nominal size of DN 150 only requires a diaphragm actuator with a membrane size of 1500 cm² in order to manage a differential pressure of 100 bar. Compared to a traditional globe valve, this equals only a tenth of the actuation force.

The low actuating force is also noticeable when dealing with extremely low strokes of 8,8 mm with a significantly lower compressed air requirement. In combination with a Type 8049 digital positioner, no compressed air is used when in the controlled state. Due to the lower stroke, actuating times of two seconds are possible for a complete stroke movement.

Two material combinations are available for the seat set. The moving disc can either be manufactured from a cobalt-chrome based hard alloy (Stellite) or be equipped with an SFC carbon coating (slide friction coating). The selection of material pairing for these sealing discs depends on many factors. In addition to the friction coefficient – which has an immediate impact on the level of the required actuation force – leak rates, chemical resistance, suitability for high differential pressures, edge stability as well as a possible cavitation operation are also decisive parameters.

Furthermore, the desired service life and the costs for spare parts must also be taken into consideration. The Schubert & Salzer Control Systems specialists are happy to assist you in this selection.

For more information contact Kamil Maharaj, Macsteel Fluid Control, +27 (0)131 581 7800, kamil.maharaj@macfluid.co.za, www.macsteel.co.za
Metso control valves

Metso offers you the most comprehensive selection of control valves on the market today. With the addition of Neles Globe Valves into our portfolio, the control valves product family is now complete. You are guaranteed to find the perfect valves for all your process needs, all the way to the most demanding of temperature and pressure conditions.

The Fluke 810 is an advanced troubleshooting instrument for vibration, enabling maintenance teams to collect data and diagnose and solve mechanical problems. The handheld device is designed and programmed to diagnose the most common mechanical problems of unbalance, looseness, misalignment and bearing failure, in a wide variety of mechanical equipment, including motors, fans, blowers, belts and chain drives, gearboxes, couplings, pumps, compressors, closed coupled machines and spindles.

When it detects a fault, the Fluke 810 identifies the problem and rates its severity on a four-level scale to help the maintenance professional prioritise maintenance tasks. It also recommends repairs. Context-sensitive on-board help menus provide new users with real-time guidance and tips.

The tester uses a simple step-by-step process to report on machine faults the first time measurements are taken, without prior measurement history. The combination of plain-text diagnoses, severity ratings and repair recommendations helps users make better maintenance decisions and address critical problems first. Typical vibration analysers and software are intended for monitoring machine condition over the longer term, but require special training and investment that may not be possible in many companies. The Fluke 810 is designed specifically for maintenance professionals who need to troubleshoot mechanical problems and quickly understand the root cause of equipment condition.

Mechanical diagnosis begins when the user first places the tri-axial TEDS accelerometer on the machine under test. The accelerometer has a magnetic mount and can also be installed by attaching a mounting pad using adhesive. A quick-disconnect cable connects it to the test unit. As the machine under test operates, the accelerometer detects its vibration along three planes of movement and transmits this information. Using a set of advanced algorithms, the 810 then provides a plain-text diagnosis of the machine with a recommended solution.

A new approach to machine diagnosis
Evaluating mechanical equipment typically requires comparing its condition over time to a previously established baseline condition. Vibration analysers used in condition-based monitoring or predictive maintenance programs rely upon these baseline conditions to evaluate machine condition and estimate remaining operating life. By contrast, the diagnostic technology in the Fluke 810 analyses machinery operation and identifies faults by comparing vibration data to an extensive set of rules developed over years of field experience. The Fluke 810 determines fault severity using a unique technology to simulate a fault-free condition and establish a baseline for instant comparison to gathered data. This means that every measurement taken is compared to a ‘like new’ machine.

Viewer application software
The tester includes Viewer PC software to expand its data storage and tracking capability. Using Viewer users can:

- Create machine setups at the computer keyboard and transfer the data to the 810.
- Generate diagnostic reports in a PDF file format.
- View vibration spectra in greater detail.
- Import and store JPEG images and Fluke J52 thermal images for a more complete view of a machine’s condition.


For more information contact Comtest,
+27 (0)10 595 1821, sales@comtest.co.za, www.comtest.co.za
Intuitive alerts improve field device reliability

Emerson has introduced new alert optimisation capabilities and mobile device health dashboards in the latest version of AMS Device Manager. Out-of-the-box alert filtering templates created using human-centered design principles provide the potential for as much as a 60 percent reduction in unnecessary alerts coming from intelligent field devices. Personnel-based alert filtering and a streamlined user interface help users to quickly identify, isolate and diagnose health and calibration issues with field devices.

Engineers and technicians are frequently inundated with multiple device alerts, often stemming from a single issue within a device. The newest version of AMS Device Manager resolves the problem of nuisance alerts with pre-defined configuration templates that filter out all alerts tangential to the core problem, leaving only meaningful, actionable notifications. In beta testing, early results show an average 58 percent reduction in daily alerts with out-of-the-box filtering.

Advanced alert filtering helps today’s digital worker to remove noise from critical data, providing that worker with the essential information needed to make fast decisions. Containing all relevant details, the new alerts will help engineers create work orders and build part lists for field technicians to perform maintenance, saving valuable hours in the field.

The release also delivers the new AMS Device View web interface, an intuitive browser-based display with mobile-friendly dashboards. The web interface allows users to view device health and calibration status from a wide range of devices, both on and off the plant floor. By focusing on device health rather than alerts, users can hone in on devices that need maintenance without being distracted by a long list of issues.

AMS Device View is part of Emerson’s Always Aware portfolio, a part of the Plantweb digital ecosystem, providing users with the applications, tools and digital intelligence they need to increase production, reliability, maintenance efficiency and safety from wherever they work. “With intuitive dashboards for easy interpretation of device health and focused alerts for fast action, plants have access to the data they need quickly,” said Mani J, director of marketing for Emerson’s Plantweb IIoT initiative. “These efficiency gains help prevent process and hardware failures, improving plant reliability and freeing personnel to focus on other critical tasks.”

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New vibration switch protects critical assets

As part of the recently introduced RC range of vibration sensors, R&C Instrumentation has launched a new compact vibration switch, designed to protect machinery against unexpected shutdown and repair costs. The RC-429 automatically trips in the event of excessive vibration levels, allowing critical systems to be shut down before damage can occur.

The RC-429 is one of the most compact vibration switches on the market, enabling the continuous monitoring and protection of assets in tight spaces. It is designed to transmit a 4-20mA signal, features an adjustable false trigger delay of up to one minute to prevent error trips, which may occur at machine start up, and is overload protected to a maximum shock of 100 g.

The RC-429, which features a MEMS (micro electro mechanical system) accelerometer integrated onto the microchip, is exceptionally quick and simple to set up, with the maximum RMS velocity set point and response delay time easily adjustable using two rotating setup dials.

It is sealed to IP67 and designed to perform reliably within a temperature range of -25 to 80°C, making it ideal for use in a range of sectors, from building services, pulp and paper, mining and metals, to utilities, automotive, water and pharmaceutical.

Minimising machine downtime and maintenance costs are essential for the productivity and profitability of manufacturers. This new switch provides a simple, cost effective method of continuous monitoring for protecting motors, generators, engines, pumps and fans, ensuring greater machine availability and increased output.

For more information contact R&C Instrumentation, 086 111 4217, info@randci.co.za, www.randci.co.za
Omniflex has been designing and manufacturing electronic products and systems for the automation and control industry since 1965. The company now brings this depth of experience and technology to the field of M2M communications: a framework of technologies providing an integrated service to retrieve and present data and to provide monitoring and control of remote assets, wherever the user or the assets may be.

Features
- Remote control: not only can assets be monitored from around the world, but they can be controlled as well.
- Instant notification of alarms: notify the correct personnel the moment an alarm occurs.
- Tailor the system: user-friendly configuration and flexibility allows users to tailor their systems to suit any application.

Benefits
- A versatile solution to remote asset management: keep in touch and in control of remote assets 24/7/365, from anywhere.
- Reduce downtime, improve business process and provide greater efficiency = higher revenues.
- Managing assets in real-time provides competitive advantage.

Applications
- Utilities: remote meter reading.
- Supply chain management: optimise stock levels, service calls and downtime.
- Building automation: monitor heating, ventilation and refrigeration.
- Agriculture: monitor pumping stations, boreholes and greenhouses.
- Environmental monitoring: water quality and gas monitoring.
- Security: intrusion alarms and access monitoring.
- Production monitoring: batch reporting and stoppage alarms.
- Cargo: position tracking, cold chain and onboard diagnostics.
- Electrical substations: status and fault monitoring.

For more information contact Ian Loudon, Omniflex Remote Monitoring Specialists, +27 (0)31 207 7466, sales@omniflex.com, www.omniflex.com

At the SPS IPC Drives 2017 trade fair, Phoenix Contact presented a cloud application for recording and analysing safety-related data. With the Proficloud solution, companies receive important information on the optimisation of sequences in production.

The safety of machinery is, and remains, a critical subject for machine operators, plant engineers, and systems manufacturers. Their first priority is the safety of machine users, but this can also cause unplanned operational interruptions. A common cause of failures is inadequate design. The ability to access safety system data via the IoT in real-time and to convert this into meaningful information unlocks enormous potential. With Phoenix Contact cloud-based solutions, status information on standard and safety functions is transmitted continuously via a Profinet control solution to the Proficloud where it is evaluated.

Thanks to the holistic consideration of resources and machinery, completely new opportunities are opened up for operators and designers to increase the operational performance. This enables, for example, the determination of interdependencies between safety and process parameters. Or the monitoring of operational and maintenance processes across the entire line during normal operation. With access to this information, measures can then be derived and operational patterns determined. The machinery design can thus be optimised and work sequences designed to be more efficient.

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SKF supplied a custom designed heavy duty bearing housing assembly and two IMX-S conditioning monitoring systems for a 12 MW SAG mill operating on a gold mine in West Africa. “This is the first combination online condition monitoring system and drive train solution for a SAG mill supplied by SKF,” says project manager, John Storm. The end-user purchased the complete new SAG mill for the gold mine from a South African project house. The application presented a number of challenges which prompted the project house to approach SKF for assistance. “We had to find a solution to address the significant loading that the dual drive mill places on the bearing housing caps,” explains Storm. “Furthermore, as the entire plant is automated with instrumentation feedback to a control room, it was imperative that the mill comply with existing protocol.”

SKF’s turnkey solution included South African designed bearings and sleeves complete with custom designed heavy duty pinion housings. SKF customised the housing assemblies to include an uprated cap bolt and housing shell thickness to ensure that the housings are able to withstand severe cap loading on drive train A and B for increased lifespan and improved uptime for the end-user. The scope of work also called for the supply of a spare pinion. “To provide additional protection to the bearings from contamination ingress we incorporated special custom sealing arrangements to customer specific requirements,” adds Storm.

SKF’s solution also extended to a customised IMX-S based solution for on-line condition monitoring and analysis. IMX-S was rebuilt into an IP66 rated panel complete with a dust canopy. Two IMX-S units were supplied to monitor both drive train A and B of the 12 MW mill. Storm explains that the system provides Modbus RTU to Modbus IP/TCP conversion for real-time integration and asset status feed to the end-user’s control room. SKF’s customised turnkey bearing housings and online monitoring system designed in accordance with customer specifications fitted the end-user’s existing infrastructure and met all the required safety factors on the mill’s A and B mill drive trains. “We supplied a world-class quality, rugged, cost-effective, easy to install solution that delivers increased productivity through higher machine efficiency and availability for the end-user,” concludes Storm.

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To maintain an overview of the multi-step production process, Kabel Premium Pulp & Paper utilises an RFID-based identification solution, integrated in a high-performance, wireless transmission system with an interface as part of its own in-house IT system. This enables workers at Kabel to constantly track which production step is currently being processed by a given paper batch.

Since 1896, Kabel Premium Pulp & Paper has been manufacturing by the running metre for the biggest printing houses in Europe. The Hagen-based company in Germany’s Westphalia region initially manufactured newspaper; now it specialises in coated paper for high quality catalogues and magazines.

Two giant paper machines and 540 workers operating in a three shift rotation handle a total capacity of around 485 000 tons a year. Wound onto rolls weighing many tons, tens of thousands of metres of paper are made according to client specifications before being delivered to customers in the requested widths.

**Paper heavyweight**

Anyone who sets foot on the factory floor in Hagen is sure to find themselves in an impressive world that sees heavy rolls of paper suspended throughout the long hall. Overhead cranes transport them from one processing step to the next. Depending on the particular paper thickness, the rolls measuring 7.2 metres wide carry around 50 000 to 60 000 metres of product and weigh up to 20 tons.

Kabel Premium Pulp & Paper produces each and every roll of paper – a ‘tambour’ in technical jargon – in line with client specifications. The multi-stage paper production process begins with the manufacturing of the base paper. As it is still very rough, it is not suitable for high quality print products. That is why the paper is smoothed in a second step, coated on both sides with special chemical materials. Depending on the desired paper quality and surface finish, the tambour then runs through the calendering machine, which smooths the surface under pressure. The calendering machine removes unevenness in the paper so that the contours do not become blurred during subsequent printing. Before leaving the factory, the rolls are cut to the desired individual width on the slitter rewinder to make processing easier for customers.

The paper is wound onto metal cores so that the rolls weighing several tons can be transported. These tambour cores made of robust metal are hung at their ends at each stage of production and are also transported as such by the overhead cranes. Around a hundred of these tambour cores are in continual use in Hagen.

**Every roll in sight**

In circumstances such as these, production faults can mean tens of thousands of metres wasted. To reliably keep a close eye on the production of each individual roll, Kabel Premium Pulp & Paper uses a custom-made RFID solution from system integrator, Intelligent Data Service (IDS) with 26 RFID reading devices provided by the sensor experts at SICK. “We required a solution to ensure the automatic detection of tambour cores in the production flow,” explains Johannes Broer, who is responsible for IT at Kabel Premium Pulp & Paper. “Our requirements included, among other things, reliable system components and wireless data transmission to our IT system. The components used are exposed to process-related contamination, dust and heat. They must be able to withstand contact with chemicals or machine oil. We had to rule out optical detection-based solutions due to the risk of contamination. This was also the case for visual markings, which do not stand up to contact with oil, for example.”

In addition, a solution with very short read times was required, since the tambours are constantly in motion. “We mark our tambours with an eight-digit number, which comprises both the date of production as well as the year. The tambour cores feature a three-digit number. Apart from the fact that the reading stations can be hard for our workers to reach, the long numbers can also result in manual input errors. Automated detection allows us to ensure accurate tracking and relieve some of the burden on our workers,” adds Broer.

This is why the tambour cores are marked with passive RFID tags, which are read at individual stations. When the tambour is rolled out for the first time, the system records which tambour core the batch is assigned to, and from this point on each station will accurately read out via RFID which tambour core the paper is being wound onto and from.

A total of 26 UHF-RFID reading devices from SICK are being used at the factory in Hagen in order to decIPHER the passive tags on the cores. Depending on the reading distance, RFU620 are used for a scanning range of up to one
metre and RFU630 for larger scanning ranges. Passive RFID tags have no energy source of their own that would require regular inspection and are more reliable than active tags when it comes to processing. They are the ideal option for objects that come under heavy mechanical strain such as tambour cores.

Digital system supplied on site
To optimally align systems to the individual application, the application specialists from SICK always carefully inspect the situation on-site at the factory. It goes without saying that they did this in Hagen, too. This is because a number of aspects had to be observed in this case. Metal reflects radio waves and can result in system faults. It is for this reason that the RFID tags on the metal cores had to be strong to a point that close proximity to metal would not pose a danger.

IDS integrated the SICK reading devices into its roll online tracking system, known as Rolf, which it had developed itself. The system collects all results directly from the RFID reading devices, visualises them and makes the data available for further processing. This means that all process data can easily be viewed in the productive database at Kabel Premium Pulp & Paper and each tambour directly assigned. “It was a tall order and we are happy to have found the right partner in SICK,” explains Rainer Marchewka, managing director of IDS. “We have been working with SICK for 15 years. We know that we can rely on them and also that long-term system support is guaranteed.”

In order to keep installation outlay at the factory low, IDS first built the entire system, including all RFID reading devices, true to scale at its own premises, where it tested and optimised the system processes, and then finally delivered the pre-configured system to Kabel Premium Pulp & Paper for installation.

RFID-based roll tracking has now been in operation for over a year. “We are happy that we opted for this solution. In truth, we have worked with RFID-based identification solutions previously, albeit with active tags. These are indeed advantageous when it comes to reading range, but the battery runtimes were too short and also the tags were too susceptible in this environment. We are very pleased with this solution and the collaboration with IDS and SICK,” says Broer.

Quite in keeping with the development of Industry 4.0, Kabel Premium Pulp & Paper is laying foundations for the intelligent factory of the future with the RFID-based Rolf system in Hagen. The company is testament to how proven production machines and state-of-the-art networking technology can be brought together harmoniously and efficiently with the right system solution.

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Wireless call for parts, service or pallet pickup
Real-time communication between work stations and forklifts.

Production efficiency can be increased through a wireless call for parts, service or pallet pickup system that allows work stations to call out to forklifts using Banner Engineering’s EZ-Light K70 Touch to wireless Q120 6-Button Pendant. This provides for quicker responses from forklift drivers and supervisors to indicate a request has been accepted. When creating a call system using wireless indicators, work stations can maintain a steady workflow and resolve critical issues quickly.

On the pendants, each station has a corresponding button that flashes red above the button when a request is made. To accommodate up to 18 stations and 6 forklifts, 3 sets of pendants per forklift are used, for a total of 18 buttons. When the corresponding button is pressed to accept a job, the light above the button flashes green to indicate the job has been acknowledged and stops flashing on all other pendants. This system provides the information necessary to react quickly to work station requests and drive efficiency improvements based on data that was previously unavailable.

Other features include:
- SMS text/email alerts: generate SMS text and/or email alerts based on specific events.
- Efficiency metrics: produce efficiency metrics with provided data.
- Cloud monitoring: push data to a Cloud web-server or PLC (via LAN or cellular connection) for remote viewing, alerting, and logging.

For more information contact Brandon Topham, RET Automation, +27 (0)11 453 2468, brandon.topham@retautomation.com, www.retautomation.com
Yokogawa has announced that it has developed an ISA100 wireless gateway module for field wireless communications that integrates the functions of an access point and a gateway. Compact in size and easy to set up, this module is ideal for building small-scale field wireless systems for upstream (oil and gas field development and production) and other types of applications where data is typically collected from a small number of devices distributed across a wide area.

Field wireless systems allow field devices to communicate wirelessly with host systems that perform functions such as monitoring and control. There is an ever-rising need for the collection of data that can help to improve productivity and enhance safety in plants and other types of industrial facilities. For such purposes, the demand for field wireless devices is particularly strong because they cost less to install and can be installed in locations that cannot be accessed using conventional wired devices.

Yokogawa released its first ISA100 wireless-compliant wireless devices in July 2010. Since then, the company has added field devices to its field wireless lineup that can measure flow rate, temperature, pressure, and vibration, gateways, and adaptors that enable conventional field devices to communicate wirelessly.

ISA100 wireless systems are fast and reliable, and can link devices that are scattered over a wide area. Yokogawa already offers a range of ISA100 wireless products that can be used to construct large-scale field wireless systems, and is now adding this product to its lineup to satisfy the demand for a gateway that is suited for the construction of small-scale systems with fewer measurement points.

Product features

1. Small form factor
Existing field wireless systems consist of wireless transmitters that can measure flow rate, temperature, pressure, and vibration in a production process; access points for receiving signals from wireless sensors; and management stations that function as gateways for the collection of sensor data via access points and send the data to a host system. This new gateway module is able to function as both an access point and gateway because it incorporates an FN110 field wireless communication module with a built-in gateway. The FN110 dimensions are unchanged, with a diameter of 23 mm and a length of 90 mm. When used together with an LN90 interface adaptor that incorporates a power supply adaptor and a host system communications interface, the new gateway module can link up to 20 field wireless devices with a host controller or other device via the RS-485 Modbus general-purpose communications protocol.

2. Easy to set up
This gateway module requires the input of just a few items to set it up. A clear line of sight between the wireless sensors and the gateway module must be secured to connect to a host system. Technicians who have no previous experience with wireless systems can easily set up this system.

3. Low power consumption
This compact module draws just 0.3 Watts of power.

Commitment to this technology
This gateway module opens up new applications for its wireless systems. ISA100 wireless field wireless systems of all sizes can now be built to suit a wide variety of customer needs. Yokogawa will continue working to offer its customers best-in-class solutions that deliver great value by introducing new ISA100 field wireless devices and wireless system devices, and in so doing will broaden the use of this wireless technology.

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**PRODUCT NEWS**

**Presence detection of low-contrast targets in a weld shop**

Environmental conditions in automotive weld shops can adversely affect sensor performance and longevity. Frequent stops in production processes may be required to clean, maintain, and replace damaged or dirty sensors. Challenges include:

- Weld splatter can burn sensor lenses, causing permanent damage.
- Accumulation of dust and residue from welding fumes on the sensor lens gradually degrades performance and reliability.
- Low-profile, low-contrast targets can be very difficult to detect.

**Solution: Q4X laser distance sensor**

- 316L stainless steel housing and an add-on aperture lens kit made of borosilicate glass protects the sensor and lens, ensuring a long working life.
- Best-in-class excess gain burns through dust and residue on the sensor lens to provide reliable performance with minimal maintenance downtime.
- IO-Link enables remote configuration, monitoring, and extended diagnostics to simplify installation, maintenance, management, and sensor replacement.
- Sensor detects sub-millimetre changes in distance to verify part presence or positioning, regardless of colour or reflectivity of object and background.
- Compact sensor installs easily into space-constrained applications.

For more information contact Brandon Topham, RET Automation, +27 (0)11 453 2468, brandon.topham@retautomation.com, www.retautomation.com

**New switches for Profinet applications**

With new Profinet functions and versions for the Factory Line Switch 2000 product family, Phoenix Contact has extended its range of managed switches for Profinet automation applications.

After a firmware update, the version 2200 and 2300 switches support Profinet device functionality and Profinet conformance Class B. With this, the devices will be integrated directly into the engineering system (PC Worx or TIA portal) as Profinet components, and configuration and diagnostics functions can be performed via a controller.

It is also possible to perform rapid diagnostics in the event of error states or failures in the connection to the controller directly at the switch, thanks to special status LEDs with the 2200 PN and 2300 PN versions.

Furthermore, the user no longer has to configure the devices for use in Profinet networks because they are supplied already configured with the Profinet mode.

For more information contact Sheree Britz, Phoenix Contact, +27 (0)11 801 8200, sbritz@phoenixcontact.co.za, www.phoenixcontact.co.za

**Miniature photocell with IO-Link**

The powerful new O8 sensor from ifm electronic is an optimum choice for applications where space is at a premium, such as assembly and robotics. It might be small, but the sensor achieves very long ranges. Moreover, the background suppression is extremely reliable and precise even for the detection of very small, flat or reflective objects. The O8 reliably copes even with constantly changing backgrounds, e.g. on robot arms.

IO-Link allows simple setting of the ranges and sensitivity, with the range adjustable to the nearest millimetre. A complex adjustment of the distance from the sensor to the object is not needed. The new sensors are also available with pre-set ranges. With their reliability and precision they are much above the average of conventional devices.

For more information contact ifm electronic SA, +27 (0)12 450 0400, info.za@ifm.com, www.ifm.com
The new full-metal sensor ranges from ifm are used wherever an application presents particular challenges to the mechanical design. In the food industry, for example, not only rapid changes of temperature but also aggressive media used for daily cleaning stress the housing material. The same applies to applications in machine tools and plants where the sensors are permanently exposed to coolants and lubricants.

In the steel and automotive industries, however, weld spatter is not only a strain on the sensing face but also on the threaded sleeve. In this context the full-metal design with non-stick coating and the robust sensing face are the ideal solution to ensure safe operation. Moreover, the robust stainless steel design offers optimum protection against abrasive parts in metal cutting and machining. Additionally, the compact and short design permits use in even the smallest spaces.

For more information contact ifm electronic SA, +27 (0)12 450 0400, info.za@ifm.com, www.ifm.com

Secure communication for all branches

The industry standard for water management, recognised by the German Federal Office for Information Security (BSI) since August 2017, explains the level of technology necessary for the protection of critical infrastructure. Phoenix Contact offers a broad spectrum of communication solutions for numerous industries and applications that meet this standard.

The proprietary Radioline wireless system enables secure communication, and serial and combined signal transmission, across 20 kilometres. The Factory Line WLAN and Factory Line EPA components for industrial WLAN and Bluetooth networks are ideal for wireless Ethernet transmission. The SHDSL Extender product range provides a robust, redundant and easily diagnosable solution for high failsafe performance wherever private cable runs are used.

The MGuard security routers protect against malware and manipulation. They enable secure communication with wide-ranging VPN and firewall functions. Furthermore, a large number of VPN connections can be used and monitored simultaneously with the MGuard Secure Cloud. If an Ethernet infrastructure is not available, the TC router provides secure solutions for connecting the plant to the control system via mobile network connection. The comprehensive portfolio of accessories rounds off the secure communication solution.

For more information contact Sheree Britz, Phoenix Contact, +27 (0)11 801 8200, sbritz@phoenixcontact.co.za, www.phoenixcontact.co.za

Linear position sensor for mobile hydraulics

Turck has added the robust LTE for direct integration in hydraulic cylinders to its portfolio of linear position sensors. The magnetostrictive sensor can withstand shocks of up to 100 g and the vibrations that typically occur within agricultural and forestry machinery. The device is also insensitive to external influences, so that the LTE is even suitable for use in the hydraulic cylinders of construction machinery in extremely severe environments.

The user can set the measuring range flexibly according to the sensor type. Thanks to the field-proven magnetostrictive technology, the wear-free operating LTE guarantees high precision, linearity and repeatability. The sensor has a 16-bit resolution and also offers three signal ranges for mobile equipment 0-5 V, 0,25-4,75 V, or 0,5-4,5 V in addition to the standard analog output signals of 0-10 V and 4-20 mA.

For more information contact Brandon Topham, RET Automation, +27 (0)11 453 2468, brandon.topham@retautomation.com, www.retautomation.com

Robust sensors for use in harsh environments

The new full-metal sensor ranges from ifm are used wherever an application presents particular challenges to the mechanical design. In the food industry, for example, not only rapid changes of temperature but also aggressive media used for daily cleaning stress the housing material. The same applies to applications in machine tools and plants where the sensors are permanently exposed to coolants and lubricants.

In the steel and automotive industries, however, weld spatter is not only a strain on the sensing face but also on the threaded sleeve. In this context the full-metal design with non-stick coating and the robust sensing face are the ideal solution to ensure safe operation. Moreover, the robust stainless steel design offers optimum protection against abrasive parts in metal cutting and machining. Additionally, the compact and short design permits use in even the smallest spaces.

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