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IS³’s 27th annual User Conference - X-Change 2019 – is the largest industrial software conference in Africa. This year, the company will present the full AVEVA end-to-end software portfolio featuring industry-specific streams including, mining, minerals and metals; hybrid; oil and gas; and utilities. See this month’s cover story on page 22 for more.
welcome

VOLUME 35 NO 3 MARCH 2019

Yokogawa adds sushi to the IIoT platter

At its 2016 User Group Conference in Johannesburg, Yokogawa whet the local market’s appetite for all things IIoT when it announced the development of a compact, low-cost wireless sensor. Aptly named the Sushi Sensor (sushi is easy to eat and makes customers happy – Yokogawa is a Japanese company after all), this battery-operated device was designed to optimise plant efficiency through continuous monitoring of vibration and surface temperature on industrial equipment like compressors, pumps and fans. At the time, the models passed around were just empty plastic shells built to illustrate the idea. But in March last year, the first production units were launched in Japan and Yokogawa is now set for rollout into other areas, beginning in Europe later this month.

A long-time protagonist of wireless technology, Yokogawa introduced its first ISA 100-compatible devices back in 2010. What sets the new Sushi Sensors apart though is their ability to communicate directly with applications resident in the cloud, unlike their ISA 100 counterparts, which are designed to send process-related data to the plant’s control systems. Cloud connectivity is established through LoRaWAN, a low-power wide-area wireless data communication protocol attracting interest among the developers of IIoT solutions. In long-range mode, a LoRaWAN network is no hustler with its top speed of only a few hundred bits/second, but with a range measured in kilometres, it is ideal for equipment-monitoring applications with update requirements in the order of hours.

According to Yokogawa, the Sushi Sensor offers plant owners a breakthrough in the drive to improve overall asset availability through a condition-based maintenance approach. The low-power design ensures the devices are ‘batteried for life’, while the LoRaWAN range eliminates the need for repeaters in the network. In addition, near-field radio communication allows device setup and monitoring via a smartphone and app. As an integral component of the company’s new Synaptic Business Automation concept, Yokogawa plans to add variety to its Sushi Sensor buffet in line with growing demand for predictive maintenance solutions – see the announcement on page 44.

MES becomes a ‘regular’

This month, the team at SA Instrumentation and Control is delighted to welcome Lance Turner as a contributing editor to the magazine. Lance, an MES specialist employed at Sasol’s Secunda plant, will be writing a regular column about his passion for unifying IT across the production spectrum and the challenges large manufacturing companies face in their drive to go digital. Lance’s vision is a unified IT and manufacturing discipline that stands ready to deliver against the promises of Industry 4.0. In the first article, he assesses the problematic issue of reconciling traditional IT approaches with the 24/7/365 demands of real-time manufacturing. You’ll find the article on page 48.

Steven Meyer
Editor: SA Instrumentation & Control
steven@technews.co.za
SA Gauge - Reliable Under Pressure
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- Pressure Testing Kits
- Calibration Certificates
Emerson has announced that it has completed the purchase of Intelligent Platforms from General Electric (GE). The addition of Intelligent Platforms PLC technology will enable Emerson to expand its capabilities in machine control and discrete applications.

Intelligent Platforms, with its portfolio of cloud-connected controllers and devices for smart plants, will serve as a strong complement to Emerson’s industry-leading Plantweb digital ecosystem. Through this expansion, Emerson is growing opportunities across process and discrete industries as well as hybrid markets such as metals and mining, life sciences, food and beverage, and packaging.

Intelligent Platforms is based in Charlottesville, Va. with approximately 650 employees worldwide and 2017 sales of $210 million.

ISA Adopts FDT 2.0 as American National Standard

The FDT Group and the International Society of Automation (ISA) have announced that FDT 2.0 technology has been fully adopted as an ISA/ANSI American standard. This will meet demands in the region for open, standardised device integration on an enterprise-wide basis. It will enhance the integration and application of various fieldbuses and devices, in addition to promoting widespread implementation of standards-based automation solutions.

FDT Group is a member-based, international, non-profit corporation that promotes the proliferation of an open standard for network and asset integration. It is recognised as the defacto integration standard established and adopted by millions of automation stakeholders around the globe.

ISA 103 Chairman, Ian Verhappen, who oversaw the ISA committee’s unanimous approval, thanked members dedicated to reviewing the ISA 103 standard in order to allow the region to adopt modern automation technology integration solutions.

Rockwell Automation acquires Emulate3D

Rockwell Automation has acquired Emulate3D, an innovative software development company whose products digitally simulate and emulate industrial automation systems. By using accurate simulation models to improve systems planning and decision-making, followed by emulation trials that test the control system before installation, Emulate3D’s software enables customers to test machine and system designs before incurring manufacturing and automation costs, and committing to a final design.

Rockwell Automation will add Emulate3D’s technology to its digital design portfolio to deliver solutions to automotive, logistics, material handling, and other industrial applications. Software will be sold as Emulate3D by Rockwell Automation, as part of Rockwell Automation’s FactoryTalk DesignSuite.

Don’t miss the April issue which will feature

- Process variable measurement
- Oil & gas
- Wireless & telemetry
- Water, wastewater & waste
- IT in manufacturing (incl. Industry 4.0/IoT & AI)
- Environmental control & monitoring
- Control systems (incl. PLCs, DCSs, scada & HMI)
- Data logging & recording
- Electrical power & energy-efficient systems
- Technews Industry Guide: Maintenance, Reliability & Asset Optimisation 2019

www.instrumentation.co.za
Siemens launches Digital Mining Incubator with Wits University

Mining remains a critical player in the macro-economic landscape of South Africa. But government, business, labour and civil society need to ask how they can align a ‘here-and-now’ emphasis on job creation, while focusing on digitalisation. This critical factor will enable South Africa to become more competitive globally and ensure that we increase digital skills in the industrial sector, without disadvantaging mining as a viable job enabler in the future.

Digitalisation in the mining industry goes well beyond the automation of production. It allows new approaches to business processes and creates real opportunities to merge the digital and physical worlds. The value of data, coupled with machine learning, artificial intelligence and additive manufacturing, offers South Africa a remarkable opportunity to create smart mines of the future. For example, imagine intelligent machines able to adjust operating parameters based on information received from other machines. These advanced capabilities will boost production and translate into profits. What must be addressed though, is how investors and technology leaders can also become educators and skills developers.

The Digital Mining Incubator is a co-creation space focused on developing mining engineering competence. The incubator is integrated into the Wits Tshimologong Digital Innovation Precinct and is aimed at upskilling young individuals who have an interest in the mining sector, as well as disadvantaged individuals interested in participating in the future of mining. Together with mentors from Wits, Tshimologong and Siemens, students will be enabled with the necessary tools and skills to transform and develop the South African mining sector.

"At Siemens we believe that there needs to be genuine investment towards the localisation of technology and the development of digital talent to enable a strong, future-oriented workforce. The integration of digitally-adept youth into the world of work will not only inspire new ideas, it will also transform and advance industries."

For more information contact
Keshin Govender, Siemens South Africa, +27 11 652 2412, keshin.govender@siemens.com, www.siemens.co.za

IS³ extends portfolio to include AVEVA’s Engineer, Construct and Procure software

IS³ - Industry Software, Solutions and Support recently signed an extension to the contract with AVEVA, which now extends its portfolio to include the Engineer, Construct and Procure software solutions.

AVEVA is a global leader in engineering and industrial software. Its expertise and innovation have put it at the heart of the world’s most ambitious projects, biggest companies, and greatest challenges. The Engineering and Design software portfolio maximises the ability to create, update and maintain 3D models, engineering data and deliverables, improves collaboration between multi-discipline teams, and manage project obligations and suppliers more effectively.

The Procure, Construct and Handover portfolio enables efficient project management with integrated resource awareness at every stage of the procurement and construction phase.

"At Siemens we believe that there needs to be genuine investment towards the localisation of technology and the development of digital talent to enable a strong, future-oriented workforce. The integration of digitally-adept youth into the world of work will not only inspire new ideas, it will also transform and advance industries."

For more information contact Clarise Rautenbach, +27 11 607 8473, clarise.rautenbach@is3.co.za, www.is3.co.za

Check out our new website

The Technews web development team has been grafting behind the scenes to remodel the way we connect you to the latest industry news, product innovations, opinion pieces and application stories that characterise South African Instrumentation and Control.

The fully ‘responsive’ design of the new site ensures that no matter whether you are viewing on a PC, tablet or mobile phone, the page automatically adjusts to suit the size and shape of your screen. No more need for mobi versions, just a fresh new content arrangement and a bunch of easy-to-use features that link the magazine articles with the Buyers’ Guide. If you haven’t checked in already, head on over to www.instrumentation.co.za and let us show you what we’ve got.

For more information contact Graeme Bell, Technews, +27 11 543 5800, graeme.bell@technews.co.za, www.instrumentation.co.za
At The International Architecture Awards
in Athens, SKF won a design award for
its Sven Wingquist Test Centre. With over
1000 entries from across 31 countries, the
awards are globally recognised as a high
accolade for any company. The judges
complemented SKF on the uniqueness
of the design, its effect on the users and
visitors of the building, as well as the
extraordinary correlation between the
Centre's purpose and its architectural
implementation.

The pioneering facility, based in
Schweinfurt, Germany is used by SKF
for large-scale bearing testing. It was
designed by architects Tchoban Voss
based in Hamburg. Frank Focke, associate
partner at the company said: “It fills us
with pride that we were able to help
this unique facility achieve a globally
recognised design. This is where, among
other things, large-size bearings for wind
turbines are tested and that is why we
have chosen a strikingly slanted, literally
warped form as the basic architectural
motif. In addition, this dynamic design
also indicates the forces being unleashed
in the interior of the building.”

Two new test rigs in the belly of the
twin building can dynamically apply
forces to huge bearings in all directions.
These combined forces are many times
higher than those of comparable facilities
and also permit significantly higher
test speeds than previously possible.
“This ensures very fast test cycles, which
ultimately saves energy,” reports
Dr. Martin Göbel, manager Global Testing
at SKF. “In addition, the findings from the
tests will enable us to produce optimised
generations of large-size bearings much
more efficiently in the future.”

A strong sense of sustainability is
echoed throughout the building. For
example, in the selection of acoustic wall
cladding and ceiling mirrors, as well as in
the lighting concept and numerous other
equipment details. In addition, waste
heat from the test facility is used for heat
recovery in the building itself, as well as
for an adjacent SKF large-size bearing
factory.

The International Architecture
Awards were presented by the Chicago
Athenaeum: Museum of Architecture
and Design and the European Centre
for Architecture Art Design and Urban
Studies.

For more information contact
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www.skf.com

BMG and Eaton Hydraulics
enhance partnership agreement
The well-established partnership between BMG and Eaton
Hydraulics has been enhanced with the recent accreditation
of BMG’s Johannesburg head office facility – BMG World – as
the exclusive Eaton Hydraulics warranty centre in Africa.
“BMG is now authorised to provide technical assessments
of Eaton Hydraulics warranties, boosting support to
customers,” explains David Dyce, business unit manager
Fluid Technology, BMG. “The local market will benefit from a
conveniently situated evaluation and repair facility for Eaton
Hydraulics products, which offers a dependable service in line
with stringent international Eaton standards. The warranty
service is enhanced by the quick supply of Eaton Hydraulics
components and spares for fluid power projects in all sectors.

“BMG’s analyst, Nicky Muller, who has attended official
training at the Eaton Hydraulics Eden Prairie facility in the
USA, heads up the warranty centre’s local team, which has
benefited from a recent skills development programme.”

Through this agreement, BMG’s national field services
facility has extended its specialist skills to support Eaton
Hydraulics and BMG customers. The mobile field service team
conducts breakdown and routine maintenance on-plant
and carries out troubleshooting and advises on possible
productivity improvements, for the highest level of plant
output and reliability.

Eaton Hydraulics offers a comprehensive standard
warranty on all products. This guarantee covers against
defects in materials and manufacture for 12 months from
the date of dispatch. The extended warranty option offers
customers a warranty period of up to five years from the date
of dispatch, with all other conditions as given in the standard
warranty.

The BMG team, with in-depth knowledge about the Eaton
Hydraulics product range, coupled with advanced technical
skills and an extensive distribution reach, is well positioned to
represent Eaton Hydraulics in Africa.

For more information contact Lauren Holloway,
BMG, +27 11 620 7597, laurenhy@bmgworld.net,
www.bmgworld.net
KZN: The investment province

The real manufacturing gross value added (GVA) for KwaZulu-Natal was estimated at R80.8 billion, making it the second highest contributor to the South African GVA behind Gauteng. This is according to MEC Sihle Zikalala. Added to this, government’s infrastructure expenditure plan for the province is tagged at over R200 billion over the next seven years, further increasing the attractiveness of doing business with companies located in KZN.

The infrastructure programme involves road construction, air freight, rail, and the provision of water sanitation, services and electrification, as well as a major focus on the maritime industry. The message is clear. The KZN manufacturing sector is in an admirable position to gear up and take advantage of the opportunities that will arise as a result of these investments.

In the recent BRICS Round Table Discussion, KZN was specifically highlighted for a number of reasons, including the rapid growth of Richards Bay, the province’s access to two large ports, as well as a burgeoning Industrial Development Zone. In addition, the country’s automotive industry is aiming to increase the local content of assembled cars from around 38% and wants to double its production to 1.2 million vehicles by 2020.

There is ongoing pressure to procure locally and with more than R50 billion worth of components required, there is a huge potential market for local manufacturers. Similarly, there is a strategic path for the suppliers of industrial technology to these manufacturers.

“It is critical that local businesses find proactive ways in which to fight any negative influences caused by the economic downturn,” says Nick Sarnadas, portfolio director at Specialised Exhibitions Montgomery. “We encourage these businesses to take a stand at the region’s largest industrial technology exhibition, where they will be able to reach their target market in a focused and concentrated way. The KwaZulu-Natal Industrial Technology Exhibition (KITE), which is being held from 24-26 July at the Durban Exhibition Centre, takes the guesswork out of networking.”

Reaching industry decision-makers is a task often fraught with complications and frustrations. “Since the goal is to speak to the right people, the ones who are in a position to authorise procurements, it is of little use to take a shotgun approach,” adds Sarnadas. “KITE has been the region’s premier platform for industrial technology equipment and services providers to interact with manufacturing companies and government agencies for the past 38 years. We have a number of packages customised to suit individual needs, including sponsorship opportunities and seminar speaking slots.

For more information contact Keraysha Pillay, Specialised Exhibitions Montgomery,
+27 10 003 3175, info@kznindustrial.co.za, www.kznindustrial.co.za

Rittal’s aftersales service plan

When investing in products and systems, it is easy to overlook the maintenance and aftercare associated with these purchases. More than just the initial investment, companies are encouraged to look at the total cost of ownership from the outset.

Service manager, Jason Osner, explains Rittal’s aftersales service offering: “Rittal offers customised software and services for planning, project management, configuration and monitoring.

“In South Africa, our service offering has grown in popularity and this is because customers are looking for a long-term partner rather than a supplier. Thanks to a customised service plan offering, businesses are able to establish a relationship with our trusted team and reap the rewards of improved efficiency.”

Customised service contracts can be selected as standalone offerings, or as a packaged deal. Rittal efficiency and service checks on popular offerings, such as its cooling units, reveals the maintenance status and potential savings, which helps to maintain a high level of efficiency. In addition, customers benefit from factoring the costs into their budget in advance, rather than having expensive unplanned service costs creep in.

In terms of the service plan offering, regular checks are conducted on Rittal components for optimised performance. Here, Rittal offers efficiency checks by performing individual analysis using equipment data and other relevant operating parameters. By running this data, it can determine potential savings and pay back periods, and provide input on how best to improve efficiencies. Regular onsite service checks are also conducted and detailed reports provided. In addition to regular maintenance, fault repair and spare parts management can also be covered.

“Rittal strives to minimise downtime and boost efficiency through partnerships that benefit cost-saving and improve productivity,” concludes Osner.

For more information contact Rittal South Africa,
+27 11 609 8294, info@rittal.co.za, www.rittal.co.za
Mitsubishi Electric supplied a major video wall installation in South Africa for Transnet Pipeline (TPL), the division of state-owned Transnet that oversees all of South Africa’s strategic fuel pipeline assets. The recently opened Pipeline National Operating Centre at Pinetown, Durban, amalgamates all of TPL’s security, management and planning functions into a single state-of-the-art facility designed to increase efficiency and responsiveness. The new control centre also acts as the master control room for Transnet’s New Multi-Product Pipeline (NMPP), a 555 km-long trunk line that transports several grades of diesel, petroleum and aviation fuels, from Durban to Johannesburg.

The installation, believed to be the largest ever Full HD video wall project in Africa, consists of three DLP cube systems. Two systems are comprised of Mitsubishi Electric’s 70” VS-70HEF120 both in an 8 x 3 configurations, display scada and security content respectively. The third system consists of a 3 x 2 60” VS-60HEF120 system used for general display purposes. Control is provided by three Jupiter video wall controllers. The two large video walls are controlled by Catalyst 4000 controllers, and a single Catalyst 4500 manages the general 3 x 2 video wall. Both the Catalyst 4000 controllers were configured with 24 output channels and 48 input channels. A total of 48 sources are available to be displayed on both video walls simultaneously at any given moment in time. This configuration ensures a 100% availability of all information should any of the main video walls fail. The Catalyst 4500 is equipped with HDCP compliant input and output channels that support a wide variety of AV hardware.

All three video walls are installed in the same control room, with the two main walls located opposite each other. All the processing hardware is sited in the server room located in the basement. Fibre is used for all display and output cabling, 54 channels in total.

Mitsubishi Electric 120 series video walls are engineered to provide exceptional reliability and long operational lifespans in mission-critical applications. The air-cooled projection engine offers up to 100 000 hours of continuous operation and requires no routine maintenance, ensuring low operating costs. The LED light source offers redundancy for total reliability and responsiveness. The new control centre also acts as the master control room for Transnet’s New Multi-Product Pipeline (NMPP), a 555 km-long trunk line that transports several grades of diesel, petroleum and aviation fuels, from Durban to Johannesburg.

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This was one of four control room projects nominated for a 2019 Inavation Award http://www.inavationawards.com/

For more information contact De Villiers Kruger, EEU Taltronics, +27 82 784 9004, div@eeutal.co.za, www.eeutal.co.za.

According to Eric Bruggeman, CEO at the South African Capital Equipment Export Council (SACEEC), some 50-70% local content in products would be considered acceptable to ensure the future growth and sustainability of the manufacturing sector.

At the Electra Mining Africa exhibition in September 2018, Bruggeman said that during the third quarter of 2017 the local manufacturing sector had experienced its highest turnover in some time. Capturing 32% of the local pie, the sector proved that it is a serious contender, running a close second to general trade.

SACEEC currently has 240 members and over the past three years these members have contributed over R43-billion per annum to the local economy. Bruggeman cited Transnet’s delayed pipeline project as a great example of how local manufacturers could help to build the country’s economy and reduce unemployment. The project, which has been plagued by numerous delays, was finally completed in early 2018. A local manufacturer of valves received a substantial order to replace the existing valves after products from two different sources had failed to produce a positive outcome.

“This is especially relevant given the fact that local procurement specialists still insist on sourcing products from abroad when local alternatives have, in fact, proven to be superior in terms of performance and reliability,” explains Bruggeman. “In a nutshell, the unnecessary importation of goods that are available from local manufacturers is costing South Africa jobs and urgently needs to be addressed.”

Determined to drive inclusion for local manufacturers, as part of both the local and international supply chains, SACEEC has partnered with Specialised Exhibitions Montgomery, to launch the Local Southern African Manufacturing Expo (LME). The exhibition will be held at the Expo Centre, Nasrec, from 21 to 23 May.

In addition to the exhibition, SAIMechE will be hosting free-to-attend seminars and there will be an area (Association of Representatives for the Electronics Industry) pavilion, while the Artisan Training Institute (ATI) will host the Skills Development Zone. Other Association partners include International Steel Fabricators (ISF), the Lifting Equipment Engineering Association of South Africa (LLEASA) and the Mining Equipment Manufacturers of South Africa (MEMSA).

“We are excited at the potential that the Local Southern African Manufacturing Expo will provide for local manufacturers to market themselves to a captive extended audience,” says Bruggeman.

“The exhibition will not only allow them to showcase their products and services in an interactive manner, but will equip them with the skills needed to drive entrepreneurial innovation and aftersales service.”

“Industry has shown great interest in the exhibition and stand sales have been brisk,” concludes Charlene Hefer, portfolio director for Specialised Exhibitions Montgomery. “We do still have a few stands available and urge local companies to seize this strategic opportunity.

Interested parties can contact our sales team to customise a package that will build their brand quickly and effectively.”

For more information contact Natasha Heiberg, Specialised Exhibitions Montgomery, +27 10 003 3083, info@localmanufacturing.co.za, www.localmanufacturingexpo.co.za
Africa Automation Fair is the premier focused platform for the Automation and Smart Control Industries in the Southern Hemisphere.

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Johannesburg, Ticketpro Dome

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www.connectedindustries.co.za

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“Transport is one of the largest causes of greenhouse gas emissions, particularly in South Africa, which has a high ratio of cars, taxis, buses and trains all using fossil fuels,” says Barry Bredenkamp, general manager Energy Efficiency for the South African National Energy Development Institute (SANEDI).

“Green fuels are being developed for diesel consumers, particularly buses and electric cars are moving from drawing boards to parking lots. Electric vehicles make sense economically, again when viewed over the life cycle of the car. The initial cost is outweighed by no services and a replacement of a battery every couple of years. Already car parks are installing electrical vehicle charging outlets and, what adds to their energy efficiency is that these are mostly solar powered, thus reducing electricity usage.

“The International Energy Agency (IEA) recently released its ‘Efficient World Scenario’, which highlights the potential for transport energy demand to remain flat between now and 2040, despite doubling activity levels. At an end-use level, the average passenger car could be as efficient as today’s best hybrids and over 40% of the global car fleet could be electrified. The annual rate of efficiency improvement for trucks can rise to 1.5% with current and planned policies, but in the Efficient World Scenario, the annual improvement rate could be over 2.5%. Non-road transport (aviation and shipping) could see annual efficiency improvements of 3% between now and 2040.

“The next big jump will be provided by LED lights. Essentially motherboards with a bulb, many of these lights are already marked as Li-Fi enabled. Li-Fi uses the light spectrum, as opposed to Wi-Fi, which uses the radio spectrum. This spectrum is already overcrowded across the world because of the rapid uptake of Wi-Fi. Li-Fi will be broader, faster and will enable anyone with an LED light to be able to connect to the world. Streetlights, traffic lights, shops, offices will all act as routers and this will change communication in ways we cannot even begin to imagine.

“What is needed is a radical change in human behaviour – one that looks at the long term effects of purchasing an item versus the immediate costs, that weighs up our children’s air quality against coal power stations; that understands that reducing water and waste also contributes to energy efficiency,” concludes Bredenkamp.

For more information contact Victoria Knibbs, Litha Communications, +27 11 484 7663, Victoria@lithacommunications.co.za, www.lithacommunications.co.za

SEW-Eurodrive a preferred supplier in the Steelpoort area

The Nelspruit branch of SEW-Eurodrive is not only an industrial gear hub for southern Africa, it also supplies drive solutions, motors and gear units for the mining industry in the region. The main differentiator in this highly-competitive market segment is the combination of its product reliability and aftersales service assistance, points out branch manager, Jonathan McKey.

Such has been the company’s success in the region that it is now a preferred supplier to about 85% of mines in the Steelpoort area alone. “Our footprint has expanded steadily since we began by supplying a handful of gear units,” comments sales representative Nico Schutte. “The main applications products in the mining industry are conveyor, agitator, separator and ball mill drive units.”

SEW-Eurodrive has made inroads into the mining industry due to its affordable, modular, and highly-reliable complete drive solutions. The M-series, MC-series and X-series are ideal to meet the highest demands for quality, reliability, and performance. The product ranges have been optimised for a range of drive characteristics, allowing for simple machine design through easily added options and mounting parts.

At Electra Mining, the company unveiled ‘The Future of Mining’, when it displayed its latest mechatronic industrial gear (MIG) unit. This represents the revolutionary convergence of gears, motors and decentralised inverters in a single handy package.

It represents an exciting future technology for the mining industry, especially with the increasing trend towards automation to cut costs and boost productivity. The MIG unit is an innovative solution that ensures practical benefits and profitability across all stages, from the installation right through to maintenance.

Long service life is guaranteed due to highly efficient lubrication and sealing, which also cuts down on maintenance requirements. Easy mounting and installation are facilitated by advanced features such as extended bearing distance and an axial thrust bearing arrangement on the output shaft.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za

Jonathan McKey.
News & Events

Dupleix Liquid Meters (DLM) is proud to announce that it has recently been appointed as the Rotex solenoid valve range distributor for southern Africa. Rotex was founded in 1967, in conjunction with a Swiss technology partner that specialised in solenoid valves.

DLM has been authorised to offer sales and expert advice on their fluid control systems which consists of solenoid valves, pulse jet valves, angle seat valves and specialised valves manufactured to the highest, certified international standards. Rotex solenoid valves can be used in a wide range of industries and applications.

The interchangeability of Rotex’s solenoid components presents a distinct advantage to DLM customers, by reducing their stock inventory and introducing flexibility. Rotex has spent years developing components that handle the stresses of heat and insulation better, resulting in solenoid valves that last longer. Rotex offers its customers more flexibility in application solutions to meet their demands.

DLM sees Rotex as an opportunity to develop and grow its installed base in southern Africa. To achieve this, DLM will be investing in key inventory and distributing these products through its broad network of sales offices and agents.

For more information contact Dupleix Liquid Meters, +27 11 457 0500, sales@dlm.co.za, www.dlm.co.za

Henry Craukamp has been appointed as managing director of Rockwell Automation for sub-Saharan Africa, effective 1 January 2019. Henry will now be responsible for leading the business in sub-Saharan Africa and for implementing the Rockwell Automation global and pan-EMEA sales strategies and initiatives, especially bringing The Connected Enterprise to Rockwell Automation customers across the region.

Henry succeeds Barry Elliot who successfully led and advanced the Rockwell Automation business during the past six years. The company thanks Barry for his strong business contributions and wish him continued success in his new role as VP Enterprise Accounts – Heavy Industries. He will be relocating to the USA in early 2019.

Henry has been employed at Rockwell Automation since January 2008. He has held various positions from application engineering to business development for the Power Control Business. In June 2015, he was appointed the EMEA South Region sales manager where he gained extensive knowledge of the Rockwell Automation EMEA organisation through leading the Power Control Business in Southern European and African regions.

Henry’s background is in electrical engineering and automation. He attained a National Diploma in Electrical Engineering from Technikon Witwatersrand, completed a MDP at the University of Witwatersrand and MBA from Henley Business School (Reading University UK). His breadth of experience in the sub-Saharan African market and proven success in prior roles will help Rockwell Automation to continue to expand its reach and grow market share.

For more information contact
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Rotex Automation Limited

Appointments

The Magnet Group has appointed Ebrahim Mahter as stores supervisor in Johannesburg.

The Magnet Group has appointed Ashraf Hoosen as sales manager in Johannesburg.

Hytec South Africa has appointed Freddie Kühn as sales director.

Hytec South Africa has appointed Klaus Marggraff as business development manager for Africa.
Automation education and training vital for South Africa’s development

By Johan Maartens, chief operating officer, SAIMC.

Part 1: Our ability to provide the skills of Industry 4.0 is wanting.

In the automation industry, the education and training provided at universities and colleges have, for various reasons, drifted away from industry requirements. The SAIMC plans to close this gap, whatever it takes, including participating in a global effort by the Automation Federation to establish a distinct automation engineering discipline.

Academic institutions have been producing high-calibre graduates for many years. So what has changed? Well, a few things have:

1. The IRR (Institute of Race Relations) reports in The South African Education Crisis, May 2018: “In 2015, the Organisation for Economic Co-operation and Development (OECD) ranked the education systems of 76 countries from around the world. The rankings were determined by examining how well students performed in science and mathematics tests. South Africa performed poorly. Of the 76 studied this way, the OECD said that the country [South Africa] had the 75th worst education system. The only country that ranked lower was Ghana.”

2. “Education is like building a house, education being the foundation,” said Marc van Pelt, MD of Pepperl+Fuchs. “Weakening the foundation weakens the structure, making it extremely difficult for South Africa to adopt Industry 4.0 in particular.”

3. The current products of the education system (graduates) have learnt the basics (some say, learnt how to learn). This is true, but nowadays industry also needs graduates to be knowledgeable about specialised technical equipment, i.e. industry no longer has the resources to teach them about this, they must already know it.

4. Production has had to become more efficient and equipment more specialised in an environment where fierce competition continues to erode profit margins. Industry can no longer afford the luxury of training new graduates in the use of the technical equipment. However, industry is willing and able to teach them about the application of technology in specific processes.

5. Many educators have very little or no industry experience, while those who served in industry years ago are no longer technically ‘current’. Inevitably, this means they revert to teaching the basic material, which these days can easily be found through YouTube or Google.

6. Industry has mostly withdrawn from the education system, leaving academic institutions to fend for themselves. This means they often lack the latest technology platforms for practical work, in addition to the educators themselves being unfamiliar with them.

Academic institutions cannot keep pace

Technology is evolving so fast that many academic institutions are not able to keep up – both in knowledge and in facilities. While it is still true that postgraduate work at certain institutions is creating sophisticated mathematical models and theories that are used by industry, a far bigger percentage of patents and new innovation now originates from industry itself – creating new revenue streams every year.

The net result is that the tertiary and education system appears to be so bogged down in policies and procedures that it is unable to cater to fast-changing industry requirements.

Of course there are exceptions: some good examples include the students who participate in challenges, like the one for solar powered vehicles, and other competitions. These students have skilled themselves in when, where and how to use the latest technology, rather than simply being aware that it exists. In addition, they are ably assisted by educators who have not lost their passion to stay abreast of the latest technology developments.

Other examples are education institutions that experiment with the latest technologies, while assisted by industry. Such institutions advance innovative ways to produce synthetic limbs for disabled people, or develop new models for wind turbines, automatic tool trays, coffee bean roasters, etc. As examples of what can be achieved if educators and industry work together, such activities should be incorporated into basic education and not be left to the handful of students that volunteer their services.

Unfortunately, exceptions alone cannot bring a country to terms with the latest industry revolutions. As one educator put it: “We battle to create relevant new courses as first a CESM (classification of educational subject matter) code must be assigned.” While we need some degree of regulation to keep the system consistent, future regulations must be designed to produce graduates with the skills needed to keep South Africa a competitive manufacturing nation through the fourth industrial revolution.

Part 2 in next month’s issue will examine the importance of industry involvement in education.

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• Maintenance and Repair Staff

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HYS11 – Basic Hydraulics
Cape Town 15-17 Apr 2019

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Cape Town 24-26 Apr 2019

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SMC

• Mechatronic Engineers

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Johannesburg 3-5 Apr 2019
Port Elizabeth 10-12 Apr 2019

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VEGA

• Automation Engineers

Measurement Solutions – Processing
with Level, Pressure and Nucleonic
Roodepoort 11-13 Jun 2019

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YOKOGAWA

• Automation Engineers

VPEF – Centum VP Essentials
Randburg 3-5 Apr 2019

VPOF – Centum VP Engineering
Randburg 8-12 Apr 2019

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Trends in plant monitoring

Early last year, the interest from many large automation and sensor suppliers focused on condition monitoring, for example, using wireless communications to monitor the condition of the motors and bearings on rotating equipment. This trend continues, and several relevant stories are featured in the magazine this month.

What I found of interest was that Yokogawa took a slightly different approach to condition monitoring and started a form of collaboration with two established sensor suppliers who also used the ISA100 standard for the wireless system – where Yokogawa was the leader in the associated control systems. One collaborator was Bently Nevada, which provided vibration monitoring systems for bearings, and the other, Spirax Sarco, which developed its own sensors for monitoring steam traps. In parallel to this activity, in its research laboratories, Yokogawa was working away on two other development routes, to establish a coordinated approach to IIoT condition monitoring for multiple sensor systems.

Sushi sensors

The first research area for Yokogawa was to develop the ‘Sushi’ sensor. Very appropriate for the Japanese company, one might think! But this sensor development started as far back as 2007, when the possibilities for industrial wireless sensors were just developing: the press was first told of the research project in 2016. The models shown then had the appearance of large bugs, in various colours – blue, yellow and silver – mainly the Yokogawa colours. But these were empty models, purely built to illustrate their concept. The Sushi sensor design idea is for a small, sealed, relatively low cost IIoT sensor, to be suitable for use in even harsh plant locations, in large numbers. Each is to have its own aerial built-in, and provide data via a wireless link. The first actual production versions of these units were launched in Japan and have been in use since last March, measuring temperature and vibration. Now the Sushi sensors are to be launched in Europe in March, and will be rolled out in other areas through the year.

The Sushi sensor is equipped with batteries for life, and is a very low power device: so the wireless link used is LoRaWAN (from the LoRa Alliance), a low-power wide-area (LPWA) wireless data communications protocol. These link to a plant server, or to the cloud, via a LoRaWAN gateway. In addition, the sensors support near-field radio communication (NFC), which allows sensor programming and local sensor condition monitoring – from a smartphone, via a dedicated App.

Yokogawa sees the major potential applications for Sushi sensors to be in measuring the vibration and temperature of plant equipment, such as compressors, pumps, motors, fans, and conveyors, much the same as the major condition monitoring markets for conventional vibration sensors. The Sushi sensors will form part of the OpreX industrial automation offering, and will use Yokogawa applications developed for data analysis using the IIoT.

Pump applications

The second research route at Yokogawa has been in collaboration with a Japanese pump manufacturer, active over the last few years. From this, their engineers have developed a new concept for pump wear monitoring, which will also be used for the emerging IIoT analysis architecture. The collaboration was with the Iwaki Co, which manufactures magnetic drive pumps widely used on various types of aggressive liquids in chemical, pharmaceutical and food plants.

Now being launched is a ‘Remote Pump Monitoring Service’ for initial trial by interested users, to prove the efficiency of the concept. With this service, operating data such as the current being drawn by a pump, pump discharge pressure and flow rate, temperature of the conveyed liquid, and tank empty/not empty status will be collected via an Iwaki pump protector and transferred to the cloud, using the new Yokogawa IIoT infrastructure.

Also launched this year, Yokogawa has developed a pump cavitation detection system, which will provide early warning of plant conditions that are liable to damage the pump, and cause increased noise and vibration. Using the DPharp EJX110A differential pressure transmitter, monitoring the pump at 100 msec intervals, Foundation Fieldbus communications transmits the data for analysis to the Yokogawa cavitation detection software loaded into a Stardom controller.

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
To navigate successfully through today’s global wave of digital transformation and make disruptive technologies work for them, manufacturers, municipalities, utilities, and all other organisations will need to roll out just the right mix of technologies at just the right time. They will need to drive and manage change in processes, people, ecosystems, and technologies while keeping safety and cybersecurity at the forefront.

Everything is becoming more connected and intelligent. Streetlights, cars, gas turbines, and thermostats stream data. Buildings, refineries, oil platforms, mines, and wind turbines are optimising asset and operating performance. Parking meters and distributed power grids deliver value to both consumers and operators. Design software can link to additive machines to print parts directly.

There are countless ways to conduct the digital transformation journey, multiple technologies and suppliers to evaluate and endless choices to make along the way. This was the focus of the 23rd Annual ARC Industry Forum from 4-7 February in Orlando Florida.

Press announcement details
Announcements from vendors at the media session included:

AVEVA: CEO Craig Hayman discussed the significant developments made since the merger of AVEVA with Schneider Electric’s Industrial Software Business in 2018, its commitment to drive digital industrial transformation, and the announcement of a major update to its entire visualisation product portfolio through its cloud subscription model. The new update is designed to provide its customers with greater flexibility in licensing, configuration and deployment.

Bedrock Automation: Albert Rooyakkers, founder and CEO, announced a new offering that protects legacy systems, supports MQTT and manages human access to controls. He discussed how the company continues to push the automation performance envelope by bringing Open Secure Automation to the edge.

HIMA: Dr. Alexander Horch, VP R&D and product development, introduced the company’s Smart Safety Platform with built-in cybersecurity. By tailoring hardware and software to each other, it enables operators to reduce the complexity of their systems and buy only what they need. The platform can also incorporate existing systems to help lower operating costs and offer high security of investment.

Honeywell: Sam Wilson, global product marketing manager, Honeywell Industrial Cybersecurity, addressed the ‘David vs. Goliath’ nature of current industrial cybersecurity, including the big risk presented by small, removable devices. He provided an update on the state of common and overlooked cyber threats, insights into customer experiences, and Honeywell Process Solutions’ current technological and software developments for industrial cybersecurity.

Inductive Automation: Don Pearson, chief strategy officer, and Carl Gould, co-director of software development, previewed the latest version of Ignition 8, Inductive Automation’s industrial automation platform. The new system offers expanded functionality, web technologies, enterprise-empowering features, and a next-generation visualisation system called the Ignition Perspective Module, which the company designed to empower users to create appealing, mobile-responsive industrial applications that run natively on any mobile device and any web browser.

L+T Technology Services: COO Samir Bagga and Akshay Chandra, senior manager, strategic marketing initiatives, unveiled the company’s ‘Factory D.O’ solution. According to the company, this is a one-stop solution encompassing wireless material tracking, machine vision-based quality inspection, digital twin, energy optimisation, collaborative robotics, integrated 3D modelling/virtual reality, and other proprietary technologies and specialised know-how.

Schneider Electric: Chris Stogner, director of Schneider Electric’s EcoStruxure Triconex safety offering, and Farshad Hendi, global safety practices leader in the industry services business, introduced EcoStruxure Process Safety Advisor, a solution that consolidates and contextualises past, present, and future operating risks and performance data for the entire enterprise across multiple sites and geographies, right down to the asset. They discussed the previously opposed concepts of safety and profitability in many industrial plants and how, by leveraging Schneider Electric’s EcoStruxure IIoT-enabled system architecture and safety applications, end users can create a closed-loop safety model to monitor any gaps between the design and performance of their operations.

Siemens: Bill Boswell, VP of marketing, cloud application solutions – MindSphere, announced new solutions, partners, and infrastructure for leveraging the IoT with Siemens’ MindSphere cloud-based operating system.

Yokogawa: Satoru Kurosu, director, premium solutions and service business, and Oscar Santollani, VP, visual MESA software business at KBC (a Yokogawa Company), discussed how the company can help customers address their energy-related carbon emission reduction goals with its end-to-end energy optimisation solution and provided details about the new release from KBC of the core Visual MESA Multi-Period Optimiser analytics technology, designed to help reduce costly uncertainty in energy planning, scheduling, and trading over multiple time periods.

For more information contact Paul Miller, ARC Advisory Group, +1 781 471 1141, pmiller@arcweb.com, www.arcweb.com
Sitting here writing another article on my cellphone, realising it’s 2019 and we have technology available to us that people could not even imagine when I was born, is quite a revelation. A sobering moment as we look at the world around us and see the opportunities that are opening up. Opportunities that will use data in ways that right now we cannot fully comprehend.

Sadly though, the technologies that are evolving can also change the world for the worse. This is not new, there are many examples in history where technology that was developed for the benefit of society, was used by despots to cause catastrophic harm.

As professionals in the automation fraternity, we have to find a balance. On the positive side, ubiquitous connectivity and data availability bring us the benefit of cloud computing and the ability to manage anything from anywhere. Today we have the ability to automate almost any mundane task, be it work or home related. If we resist automation our competitors may beat us to it and we risk being at a disadvantage in the marketplace. We have access to the technology that others have developed, which in many instances is freely available online. But remember, if it is free online there is almost certainly a risk. So ensure that you understand that risk, particularly if it involves data security. Do this in order to reach a level of understanding that gives you the freedom to choose your own path going forward.

It is a fascinating topic, and also a very necessary one. I recommend that you be sure to evaluate your skills development and growth in line with emerging technology trends. And above all, make sure you stay on top of cybersecurity developments. Cyber-attacks are the downside of our connected society. Be sure you are in a position to protect yourself in both your personal and professional capacities.

SAIMC 2019 AGM
The AGM will take place at Park Inn Hotel, Sandton on 8 March at 15h00, where the newly elected council will be announced. All members are invited to attend and be part of the future decision-making process. We value your insights.

Please direct enquiries to admin@saimc.co.za.

Yours in automation,
Annemarie van Coller
The highlight of 2018 was the end-of-year dinner enjoyed by members and the committee at Cheers in Irene. We were fortunate to have Ina and Johan Maartens join us as well. Another noteworthy item was the meeting between Johannesburg and Tshwane branch committee members to strategise around future collaboration opportunities. This meeting was also attended by vice president Pregs Naidoo. Topics discussed included scorecards and focus areas for 2019, newly created subcommittees i.e. Societal (focus on community, schools etc.), Golf Days, Site Visits, Training Days and finally the Relationships Committee (the drive to get more members, end users, patrons etc.). It is important to note that the two branches will be working closely across Gauteng to leverage any synergies that we feel will add additional value to our patrons and members. A joint call for members to support and assist the initiative will be issued shortly.

AGM

The AGM was held on 6 February at Centurion Country Club and was attended by a good number of people, some from outside the industry. We were also fortunate to have Pregs Naidoo and Johan and Ina Maartens join us for the event. The following people form the new committee: Petrus Klopper, Mark Tatlor, Nico Marneweck, Muhammed Babamia, Thabo Lekgouane, Johan Maree and Sebastiao Domingos. Roles will be defined at the next committee meeting.

The branch thanks Jurie Weideman and Archie Pitso who have decided to stand down. At present, the challenge for the new committee is to increase funding along with members and patrons, so that we can make an evermore positive contribution in our region.
Durban branch

The AGM was held at the Durban Country Club on 6 February. A respectable audience of 23 members, six Patrons and one student member, gathered to attend the proceedings which ran smoothly under John Owen-Ellis’ direction.

Treasurer Kevin McElroy presented the accounts, and although of course the SAIMC is a non-profit organisation, the Durban branch books were deemed healthy with some good cash reserves that will enable us to fund non-sponsored technology evenings, training and other necessary industry events. (The Durban branch specifically keeps a few dates during the year for non-vendor associated topics with the aim to get more end-users involved, and keep the members interested through relevant technical information)

There were no queries on the accounts, which were duly accepted before chairman Hennie Prinsloo took the stage and gave a summary of the busy and successful year that was 2018, culminating in a vote of thanks to the committee for their hard work in attaining Platinum status in the overall classification. A voice from the floor responded with a reciprocal vote of thanks, acknowledging Hennie as the driving force and ‘Chairman Formidable’. Rousing applause echoed the sentiment.

The branch was honoured and grateful for SAIMC president Annemarie van Coller’s presence at the AGM. She gave a refreshingly informal presentation on what has been happening at council level, which turned into a lively discussion and Q&A session. Annemarie stressed that she needs feedback from all the members on priorities and problems within the SAIMC, and wants to work personally with all the branches and members.

Electronic voting had taken place earlier and John Owen-Ellis announced the results of the election. The new committee is as follows: Hennie Prinsloo, Jane van der Spuy, Dean Trattles, Kevin McElroy, Paul Sikhakhane, Howard Lister and John Owen-Ellis.

Hennie Prinsloo – Chairman
Paul Sikhakhane – Vice Chairman
Kevin McElroy – Treasurer
Howard Lister – Secretary
Jane van der Spuy
Dean Trattles
John Owen-Ellis

The practice of co-opting other members to the committee has worked well in recent years and will be continued through to 2019. Co-opted members include:

Lucky Penduka
Mark Calvert
Ralph Naidoo
BUSANI SIBINDI
Eddie Mohlmann
Anil Lonappan

The formalities over everybody enjoyed some good networking and a delicious chicken curry for supper.

Secunda branch

The branch AGM took place on 17 January. In order to keep the momentum of the last two years, the committee remained unchanged, with the exception of the loss of two reliable members, Xandri Cornelisen and Annemarie van Coller. To both these ladies, thank you for your unselfish service and commitment to the branch and the SAIMC.

First technology evening for 2019

Following the AGM Cobus Pool from Proconics gave an informative presentation titled ‘Cybersecurity for critical infrastructure – legislation and regulation’. In today’s connected world, everyone benefits from advanced cybersecurity programs. At an individual level, a cyber-attack can vary from identity theft, blackmail attempts to the loss of vital information. Everyone relies on critical infrastructure like power plants, hospitals and financial service companies. Securing these and other organisations is essential to keeping our society functioning and needs to comply with legislation and the relevant codes of practise. The branch thanks Cobus for this informative presentation.

Technology evening dates for 2019: 7 March, 4 April, 9 May, 6 June, 11 July, 1 August, 5 September, 3 October and 7 November.

Committee for 2019 (Front left to right): Gerhard Swarts, Lezahn Meiring and PJ Truter. (Back): Lizwe Sikunyana, Johan Maritz, Andrew Barnes, Iddo Japhta and Johan Grobler.

Cobus Pool.
Zambia branch

Three SAIMC members from Zambia took part in the Technical Education Vocational and Entrepreneurship Training (TEVET) Stakeholders Consultative Workshop from 21-23 January at the Moba Motel in Kitwe.

The participants reviewed the curriculum with respect to concerns about the implementation of examinations, assessments and practical toolkit schemes in areas pertaining to the engineering, construction, agriculture and forestry programmes.

The objectives of the Workshop were as follows:
1. To engage stakeholders in order to develop an appropriate examination and assessment framework that meets the requirements of the sector.
2. To engage stakeholders in order to agree on appropriate examination paper formats and structure for different programmes in the sector.
3. To engage stakeholders in order to review the implementation of the practical assessment toolkit and agree on the way forward.
4. To engage stakeholders in order to review the implementation of continuous assessment systems in TEVET.

Vaal branch

At the February technology evening, Sagadevan Kanniappen, product specialist for petrochemical, chemical, oil and gas at WIKA Instruments, gave an in-depth presentation on flow measurement and how it has evolved over the years. He started with differential pressure (DP)-based measurement and then moved on to the newer methods available today. However, DP-based flow measurement still remains a common flow measurement type found in industry today, due to its versatility, ease of use, low maintenance and favourable cost of ownership.

The evening was extremely well attended by 32 members and guests who enjoyed the networking opportunity at the braai after the presentation. The branch thanks Sagadevan for this insightful presentation.
IS³’s 27th annual User Conference – X-Change 2019 – is the largest industrial software conference in Africa. From 17-20 March it returns to one of South Africa’s scenic Sun City Resort. X-Change has been a success for a quarter of a century because it has always delivered on three consistent promises: business and networking opportunities; the key to improved operational benefits; and an unequalled view into the New Way of Work, which enables transformation through Edge-to-Enterprise.

This year at X-Change, IS³ will present the full AVEVA end-to-end software portfolio featuring industry-specific streams including, mining, minerals and metals; hybrid; oil and gas; and utilities. The AVEVA software solutions and products will be the focus for day two, with technical deep-dive sessions, together with the Collaboration Expo where demonstrations will be showcased throughout the day. These sessions and workshops are designed to demonstrate how Edge-to-Enterprise transforms business processes and the entire value chain to align with business goals.

What’s in it for you?
Hands-on training: includes a preview of all the new AVEVA products, the next generation of industrial software. Learn about the newly released and purpose-built turnkey industry solutions that address specific vertical challenges faced by end users.

Meet the experts: meet with the subject matter experts behind the technologies. IS³ and AVEVA thought leaders will host demonstrations and provide opportunities to speak specifically to you about your needs.

Network with peers: network with industry peers and share customer success stories and best practices. Throughout the conference you can meet face-to-face with industry and process experts, interact with fellow automation professionals and make new contacts.

Experience the products: discover how IS³ and AVEVA are leading innovation that can work for you using the technologies of the IIoT, Industry 4.0, digitalisation in the cloud, predictive analytics, and more, touch and experience the technologies all in one place with live hands-on demonstrations.

Industry-specifi c topics: discover what leaders in your industry are doing to compete in challenging economic times. Industry specific forums will cover pertinent
topics such as compliance to regulatory requirements, increasing efficiency and reducing costs with automation.

X-Change by numbers
Four hundred delegates will get to see how their colleagues are addressing the ever-increasing challenges their industries face. They will meet like-minded people from Africa’s top mining companies, leading food and beverage producers, top manufacturing companies and major utility providers, allowing them to share how the problems they are confronted with are being addressed.

Fifty top-rated technical presentations by local and international experts will address various topics of interest to industry, including what to expect in the near future, and how to turn this into bottom-line profits. And they are not just at the speaker’s podium; they will also be available for one-on-one meetings about specific topics.

Ten end-user presentations will demonstrate the value AVEVA Software solutions have delivered to South African companies.

Twenty exhibitors from the best system integrators and solution providers will show the depth of knowledge and expertise available in the country right here and now. Every year, these industry leaders choose the unique opportunities offered by X-Change to network with existing and potential customers, and to showcase their capabilities. From instrumentation to software, and from consulting to system integration, these solution architects are at the top of their game and combine their skills, knowledge and experience with AVEVA software solutions to provide world-class implementations for industry.

Conclusion
X-Change is designed to help delegates address today’s challenging issues and pain points, whether they are in the mining, utilities, oil and gas or hybrid sectors. X-Change presents an opportunity to ask questions, so join us from 17-20 March and get the answers from those best qualified to supply them. X-Change is your opportunity to learn, share experiences and network at Africa’s longest running industrial software event. To book a seat, give a presentation, or reserve an exhibition stand, please visit www.x-change.co.za.

For more information contact Clarise Rautenbach, IS³ - Industry Software, Solutions and Support, +27 11 607 8473, clarise.rautenbach@is3.co.za, www.is3.co.za

“From steam to electricity to the digital age, we have been preparing for our ultimate journey: the 4th Industrial Revolution, where intelligence is reimagined!”
Let there be light

Fuel cell system helps channel electricity to rural community.

Like many developing countries, South Africa faces an acute power shortage, and the lack of reliable access to electricity is an impediment to economic growth, investment, and development. Originally designed as a backup power system for telecommunication stations in remote areas, the ME2Power fuel cell has transformed its role into the main power generator for small communities. Chung-Hsin Electric & Machinery’s (CHEM’s) fuel cell mini-grid system uses platinum as a catalyst and is fuelled by methanol. It generates mostly water as a by-product.

This approach has now become an alternative sustainable energy solution for off-grid communities after completing a two-year pilot run in Naledi Trust community in South Africa. “The government of South Africa is considering a rollout of similar plants in rural areas where the cost of electrification via an expansion of the national power grid is too costly, or technically prohibited,” said Amy Liao, director of CHEM’s Hydrogen Department.

Improving remote maintenance costs and metrics

CHEM’s 5 kW ME2 fuel cell system is integrated into a complete hybrid off-grid energy solution. It includes a battery bank and inverter operating within a micro-grid. A mixture of water and liquid methanol is piped through to these fuel cells where an electrochemical process converts it into hydrogen gas, which is used to generate electricity.

“The theft of the solar PV panels is a common phenomenon in South Africa,” explained Liao. “The government of South Africa was eager to find an alternative solution to the problem. Weighing 295 kg, the ME2Power system makes itself a hard target.”

The system provides a total of 15 kW of electric power and generates a peak of 70 kW with the support of batteries. It is sufficient to power the 34 households in the Naledi Trust community. Monthly delivery of liquid methanol fuel to an external storage tank enables uninterrupted primary power to these homes.

“It takes a lot of manpower to conduct inspections and manage the logistics of fuel delivery,” said Liao. “As all systems are located at remote places, it was a challenge for us to improve our maintenance metrics without a network.”

3G helps gain real-time insight

To solve this problem, CHEM integrated Moxa’s cellular remote I/O into the fuel cell system. The I/O features dynamic IP access that provides reliable 3G cellular connectivity. CHEM’s fuel cell system is currently the only one that offers a remote monitoring function.

“Deploying IIoT technology, fuel cell systems distributed at scattered locations can be fully monitored via a mobile phone. Control sites can check the condition of systems, including power consumption, voltage, power supply time, methanol level and unit sensors, anytime.”

In addition to collecting data from sensors at remote sites, Moxa’s patented Click&Go Plus IF-Then-Else control logic allows CHEM to configure SMS alarms to deliver real-time notifications for handling issues as soon as they arise. “This report by exception approach requires far less bandwidth than traditional polling methods,” said Joseph Chang, special assistant of the chairman’s office, CHEM.

The IIoT gives rise to Machine-as-a-Service

In addition to saving time and cost on inspections, CHEM can now organise the logistics of fuel delivery and onsite troubleshooting more efficiently. Data from field sites is collected and transmitted to the scada-based control and monitoring centre located in Taiwan.

“This allows us to work more efficiently with our local service provider,” explained Chang.

“When the scada system receives an abnormal status report, we can immediately inform the local service providers to dispatch maintenance personnel for instant onsite troubleshooting.”

“Fuel cell system costs are higher than a diesel-powered generator,” added Liao. “In the past, this meant that customers facing budget restrictions did not usually consider purchasing fuel cell systems. But now that the IIoT has transformed our business model, we are transitioning from selling a product to offering Machine-as-a-Service. Rather than relying on a one-time sale, we are charging customers based on machine use and service. This business transformation helps us to generate a new revenue stream in aftermarket services by strengthening our core business in parts, repair, and maintenance. By analysing the collected data, we can help customers improve the efficiency and stability of their operations, and provide predictive maintenance services.”

“IIoT technology is also helping our customers to measure their energy usage and manage their budget,” concluded Chang. “Consumers can now pay according to actual power generated and consumed. “We will continue to enhance our remote monitoring and control system to improve service quality for customers. As a member of Moxa’s Solution Partner Alliance program, CHEM is working hard to integrate GPS into its next generation fuel cell system.”

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za
Stop the Enemies of Turbines
With Our High Performance Analysers

Fully automated sodium, silica and chloride/sulphate measurement systems give you:

- Reliable trace level monitoring
- Grab sample measurement capability
- Automatic calibration for minimal operator involvement
- Multi-stream capability
- Low maintenance

www.microsep.co.za
TDK Corporation has announced the introduction of the GXE600 series of 600 W AC-DC power supplies, certified to the IEC 60601-1 medical safety standard as well as IEC 62368-1. In a 1U high package, these convection cooled products have the ability to be digitally programmed across a wide range using an RS-485 interface (Modbus RTU protocol) or with a 0-6 V external voltage. Target applications are medical, industrial and test equipment requiring quiet operation, fan-less cooling and constant voltage, constant current programmability.

The series can be operated as 24 or 48 V fixed output supplies, or programmed to provide a constant voltage, constant current (CVCC) source. The voltage adjustment range is from 20 to 120% and the current from 20 to 100%. Protection and recovery parameters can be set, as can the rise time slew rate. Via the digital communications interface, the power supplies can also indicate the estimated remaining electrolytic capacitor life, operating runtime and alarm history to enable remote preventative maintenance indication or fault finding.

The supplies operate from a wide input range of 85-265 V AC with dual input fuses as standard. They can be used in ambient temperatures of -20 to 70°C, derating linearly above 50°C to 50% load at 70°C. Derating or external cooling is required below 170 V AC input. The series also features an isolated 5 V 1 A standby voltage, as well as isolated On/Off, DC Good and AC Fail signals. Up to five units can be run in parallel.

**For more information contact Accutronics, +27 11 782 8728, info@accutronics.co.za, www.accutronics.co.za**

Chlorides and sulphates cause pitting and stress corrosion in expensive power plant components, such as turbines and boilers, leading to extensive maintenance and unplanned shutdowns. Monitoring these ions at low ppb levels is therefore a key measurement in power plant chemistry.

Mettler Toledo Thornton’s 3000CS analyser is an on-line instrument for direct measurement of chlorides and sulphates in pure water and power cycle chemistry samples. The analyser continuously monitors these highly corrosive contaminants to assist in corrosion control and minimising damage to critical power plant equipment. Early, unambiguous detection of trace levels of chloride and sulphate ions is provided with minimal operator supervision.

**Controlling chloride and sulphate in power plants**
The 3000CS analyser automatically performs direct chloride and sulphate measurements in the water/steam cycle. The most important point in the cycle is at the turbine inlet, to ensure that only acceptable levels of chlorides and sulphates enter with the steam into the turbine. For boiler feedwater monitoring, the analyser ensures low ppb levels of contaminants. For condensate monitoring, it detects breakthrough at condensate polishers of contaminants and deterioration of sulphated cation resin. Low chloride and sulphate levels are ensured in makeup water by monitoring them after all treatment stages, before the water is sent to the storage tank that feeds the water/steam cycle.

Low cost of ownership: typically, chloride and sulphate measurements are done with off-line technologies, such as ion chromatography and inductively coupled plasma. The 3000CS provides accurate chloride and sulphate measurements continuously, delivering a rapid return on investment by eliminating the need for costly internal or external lab tests.

**Easy to maintain with ISM predictive diagnostics**: the unit features semi-automatic calibration and an intuitive touchscreen interface. Intelligent Sensor Management (ISM) technology provides diagnostics that predict when maintenance or replacement of consumables will be required.

**For more information contact Darren Prinsloo, Microsep, +27 11 553 2300, darren.prinsloo@microsep.co.za, www.microsep.co.za**
Schneider Electric has announced enhancements to EcoStruxure Power, the digital energy management system built on market-leading connected products, edge control software and advisor services. The latest architecture is fully certified to ISO energy management standards and compliant to IEC cybersecurity standards. New features make low and medium voltage power distribution simpler, safer, and farther reaching for building, industry, and data centre customers.

“All businesses today are committing to improved efficiency and uptime, while reducing risks, such as electrical fires, by meeting the latest standards and regulations,” explained Philippe Delorme, VP Building & IT Division. “As one of the market’s comprehensive IIoT and digital power management architectures, EcoStruxure Power’s frequent system releases continue to deliver value from sensor-to-edge-to-cloud to improve overall energy performance.”

Extension of ISO certification to incorporate new depth of data management: the latest EcoStruxure Power architecture has obtained ISO 50001, ISO 50002 and ISO 50006 certification, making it a first among comprehensive digital power management systems. Conformity to these ISO standards supports customers to use energy more efficiently, bringing associated cost savings through actionable energy management data.

Compliance to IEC 62443-4-2 cybersecurity standard: today’s IIoT applications for electrical distribution and industrial control systems require IEC cybersecurity compliance. EcoStruxure Power’s edge control solutions are leading the field in incorporating IEC 62443-4-2 security assurance. Schneider Electric promotes a holistic security approach to safeguard, assess, monitor and manage customer systems.

Fire-preventative thermal monitoring applications: EcoStruxure Power’s unique, fully integrated sensor-to-edge-to-cloud solution prevents electrical fires by continuously monitoring temperature rises for MV & LV power systems. The solution is a safer, more cost-effective and reliable alternative to traditional IR thermography. Trends and alerts support predictive maintenance strategies.

Fast power event analysis: event analysis tools make it easier than ever to get to the root cause of problems through user-friendly interfaces. Simpler and deeper data analysis covering all devices and consolidated information improves power system operation reliability.

Comprehensive microgrid solutions: in the new energy landscape, microgrids are critical for facilities with intensifying requirements for resilience, sustainability and cost savings. The latest EcoStruxure Power architecture uses EcoStruxure Microgrid Operation to manage the network, the distributed energy resources (DER), and the protection systems for increased microgrid stability and efficiency. Such facilities oversee microgrid control with EcoStruxure Power Monitoring Expert and Power Scada Operation in either island or normal operating mode.

For more information contact Silindelokuhle Dumakude, Schneider Electric SA, +27 11 234 6400, sli.dumakude@se.com, www.se.com/za
Smart grid is an electrical grid that uses digital communication technology to monitor the status of power consumption and power quality in real time. By using this information, engineers can adjust the power generation and the load of transmission and distribution to reduce power consumption and enhance the power grid's reliability. In order to reap the benefits of smart grids, legacy systems need to be upgraded with minimal cost and efforts. Engineers have to integrate legacy systems into new communication networks through protocol gateways that convert between Modbus RTU/ASCII/TCP, IEC 60870-5-101 and IEC 60870-5-104.

Two common solutions for protocol conversion are available: computing platforms and standalone gateways. Each solution has its advantages and disadvantages for different scenarios.

Instead of using a computing platform, Moxa provides the MGate 5114, a standalone gateway that provides an ideal solution for medium and small power grid system upgrades. Usually, three scenarios for upgrades occur, and Moxa solutions can make them fast and easy.

Communication between a substation and the power dispatch centre: in this scenario, protocol conversion is required because an upgraded power dispatch centre, which usually uses IEC 60870-5-104 protocol communication, needs to monitor substations that are still using legacy systems based on IEC 60870-5-101 protocol communication. The MGate 5114 protocol gateways can convert between IEC 60870-5-101 and IEC 60870-5-104, making it easy for operators to monitor legacy systems in substations.

Communication within a substation: in this scenario, protocol conversion is required because the scada system within a substation has been upgraded, and the protocol communication used is IEC 60870-5-104. To monitor the onsite legacy devices, such as bay controllers, relays, and meters, that use IEC 60870-5-101 or Modbus RTU/ASCII/TCP protocols, the MGate 5114 protocol gateways can be used to make legacy devices visible in scada systems.

Communication between renewable energy systems and the power dispatch centre: for power grid systems, it is essential to ensure the power dispatch centre is able to monitor the status of renewable energy systems to ensure power quality. However, renewable energy systems, such as solar power systems, usually use Modbus TCP as protocol communication, while the power dispatch centre has already been upgraded with the IEC 60870-5-104 protocol. In this scenario, the MGate 5114 protocol gateways can convert between these two protocols, allowing the power dispatch centre to communicate with renewable energy systems.

From the above three scenarios, you can see that the MGate 5114 series features multiple protocol combinations that support Modbus RTU/ASCII/TCP, IEC 60870-5-101, and IEC 60870-5-104 protocols, without extra protocol licence fees. The gateway not only fulfils various power grid scenarios in just one model, but also requires no additional development efforts. Moreover, engineers who are not familiar with protocols always look for ease-of-use gateways. The MGate 5114 Series provides a wizard function, and just five steps are needed to finish the configuration. It also provides powerful troubleshooting tools such as diagnosis and object status and traffic monitoring functions, which make commissioning easy.

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za
Dry-type transformers for water project

Dry-type transformer specialist Trafo Power Solutions has secured an order for 13 custom-designed cast resin units for Rand Water’s large Zuikerbosch Wastewater Treatment Works near Vereeniging.

The water purification and sedimentation facilities at the plant will reportedly provide an additional 600 Ml per day to the system at a project value of R3 billion, as part of efforts to meet growing water demand in Gauteng due to steady population migration into the province.

The transformers being provided by Trafo Power Solutions range in size from 100 kVA to 1 600 kVA and have been modified to include earth fault and surge protection. This is in addition to the standard temperature protection features.

“The key advantages of dry-type transformers in this kind of application are their inherent safety and their ease of installation,” says Trafo Power Solutions managing director, David Claassen. “The units can be installed inside built substations rather than having to be placed outdoors with their own civils and infrastructure.”

Unlike conventional oil-cooled transformers, the dry-type units do not carry the risk of oil leaks or spillage and hence do not require special mitigation measures to protect the environment. The technology’s relative safety also makes them more versatile in terms of the locations in which they may be housed. The units are self-extinguishing and flame-retardant by nature, allowing them to be categorised as ‘F1’ in terms of international fire ratings.

“The transformers represent state-of-the-art technology from a leader in cast resin transformer products, Hammond Power Solutions (HPS), which has been developing this field for over a century,” says Claassen. “We have sourced our custom-designed units from the group’s manufacturing facilities in Italy, which boast state-of-the-art expertise and equipment.”

While dry-type transformers have been around since the early 1900s, they are becoming increasingly popular in a variety of applications as the price differential compared to conventional transformers is no longer that significant.

For more information contact David Claassen, Trafo Power Solutions, +27 11 325 4007, david@trafo.co.za, www.trafo.co.za
Fire safety in high occupancy buildings is critical. Large numbers of people produce greater activity within these environments, which can lead to things going wrong. In particular, fire can escalate quickly into a catastrophe. This eventuality needs to be confronted in the design and protection of buildings and their occupants. Smoke inhalation too can be fatal. Smoke visually obscures escape routes that can prevent fast and safe evacuation. It also inhibits the performance of fire rescue responders. These are just some of the dangers surrounding fire within high occupancy buildings that place hard emphasis on early detection of fires and alerting occupants to the threat.

Fire sensing methods
The traditional method of sensing fire is to detect smoke by means of light obscuration within a sensing chamber. This is known as optical smoke sensing. However, there are challenges to sensing fires within bedrooms in high occupancy buildings using such methods. This is because of the human activity that occurs within these areas. Often bedroom applications result in unwanted fire alarms with many people believing that the smoke detector is ‘too sensitive.’

This is not the case. Spraying of aerosols such as deodorants, hair sprays or air fresheners mimic the obscuration caused by smoke. Similarly steam from showers can also do this. The key is to separate these unwanted phenomena from a genuine fire, while providing an early and stable alarm signal. Alien Systems & Technologies utilises Protec 6000PLUS detectors that can discriminate between aerosols, steam and genuine smoke by utilising multi-sensor technology governed by an algorithm that makes the fire alarm decision. These detectors must have all three fire phenomena present – smoke, a rise in temperature and a rise in carbon monoxide.

Testing shows that even with hot steam or aerosols, the problem of unwanted alarms is solved. For example, in one such test steam was allowed to fill a Perspex test chamber with three detectors present: an optical detector, an optical/heat detector and an optical/heat/CO detector. The steam filled the test chamber and after approximately 35 seconds the optical detector produced a fire alarm. The test was allowed to run for a period of 5 minutes and the other two detectors ignored the steam and did not produce any fire alarms.

In a following test, steam was used to fill the Perspex chamber and after approximately 40 seconds the optical detector produced a fire alarm. Then after one minute a small smouldering piece of towel is placed within a test chamber with the steam still present to simulate a small fabric fire that is common in a bedroom. After another minute, the optical/heat/CO detector produced a fire alarm because it sensed a genuine fire was present. This is because it sensed the obscuration of light, a rise in temperature and a relatively high amount of carbon monoxide and the algorithm monitoring the sensor was able to make an accurate decision that a genuine fire was present. The optical/heat detector produced a fire alarm one minute afterwards.

Correct selection of detectors is vital
These tests show that the selection of fire alarm detectors in buildings is vital to prevent unnecessary evacuations from erroneous fire alarms. The disruption to occupants as well as the fire brigade is severe. Such unwanted alarms can lead to apathy, which then further increases the risk.

AST’s Protec 6000PLUS detectors avoid this scenario as only genuine fires are sensed, and sensed early. There are also enhancements that can be added to the detector range. These include the option to add a visual alarm to the detector body. Programmable speech messages can also be added over and above standard audible tones. This allows for clear fire alarm evacuation commands to be broadcast without the need for extra annunciators. Furthermore, other non-fire emergency messages can also be broadcast over the fire alarm system. For hotels, AST can even integrate a vibrating pillow into the fire alarm system in order to provide an alarm signal that will alert sleeping occupants and inform them to follow the escape route.

For more information contact
Alien Systems & Technologies,
+27 11 949 1157, sales@astafrica.com,
www.astafrica.com
Converter’s for building technology

Siemens presented a new converter series at last year’s SPS IPC Drives. The converters of the new Sinamics G120X series are especially suited for use in pump and fan applications in industries such as building technology and also in industrial environments. With a power range of 0,75 to 630 kW, Sinamics the converters can be operated with any motor, but are at their most effective running with synchronous reluctance motors from Siemens. Sinamics G120X are configured throughout for cost-optimised and resource-saving operation across all voltages and supply networks, and their characteristic compact design saves space in the control cabinet. Although not featuring an additional output reactor, the converters enable motor cable lengths of up to 150 metres. The integrated safety functions are certified to SIL3.

Simple, reliable and efficient
The series offers outstanding ease of operation and is simple to commission using the Sinamics Smart Access Module and the IOP-2 operator panel. The converters can be selected and ordered using only a single purchase order number in the Siemens drive technology configurator. Their integrated DC link reactor enables Sinamics G120X converters to run with the utmost stability under all network conditions. This robust, drip-proof new series comes in the form of a painted module as standard, with an additional contaminant-resistant coating as an optional extra. A high C2 (optionally C1) EMC category and a protection rating of IP20 (optionally IP21 in UL open type) ensure that the converter can be reliably used in any kind of industrial environment. Sinamics G120X converters are in compliance with all relevant EU energy-saving standards, and offer an operating efficiency level of over 98 percent. Their comprehensive range of integrated application-specific functions such as Flux Reduction for adjustment in line with the actual load, Eco Mode which ensures best possible performance and minimal losses coupled with low dynamic loads and optimised output power, or Keep Running Mode to reduce speed prior to a shutdown.

Ready for digitalisation
Sinamics G120X converters can be linked to MindSphere over Sinamics Connect 300, offering users the opportunity to analyse valuable operating data gathered from the converter, the drive train and the machine using the MindSphere app Analyse MyDrives. This enables the visualisation and analysis of status information, providing users with valuable data which can be used as the basis for optimising processes and maintenance strategies.

For more information contact Kaylin Pather, Siemens Digital Factory and Process Industries and Drives, +27 11 652 2795, kaylin.pather@siemens.com, www.siemens.co.za

EM supplies smart building solutions

The latest Hager smart solutions for automated building control have been supplied by ElectroMechanica (EM) of Cape Town for Swarovski Lighting’s new showroom in Green Point.

The leading supplier specified high-quality Hager B7 switch frames, which feature a clean design, vega-D enclosures in a ready-to-mount configuration, and the domovea automation dashboard, which is controllable from a smartphone or tablet, as well as the wall-mounted keypad.

The dashboard provides for intuitive control of a range of devices, from lights to shutters, heating, air-conditioning, and other systems, from single rooms to entire floors. The main advantage is that it allows for easy control from a single point, including remote control via an app available for iPhone, iPad and Android devices. The dashboard even allows energy-consumption data to be stored for comparison against various timeframes, from days to months.

The project commenced towards the end of 2017, and was completed in Q1 2018, according to Ryan Whitelaw, EM product manager for building automation. "Our brief was to supply centralised control for all of the light fittings on display," he explains. "Not only was this for control of the premises through the activation of various themes, such as for morning and evening, but the aim was also for salespeople to be able to demonstrate the products to customers via tablets.

"The specification of the lighting products is quite technical, which is why we proposed the advanced Hager solution. The project serves as a flagship for building automation, which is gaining in popularity in South Africa, due to a growing requirement for energy efficiency, convenience and sustainability.

"There has definitely been noticeable growth in the smart home and building automation market over the last three years or so. Whereas in Europe it is almost a standard across most households, businesses, and commercial buildings, we are only starting to align ourselves now.”

The Hager solution forms part of EM’s extensive product range of high-quality industrial electrical goods, motor control switchgear and electronic automation products for a range of clients and market segments. End users include wholesalers, consultants, building contractors, system integrators, switchboard and panel builders, and also engineering procurement companies.

For more information contact Karen Zotter, ElectroMechanica, +27 11 249 5000, karenz@em.co.za, www.em.co.za

www.instrumentation.co.za March 2019 31
Through its Foxboro brand, Schneider Electric continues to provide high-quality instrumentation to customers through the introduction of a multi-tiered pressure transmitter line. The new transmitters are designed to make processes more profitable by providing the opportunity to select a transmitter offering at the best price/performance ratio for the application, with the added value offered by Foxcal technology. In addition, these transmitters have TÜV Safety SIL2 certification standard.

Features and benefits
This new Schneider Electric pressure transmitter family gives users the opportunity to select the best pressure transmitter to meet any application requirement. These low power instruments are offered with a wide variety of features, communication protocols (4-20 mA HART, Foundation Fieldbus and 1-5 VDC), materials, certificates, accessories, and services, which all add to the performance capabilities and versatility of the range.

Premium performance
For the most demanding applications, the best accuracy available is required. For these choose Premium Transmitters with accuracy up to 0.025% reading and stability better than 0.015% (upper range limit) per year for 10 years, with FoxCal technology embedded and SIL2 certification standard.

Advanced performance
One transmitter that covers most applications: with FoxCal dynamic technology, users benefit from wide rangeability, keeping accuracy at the highest level. With an accuracy of 0.05% of reading and SIL2 safety certification as standard, these advanced pressure transmitters cover most plant pressure sensors requirements with only a few models to capture the phrase – one transmitter does it all.

Value performance
Here, Schneider Electric provides an economical pressure transmitter without compromising on quality. It has been designed for applications requiring accuracy of 0.075% span, where customers benefit from a robust construction. It complies with industry standards, including SIL2 safety certification as standard.

FoxCal Technology explained
Where traditional transmitter suppliers have a 2-point static calibration selected according to the sensor limits ‘zero and span’, Schneider Electric implement the patented FoxCal dynamic technology that includes 11 calibration curves all in 1 transmitter. This is 10 times more data stored permanently in sensor memory. FoxCal technology allows the pressure transmitter to transition automatically and selects the best calibration curve based on the sensor’s input. Accuracy is thus always improved to the best level expressed as a percentage of reading.

With FoxCal technology and TÜV SIL2 safety certification, coupled with high accuracy and reliability, the multi-tiered pressure transmitter family is an ideal solution to optimise investments and realise savings. The same transmitter can now be deployed for standard and safety applications.

Communication and maintenance
To guarantee easy integration of the pressure transmitters, Schneider Electric pressure transmitters and associated configuration files have all been tested in dedicated interoperability laboratories. In addition, all devices are compatible with Field Device Interface technology.

For ease of maintenance and plant start-up, embedded diagnostics have been improved with the latest communication protocol versions. A feature of the new transmitters is the inclusion of two real-time clocks that have been integrated to keep track of the number of days the transmitter has been in service in the field. This is a key parameter for predictive maintenance available on Hart and Foundation Fieldbus.

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Applications

These flow indicators are often used to reassure yourself that flow of liquids or gases is present in dosing systems, printing machines, machine tools, high pressure circuits, cooling circuits, industrial processes and often in the chemical industry. In addition to the below mentioned units, we also offer Spherical- and Piston-type flow indicators.

TURBINE

The liquid or the gas to be monitored flows through a sight-glass in which the turbine is visible. The speed of rotation of the turbine is directly proportional to the speed of the fluid under control.

ROTOR

The liquid or the gas to be monitored flows through a sight glass in which the rotor is visible. It can be controlled both in terms of quality and flow. The speed of rotation of the rotor is directly proportional to the speed of the fluid under control.
Jumo has introduced the new plastoSens T04 plastic temperature probe, which can measure the temperature in injection moulding processes by simply being placed on a pipe. To measure the temperature, different platinum thin film sensors can be used in a two-wire circuit, depending on the requirements – maximum measurement temperature is 180°C.

The Jumo plastoSens T04 probe with protection type IP65 is made entirely from thermally conductive plastic, which not only ensures fast response times, but also guarantees reproducible measurements. A wide range of variants with different diameters ensures that the probes can be optimally adapted to suit the pipe diameter, regardless of whether the pipe is made of copper, steel or plastic.

As a further benefit, the device is fastened externally which means the flow in the pipe remains unchanged. The T04 enables temperature measurement on tubes as small as 8 mm, and the entire temperature probe installation can be given a seal to identify tampering.

The accessories, including a shielding shell and fastening clip, ensure that the probe can be mounted quickly and easily without the need for additional tools. Environmental influences such as drafts, which can falsify results, are also minimised.

Compact plastic temperature probe

Nivotec 4000 series is standardised and cost effective.

The ranges provide all the necessary data to plant operators in the control room, as well directly to the supplier. Continuous real-time visual information about fill levels facilitates easier material planning and early recognition and elimination of shortages that could result in lost production time.

The systems can evaluate analog 4-20 mA and Modbus RTU from continuous measurement technology, as well as digital signals from full/empty type detectors. Visual information is available on a touch panel digital display in a control cabinet, or via a web server module.

Features and benefits
• Visual indication of level in weight, height, percentage and volume.
• Truck module to prevent overfilling of silos.
• Silo full, empty and over fill limit alarms.
• Simultaneous access to multiple computers via browser software.
• Password-protected for various use levels.
• Five selectable email recipients for fill level information.

For more information contact
Morton Controls, +27 86 100 0393, sales@mortoncontrols.co.za, www.mortoncontrols.co.za

UWT’s Nivotec series is designed to make data movement and communication between monitoring and control systems easy and flexible. The Nivotec 2000 and 3500 series are specifically adaptable to customer needs and are modular and expandable. The Nivotec 4000 series is standardised and cost effective.

The ranges provide all the necessary data to plant operators in the control room, as well directly to the supplier. Continuous real-time visual information about fill levels facilitates easier material planning and early recognition and elimination of shortages that could result in lost production time.

The systems can evaluate analog 4-20 mA and Modbus RTU from continuous measurement technology, as well as digital signals from full/empty type detectors. Visual information is available on a touch panel digital display in a control cabinet, or via a web server module.

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Relative humidity probe hands control to the user

The Michell HygroSmart HS3 advanced interchangeable relative humidity and temperature probe is 100% configurable to give users maximum flexibility. It also allows for alterations to RH measurements, to keep step with changes or developments in the process.

Users can set the zero/span range, output signals and choose from five output parameters including dew point. All these changes and settings are made on a PC via the application software. The unit can also be ordered directly from Michell with the probes fully configured to unique, individual specifications.

The instrument ensures zero process downtime by keeping maintenance to a minimum with an interchangeable sensor. When recalibration is due, the old HygroSmart HS3 sensor is simply exchanged for a new, freshly calibrated one. This simple procedure allows for the probe to remain installed, and takes only a few seconds to carry out. Using the replaceable sensor ensures that the HygroSmart HS3 probe has a low lifetime cost, when compared to fully disposable probes.

Alternatively, minor calibration adjustments can be easily made on any installed HS3 probe, with a 5-point digital trim adjustment via the application software to ensure maximum accuracy without needing to replace the sensor.

Designed for demanding industrial conditions, the HygroSmart HS3 probe features a solid corrosion-resistant body, 10 bar pressure sealing and IP67 pressure rating. In addition it also has an accuracy of 0,8% RH, making it among the most accurate probes on the market.

Monitoring the level of molten polyethylene

More than ever before, the number of car parts made from plastics and plastic composites is on the increase. According to the American Chemistry Council, plastics account for approximately 50% of the volume of a typical vehicle. Using plastic in cars helps achieve better fuel efficiency and improves vehicle safety. Many of these parts are made of polyethylene, and recently, VEGA Americas helped an auto parts manufacturer track the level in their tanks.

Creative mounting made possible with the Vegapuls 64
Because of the low dK product and the close proximity to the sidewall, VEGA representatives suggested testing a Vegapuls 64 on three of the vessels. To bypass the large mixer flange on top of the tank, installers had to reduce the size of the threaded process connection and add an extension. This was made possible because of the versatility of the Vegapuls 64’s process connections. After constructing the elaborate process connection and commissioning the radars, installers were able to get a reliable signal.

The previous instrumentation on these vessels had not been functional for years, so operators had been working blind. This new solution involving a unique process connection and the Vegapuls 64 guided wave radar has enabled the plant to run its processes at an optimal production rate and reduced the risk of tank overflow. The plant is now planning to replicate this setup on the other tanks.

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For more information contact Instrotech,
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Visual flow indicators from Valco

The visual inspection of the passage of liquids, gas and other matter in plant processes is a critical element and can be achieved quickly and efficiently with Val.co’s visual flow indicators, which can be installed irrespective of whether the plant is automated or not.

Jan Grobler, managing director of GHM Messtechnik South Africa commented, “There are four system-focused visual flow indicators: rotor, sphere, turbine and piston. All four offer the engineer a quick solution to flow assessment in plant processes. The visual flow indicators offer well illuminated and easy inspection functions. Val.co is part of the GHM Group based in Europe, and all of its flow indicator offerings are of the high quality that one has come to expect from European manufactured instrumentation.”

System descriptions

**Rotor flow indicator**
The rotor is an element that displays the flow with several rotating paddles positioned orthogonally to the direction of flow. It is supported by a rotation axis with ball bearings to reduce the friction and increase the stability of rotation. Grobler said, “The liquid or gas to be monitored enters into a viewer pipe and can be controlled both in terms of quality and flow, with the speed of rotation being directly proportional to the speed of the fluid under control.”

**Sphere flow indicator**
The liquid or gas to be monitored enters into the transparent dome. The position of the sphere inside the transparent dome controls the speed and flow rate of fluid.

**Turbine flow indicator**
The element that displays the flow velocity is a turbine with spiral paddles orientated in the flow direction. The turbine is supported by a rotation axis with ball bearings to reduce the friction and increase the stability of rotation. The liquid or gas enters into a viewer pipe inside the turbine housing.

**Piston flow indicator**
A piston that slides along the shaft is housed inside a transparent glass viewer pipe, which the liquid or gas to be monitored enters. The position reached by the piston inside the pipe is proportional to the speed of the fluid under control.

“All four of the visual flow indicators offer rotation speeds which are directly proportional to the speed of the fluid under control,” explained Grobler. “They are cost efficient simple-structured devices and are extremely easy to install, giving engineers a clear and precise visual confirmation of the status of the fluid under inspection. They can perform on closed or open line systems.”

The visual flow indicators are available from DN8 through to DN50 with maximum temperatures of 200°C and flow rates up to 190 l/min.

For more information contact Jan Grobler, GHM Messtechnik South Africa, +27 11 902 0158, info@ghm-sa.co.za, www.ghm-sa.co.za

Compact pressure sensor module

With the extremely compact MPR-1 piezo sensor module, WIKA has expanded its portfolio of integrative pressure measurement devices for OEM applications with standardised output signals.

With a diameter of just 19 mm and height starting from 17 mm (depending on the process connection), the sensor module can be integrated into a wide variety of products and applications. The custom-fit specification is supported by the selection of analog and digital output signals. The version with digital I²C signal features very low power consumption and a fast response time (3 ms). It is therefore ideal for applications requiring battery operation. In addition, a temperature value can be output via the I²C signal.

The model MPR-1 is available as standard, with gauge and absolute pressure measuring ranges (from 0-0.4 bar to 0-25 bar) as well as vacuum measuring ranges. It measures with an accuracy of 0.5% of the span. On request, a higher accuracy and other pressure ranges can be supplied.

For more information contact WIKA Instruments, +27 11 621 0000, sales.za@wika.com, www.wika.co.za
Krohne has introduced the new Optisys TUR 1060 optical turbidity measuring system. The main application areas are quality or filter monitoring in drinking or cooling water circuits, or demineralisation processes.

The new analytical system employs 90° scattered light technology and is compliant to US EPA 180.1 and EN ISO 7027. It comes standard with 4-20 mA and Modbus RS-485 communication, and features improved usability, fast measuring response time, simple and cost-efficient calibration, data logging and low maintenance requirements.

Although the 1060 shares components with its predecessor, Optisys TUR 1050, and can be retrofitted, the system has been completely redesigned to provide improved usability and simple start-up and operation that require no special knowledge. For flexible use, the measuring ranges can be adapted according to the application. It can be calibrated with reusable calibration cuvettes in less than five minutes, without dangerous formazine contact.

The new system has an integrated data logger for storing measurement readings dependant on selected logging intervals, between 1 and 60 minutes. Calibration data and logged data can both be downloaded via the USB interface. The new instrument has low maintenance requirements due to a long lasting light source and automatic ultrasonic cleaning of the measuring cuvette, which provides for minimal wear, high long-term stability and short downtime.

For more information contact Deon Rampathi, Krohne SA, +27 11 314 1391, d.rampathi@krohne.com, www.za.krohne.com
Case History 165

Interesting tests on loop problems show how much can be deduced from the results.

Michael Brown is a specialist in control loop optimisation with many years of experience in process control instrumentation. His main activities are consulting, and teaching practical control loop analysis and optimisation. He gives training courses which can be held in clients’ plants, where students can have the added benefit of practising on live loops. His work takes him to plants all over South Africa and also to other countries. He can be contacted at Michael Brown Control Engineering cc, +27 82 440 7790, michael.brown@mweb.co.za, www.controlloop.co.za

I have published many articles showing problems in control loops with figures showing the tests conducted to determine the problems. This time, by way of a change, I would like to suggest that readers first study the figures, and try to determine what can be deduced from these.

Figure 1

Figure 1 is an ‘as-found’ closed loop test (i.e. a test with the controller in automatic and using the existing tuning parameters) on an air flow loop in a metallurgical plant in Portugal, where I recently did some work. Have a good look at it and see what you think is wrong. Then carry on reading below.

This is what can be determined from the test:

• It can be seen that the PV (process variable) never actually settles at setpoint, and that after the SP (setpoint) changes it still does not get there but slowly ramps it. This is an indication on a fast process like flow that the integral setting is far too slow.

• On the SP changes it can be seen that there is a big kick in the PD (controller output) and then the PV tends to cycle, with about 1,5 cycles on the SP change upwards, and about two full cycles when the SP was stepped back down. This indicates two things are wrong:
  1. The proportional gain is far too big and the tuning is actually close to instability.
  2. There is a strong possibility that the valve has non-linear installed characteristics, so the response is slower in the higher ranges and faster as the PV gets lower.

• The PV and the PD are working at extremely low values in a region well below 10%, which is in fact the region where they normally operate. Working so low down is very bad practice. Firstly, most flow measuring methods do not work well at very low ranges, and may in fact be terribly inaccurate and possibly give incorrect readings; this obviously depends on the type of flow measurement being used. In this case it was a vortex shedding flowmeter. The specifications for this were not available onsite, but I strongly suspect that the measuring span of the meter is far too wide.

This is what can be determined from the test:

• The response in the first three steps was rather slow compared with subsequent steps, which would indicate that the valve was pretty sticky and then loosened up a bit. The latter steps also gave a rather peculiar response for a flow loop with a sudden change in the PV, which then slowed down taking quite a while to get to the final position. Again, this would indicate

Figure 2

Figure 2 shows an open loop test, on the previous system, with equal step changes in PD being made in both directions with the controller in manual. Unfortunately it is hard to actually determine deadtime and lag times from the figure without being able to zoom in and see more details, but let it suffice to say that if you could you would have found that the deadtime was about five seconds and time constant about nine seconds, which was repeatable on most of the steps. Bearing this in mind, what would you deduce?

This is what you should be able to come up with:

• The response in the first three steps was rather slow compared with subsequent steps, which would indicate that the valve was pretty stickly and then loosened up a bit. The latter steps also gave a rather peculiar response for a flow loop with a sudden change in the PV, which then slowed down taking quite a while to get to the final position. Again, this would indicate
stickiness in the valve with the positioner forcing the valve to the final position.

- Normally flow loops with pneumatically actuated valves have deadtimes around 1-2 seconds and time constants about the same. The excessive deadtime and slow time constant in this particular case indicate that the valve is really sticky and that the positioner is working hard to get it to the right place.

- The three steps downwards in the middle of the test confirmed the quite badly installed non-linearity of the valve, with the last step being almost three times bigger than the first. The controller was then retuned using the largest steps at the low end of the range.

The original tuning was P = 3, and I = 120 seconds/repeat. This confirms the original deductions made when looking at the 'as-found' closed loop test, i.e. too high a gain, and too long an integral.

New tuning was then set at P = 0.9, and I = 10 seconds/repeat. Figure 3 shows the loop running in automatic with the new values and steady SP. There is a small cycle on the loop. The question is: Is this instability due to bad tuning, or is there another reason?

Generally, people with little knowledge of practical process control would say that it is due to bad tuning, and this is probably why the original values were chosen to operate so slowly – so that it did not cycle. However, the integral was then so long that it never got to setpoint, so the person who tuned tried to compensate by increasing the gain.

The cycle is in fact a fairly typical ‘stick-slip’ cycle, which I have discussed in quite a few previous articles. It is caused when the positioner cannot get the valve to exactly the right position. The valve sticks and then the integral action in the controller, now with correct tuning, is relatively fast and so keeps ramping until the valve does actually move. This causes the positioner to push too much pressure into the actuator, which then forces the valve to 'slip' and overshoot the setpoint. The whole thing then repeats in the opposite direction. The stick-slip cycle is immediately identified by the saw-tooth waves on the controller output, which are more or less pure ramps due to the constant integrating error.

In reality, the cycle which looks terrible in the figure due to the expanded scale, has an extremely small amplitude of about 0.5%, and can be completely ignored. It will not affect the life of the valve to any noticeable extent. Also, if the recommendations are followed and if the valve is serviced, the cycle would probably disappear.

It is most interesting how logical conclusions can be deduced from correct interpretation of the results generated by these types of analytical and tuning tests.
Flexible drive control

One module fits perfectly with another: a complete drive system consisting of the servo drive CMMT-AS and servo motor EMMT-AS from Festo enables complete connectivity in hardware and software. Users can commission the complete drive system consisting of the servo drive, servo motor and mechanical system in only three minutes.

The compact servo drive is an integral part of the Festo Automation Platform. It is designed for dynamic motion, point-to-point and interpolating in demanding applications such as assembly and handling technology, for packaging machines or in the electronics industry. It is perfect when combined with the AC synchronous servo motor.

Due to the ‘closed-loop controller concept for Ethernet-based bus systems’ the servo drive enables seamless fieldbus integration with the products of most controller manufacturers. This also applies to the simple integration of the servo drive into application programs, including controller-specific function elements, for example from Siemens, Rockwell or Beckhoff.

The auto-tuning function supports the easy commissioning of rotary and linear movements, which automatically optimises the control behaviour of the connected servo motors and linear mechanisms from Festo. Furthermore, the function supports the mechanical systems of third-party suppliers during commissioning.

The EMMT-AS is an AC synchronous servo motor for demanding and dynamic applications. The connection of the motor using a single-cable solution for the power supply, the encoder and the brake, reduces the installation effort and saves space in the control cabinet. It is characterised by a low detent torque. It is therefore easy to regulate and guarantees path accuracy for both linear and rotary positioning tasks.

Quick commissioning

Easy, reliable and fast commissioning is made possible by the integrated electronic rating plate, which contains all the relevant motor data and can be read directly from the unit.

The free Festo Automation Suite is the main software of the constantly expanding Festo Automation Platform, which is entering the automation market with numerous new products and solutions from the mechanical system to the cloud. It combines the parameterisation, programming and maintenance of Festo components in one program, and enables the commissioning of the entire drive package, from the mechanical system to the controller in just a few intuitive steps.

For more information contact Kershia Beharie, Festo, 086 003 3786, kershia.beharie@festo.com, www.festo.co.za
New benchmark scada software platform

MAPS 4, the latest scada solution for control and visualisation from Adroit Technologies, extends connectivity options, adds user tools and increases the scope of its built-in functionality. The result is a software suite that can reduce the time taken for project development and integration, while also enabling users to realise Smart Factory objectives.

Built on a strong Service Oriented Architecture (SOA), the full MAPS 4 process suite delivers flexibility in automating, controlling, verifying and auditing processes. It provides a full life-cycle planning, management and integration platform for applications from manufacturing to infrastructure. There is also a dedicated HMI version available for machine builders and customers that require a more lightweight scada solution for localised control and visualisation tasks.

Features
The scada software suite has useful everyday features such as an MS Excel bulk-configuration tool, which, for example, enables Excel users to create a large part of a scada project – for instance Tag databases, logging and alarm definitions – in an intuitive and easy to use environment. The user also benefits from the many copy/paste and mass-configuration functionalities in Excel.

In addition, there are extensive libraries for Mitsubishi Electric factory automation hardware and more than 100 other PLC and RTU drivers to make routine configuration quicker and more efficient. Use of pre-configured Object Template models, as well as easy creation of new, individual models, also support a fast, optimised integration process.

Project changes can be deployed centrally providing a single point of engineering that reduces costs and increases usability. Secure data sharing and cross platform connectivity are both high priorities for many process management applications. Therefore the scada solution can be hosted locally, in the cloud, or privately. It can also be connected seamlessly to other third-party cloud-hosted environments.

IoT ready
Developed around popular industry standards such as OPC DA and UA, MQTT and BACNet, the entire software suite is effectively Industry 4.0 and IoT ready. It combines the compatibility advantages of built-in OPC UA and DA support, with the openness of an HTML5 web client. Secure web connections provide easy browser-based monitoring and operation for PCs and mobile devices.

The scope and scalability of the product mean that project engineering and development costs for both large and small applications can be significantly reduced. The amount of physical programming required is kept low, even when the complexity of the application increases. This has benefits for the end user and the system integrators as both can become more competitive as a result. The investment is also better secured because the solution remains flexible for updates and new projects.

For more information contact Adroit Technologies, +27 11 658 8100, samanthab@adroit.co.za, www.adroit.co.za
There are few applications where the demands for material testing and quality assurance are more challenging than in the aerospace industry. Ensuring the safety of passengers, crew and cargo through adequately inspected materials and components is no simple task. Genesis Systems Group is a robotic systems integrator, supporting the manufacturing, transportation and aerospace markets. The company specialises in robotic non-destructive inspection (NDI) systems to cater to the special testing requirements of large components for aircraft, satellites and rockets. Even for experienced professionals, manual inspection of such components has been a challenge until now, because they have to move around the parts and at the same time ensure complete material testing in compliance with the highest accuracy requirements. Automated with PC and EtherCAT-based control from Beckhoff, the inspection systems from Genesis now perform these tasks with the required precision, yet at a much faster rate.

**PC-based control used to inspect large aerospace components**

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<th>Robotic systems designed for the ultimate test</th>
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| The NSpect line of NDI solutions from Genesis is designed to check large-surface aerospace components for material defects and compliance with manufacturing specifications. For that purpose, Genesis integrates robots with ultrasonic process equipment to conduct through-transmission ultrasound testing using a sender and a receiver. Common ultrasound test types include pulse echo, phased array and shearography. Other techniques are also supported. The range of materials that can be inspected is vast, but most commonly involve steel, aluminium and composite materials. An important component in these systems is a 6-axis articulated robot paired with a virtual encoder called the Genesis Blitz Module. Through extensive C++ programming, the module can take all robot positions and create a virtual encoder with six degrees of freedom in around 200 microseconds. This is intended for grid sizes that are measured in increments of 1 mm or less. This position feedback ensures seamless inspection of the large-surface components. “In the inspection world this is called pulse-on-position (PoP),” explained Ryan Steckel, automation systems engineer, Genesis Systems Group. “The Blitz Module takes the inspection data from the material under test and correlates the data with the position of the instrument or sensor. The faster the pulses can be sent, the faster the robot can run and the more productive the NDI systems are as a result.” The recognised standard to send these pulses is 10 ms, while the module developed by Genesis can send pulses in just 1 ms. In this context, EtherCAT also promotes extremely accurate measurements and highly precise system synchronisation, which is critical for test and measurement applications.

Another new development from Genesis is called the RoboPogo, a parts holding system with multiple articulated robots for components undergoing NSpect NDI testing.
The RoboPogo solution sets itself apart because a single system can handle complex parts with multiple geometries, according to Whitney Moon, director Aerospace Division, Genesis Systems Group. "In 2017 Genesis took on a project that required the fixing of especially large parts for NDI. Doing this with traditional hard tooling, or manually adapted fixtures, would be very cumbersome and expensive," he explained.

When holding parts that are between 3 and 30 metres long, such a solution is ideal because the articulated robots offer the required degrees of freedom to accommodate multiple part geometries, varied processes or applications, and can even enable dynamic repositioning during the ongoing inspection process. This is all precisely synchronised with the inspection robots of the NSpect series.

**PC-based control simplifies system integration**

"The applications we address with solutions like the RoboPogo are very complex, so we need automation systems that simplify our designs," added Moon. "PC-based control systems are ideal because we can solve all tasks with one integrated platform from a single source."

Genesis Systems integrates all functions into one Beckhoff CX2030 Embedded PC. This powerful device can run the PLC, safety PLC, motion control, HMI software, Windows OS and essentially any inspection software used by Genesis. "We use the CX2030 Embedded PC networked over EtherCAT on our systems with 20 robots, and we still only use about 25 percent of the CPU capacity," explained Steckel.

"Gathering all the NDI data and maintaining communication with 20 different Kuka robots within a millisecond is impressive, a testament to the value of PC-based control and EtherCAT."

System programming and runtime is handled using TwinCAT 3 software, which simplifies deployment further. "The engineering environment accommodates structured text and object-oriented programming (OOP), which helps us grow the RoboPogo concept – as some systems have four robots, while others have as many as 20," said Moon. Steckel added that OOP allows Genesis to implement existing code libraries in new systems: "To start up a new system, it is much easier just to set basic parameters rather than rewriting every line of code."

**EtherCAT cuts automation effort, boosts safety**

On the networking side, RoboPogo and other NDI systems from Genesis communicate via EtherCAT, which is widely accepted by major robot manufacturers around the world. Genesis Systems was also an early adopter of EtherCAT P and One Cable Automation (OCA) technology. "As Genesis Systems began to work with more commercial aeroplanes and spacecraft, many applications extended for long distances," said Moon. "Having to run the numerous cables involved back to enclosures is especially time-consuming and expensive in these cases. That's why Genesis Systems Group uses EtherCAT P technology to route the power and EtherCAT network around entire fixtures without running lines way back to a main enclosure from each stand." To reduce these cable runs, a large percentage of the I/O devices deployed by Genesis Systems are EtherCAT P Box and EtherCAT Box modules with IP67 protection, combined with servomotors and drives with One Cable Technology (OCT).

Integrated safety technology in the EtherCAT I/O system takes the form of TwinSAFE, which provides additional benefits. "Using TwinSAFE we've reduced our required number of traditional safety relays by 90 percent," said Moon. "EtherCAT diagnostics also help boost the safety in our systems with built-in tools that can identify the exact location of any error from a device connected to the network." TwinSAFE offers another benefit. "It also allows our safety zones to be reconfigurable on the fly. For example, we can have one established safety zone, where an operator can close a gate resulting in two different zones. Safe loading can happen in one zone, but the system continues running in the other. This was previously not possible with other PLCs and safety interfaces we worked with," explained Steckel.

**Significant savings with increased accuracy and productivity**

"By adding OCA technology, Genesis can reduce NDI system cabling by up to 50 percent for drives, motors, sensors, actuators and pneumatic valves," said Steckel.

"We also reduced cabling and installation time of all electronic components by 50 percent," concluded Moon. "Additionally, we reduced the space needed in our electrical cabinets and enclosures by 20 percent."

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Yokogawa has announced that it will release the Sushi Sensor, an OpreX brand wireless solution, in markets other than Japan, starting with Europe (shipping in March 2019). Already available in Japan, the Sushi Sensor is a compact wireless device with integrated sensing and communication functions that is intended for use in the monitoring of plant equipment, vibration and surface temperature. Optimised for IIoT applications, the Sushi Sensor enables the online monitoring of equipment operating conditions, which helps to improve equipment maintenance and prevent failures by detecting signs of abnormalities at an early stage.

Development background
As manufacturers strive to improve productivity and the efficiency of their plant maintenance operations, they have a growing need for solutions that facilitate the collection of equipment data. This is driving demand for wireless sensors that are easier and cheaper to install than conventional wired devices.

To detect signs of equipment abnormalities at an early stage and prevent unexpected equipment failures, it is essential to frequently measure the vibration and surface temperature of plant equipment such as compressors, pumps, and motors, and to enable the monitoring of such data online. Although crucial equipment may already be continuously monitored by using wired sensors, this may be difficult with many other types of equipment due to the high initial cost and the challenges of wiring devices in difficult to access locations. Such equipment must be inspected during operator rounds or periodic inspections. Therefore, there is an increasing need for wireless vibration and temperature sensors that can be installed easily and at a low cost, to improve maintenance efficiency.

To meet this need, Yokogawa has developed the Sushi Sensor, a compact wireless device that measures vibration and temperature and uses LoRaWAN, a low-power wide-area (LPWA) wireless data communication protocol that is attracting considerable interest among developers for use in IIoT applications*1. Yokogawa released the Sushi Sensor in the Japan market in March 2018, and has already established a solid track record with this device. Yokogawa also offers field wireless systems that comply with the proven and highly reliable ISA100 Wireless*2 standard and help to ensure stable and safe plant operations. The European release of the Sushi Sensor is set for 2019, with other regions following after that, giving our customers in these markets a greater range of optimum solutions to choose from.

Features
Easy installation and setup
The compact wireless sensor complies with the LoRaWAN communication standard for long-distance communications, and thus needs no repeaters. It is also battery-powered, eliminating the need for an external power supply. Being compact and lightweight, this sensor can easily be mounted on all kinds of plant equipment. In addition, the sensor supports near-field radio communication, which allows sensor setting and sensor condition monitoring from a smartphone via a dedicated app.

Excellent environmental resistance
Although vibration and temperature sensors for IIoT applications are commercially available, most of them were designed for indoor use. Yokogawa’s compact wireless Sushi Sensor is environmentally robust and is well suited for installation in harsh plant locations.

Monitoring via on premise or the cloud server
Data collected by the Sushi Sensor can be monitored either from an on premise server or a cloud-based server via a LoRaWAN gateway. From the on premise server, or any device in a remote location that can access the cloud server, operators and maintenance staff can monitor the vibration and surface temperature of equipment throughout a plant.

For the monitoring of equipment operating conditions, the compact wireless sensor with integrated sensing and communication functions collects vibration and surface temperature data and transmits this via a LoRaWAN gateway.

Applications
The sensors are designed to measure the vibration and temperature of plant equipment such as compressors, pumps, motors, fans and conveyors in the oil and gas, chemicals, electrical power, pulp and paper, pharmaceuticals, food and water industries.

For more information contact Yuvisti Ramgulam, Yokogawa South Africa, +27 11 831 6300, yuvisti.ramgulam@za.yokogawa.com, www.yokogawa.com/za
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Complete Process Control Solutions and Services Provider
Advances in blockchain technology could enable the food and beverage industry (F&B) to enhance traceability. In the US alone, food recalls and foodborne illnesses cost some $77 billion per annum, including discarded products, loss of revenue, damage to corporate reputations and healthcare costs. Better traceability could significantly reduce these.

“Blockchain comes into its own when the data needs to be highly secure, or if smart contracts are to be managed,” says Marc Ramsay, VP Industry Business Unit, Schneider Electric South Africa. “If an F&B manufacturer is handing off a finished product to a logistics company, which then delivers it to a retailer that stores it within a cold storage facility, the F&B stakeholders want to make sure that the logistics company does not damage the product and that it gets to its destination on time.

“Blockchain technology gives F&B organisations the ability to be much more precise in how they track their goods, and could simplify the execution (invoice/payment) of supply contracts. When an issue occurs, they can be more accurate about what needs to be removed and what can be kept in the food distribution pipeline.

“Verifications could all be dealt with within blockchain through smart contracts. At the IIoT level, sensors could be placed on transportation devices, such as pallets and packages, allowing variables like temperature and vibration levels to be monitored and the data stored in the blockchain.

“Stakeholders would then have real-time visibility into the stipulations of that contract and whether or not any of the agreed rules had been breached. This powerful tool provides traceability, security, transparency and real-time access to contracts that affect the upstream and downstream supply chain.”

Blockchain process unpacked
In a blockchain process, networks of computers use consensus mechanisms and cryptography to allow each participant on the network (or along the supply chain) to update a distributed ledger in a highly secure manner, without a central authority. (For a hacker to breach one of the blocks in the chain would be difficult; to breach all the links at the same time would be nearly impossible.)

In a private blockchain, this can be complemented by access rights rules, defined by each participant of the blockchain based solution, making it difficult to access the ledger data without the proper access rights. Moreover, some blockchain technologies have ‘smart contracts’ capability, which allows defined rules to be executed on the data in a secure way.

As a result, the level of trust built into such a system is high. When working within a trusted system, the time and cost associated with lengthy back and forth business processes is reduced. The ability to track movements across the various stages of a product lifecycle become much more acute, thereby improving the efficiency of the entire supply chain, i.e. defective products can be quickly traced and loss of revenue or damage to reputation limited.

More work to be done
“Although the use of blockchain in this type of application is still in the experimental and pilot stages, Schneider Electric is prototyping new ways to leverage its expertise in plant automation and process control to build and develop solutions that improve traceability across product life cycles,” concludes Ramsay.

“By partnering with blockchain technology specialists, such as Microsoft and IBM, we are assessing its contribution to the development of blockchain-based solutions that will support a multitude of key manufacturing and process industry requirements.”

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Traditional vs manufacturing IT

By Lance Turner, MES specialist, Sasol.

Decades of technological evolution have introduced an era of fast-paced information consumption that has no end in sight. In fact, it often seems to be more needed than wanted with Data Lakes/Big Data reigning supreme in an effort to milk the last bit of value out of what seems to be mundane data to the everyday IT user.

Traditional IT has leaped to the fore in this quest to satisfy the thirst for information that allows smarter decision-making along the road to a Utopian state of ‘better value for shareholders’. Based on 10 years of industry experience, I see the futures of traditional and manufacturing IT converging to a point where traditional specialists could barter well if they understood manufacturing principles and logic to a level that enabled them to deliver enhanced IT services to organisations in this industry.

Convergence – who hasn’t heard this buzzword before? But what is required in this context, is a synergy between IT systems and actual plant requirements. I’ve been involved, too late in many cases, in many IT projects which tend to overlook that behind it all there is a plant relying on the system. Traditional IT is concerned with delivering a solution and then walking away: “Use what we’ve built, it’s based on what you asked for.” Manufacturing IT, on the other hand, is much more involved, often with complex integration into legacy systems or different vendor platforms. Dependency is a large factor in manufacturing IT because the systems need to pump data 24/7/365, whereas traditional IT has a much lower system dependency, i.e. maintenance windows can easily be scheduled to implement changes, and should the system be down, users can drink coffee and chat until it is online again – not so with manufacturing IT…

Manufacturing IT has a different kind of dependency

The idea that systems must be available all the time seems foreign to traditional IT users. So large is the emphasis on manufacturing IT that terms such as industrial IT, operations technology, or manufacturing execution systems (MES), exist to distinguish the attention the one requires above the other. But no matter the different uses, it is still IT. It uses data, servers, networks and switches, the distinction being how manufacturing IT is operationally different when compared to traditional IT.

The analogy would be a PC used in the office environment vs one used in a control room. Both have Outlook for emails and diaries, both have applications relevant to the users’ job outputs, and both are maintained by the company’s IT department. But, changes or updates to the office PC can be done after hours when the PC is idle; not so for the PC in the control room. We have to schedule agreed maintenance windows, we have to find out who is working on the PC during what shift, we have to find out if the applications running on the PC are all compatible with a new Microsoft patch, and then, we most probably have to send out a technician to do the update manually since the PC is either not connected to the network, or not accessible outside its VPN. An even bigger problem is trying to get hold of any third-party vendors that have applications running on that PC. This inconvenience becomes a nightmare when Microsoft releases a new operating system that indirectly forces a company to upgrade half the technology in its MES layer!

Greater awareness required for digitalisation

Simple analogies, but true nonetheless. Traditional IT has a much greater impact on manufacturing IT than both disciplines care to admit. Our support models, our networks, our hardware and software compliances are all geared to traditional IT specifications, even the way we ‘do projects’ is geared towards traditional IT. Manufacturing IT, on the other hand, has a unique requirement: make me work and keep me updated, but do not disturb me unless absolutely necessary. Whereas traditional IT can be changed with relatively minimal impact on the safety and profitability of the business, this is not always the case with manufacturing IT.

There has to be a greater awareness of the complexity and vulnerability IT systems used in manufacturing face when compared to their office-based counterparts. The impact on manufacturing IT, whether from a security breach, a system or process update, or heaven forbid – a change to a safety procedure, is far greater than that of a traditional system. Convergence with a focus on distinguishable boundaries is applicable today. However, in the future I foresee manufacturing IT evolving alongside traditional IT to ultimately become the ‘digitalised IT’ we all aspire to achieve.

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Lance Turner

Lance Turner is an MES specialist employed at Sasol’s Secunda plant. He has an honours degree in Information Systems with a focus on Enterprise Architecture design and solutions. A certified MESA MES/MOM student, his passion is amalgamating general IT across the manufacturing spectrum. Lance’s vision is for a converged IT and manufacturing discipline that will become the reality of Industry 4.0. His team motto is MES services that are always available, always stable, and always dependable.
Cloud-based solution enhances compliance and risk management

A cloud-based platform to enhance performance in procurement and on-boarding times, Passport 360 allows for improved visibility with regard to compliance, time, safety, and risk management, resulting in increased productivity. This benefit is a safer and more productive workplace. In addition, simplified and accessible systems allow for greater participation from all stakeholders. The main aim of Passport 360 is to improve overall organisational efficiency from the moment the first contractor is engaged, all the way to the end of a project’s lifecycle.

“Our solution ensures transparency, productivity, and efficiency within the procurement and on-boarding process,” explains Siobhan Whitehead, director and co-founder of Passport 360. “We aim to change and improve processes by applying technology that results in better and more sustainable outcomes for all our clients and stakeholders.”

Online automation and mobility
The system is a pioneering health and safety platform that allows organisations to optimise their administration and compliance requirements in an integrated online environment.

For example, Kumba Iron Ore in the Northern Cape used Passport 360 to replace paper-based systems and processes with online automation and mobility. One of the largest open cast mines in South Africa, Kumba manages some 600 contractors and employs over 8000 workers.

The paper-based process adopted traditionally by Kumba was not only drawn-out and tedious, but resulted in costly delays and inefficiencies. The resultant inconsistent standards and requirements across all sites caused much confusion, duplication and cost inflation, not to mention added risk. “Kumba’s operations called for constant monitoring of compliance in real-time, with the added benefit of readily-accessible information in the event of any incident,” elaborates Whitehead.

Streamlined contractor management
The mining giant subsequently implemented the solution to streamline and improve its contractor on-boarding times, resulting in significant cost savings. The solution was rolled out at four sites, namely Kolomela, Sishen, Saldanha Bay, and Kumba Iron Ore Head Office.

“We met with Kumba to assess its requirements for contractor management, which allowed us to customise an online solution for its specific requirements,” outlines Simon Warne, system architect and co-founder of Passport 360.

The system integrates four elements:
1. Individual compliance, including an online profile for every person on-site, accessible via a QR code.
2. Service provider profiles, including vendor prequalification and a star rating system.
3. Plant and equipment in terms of tracking and monitoring.
4. Tools.

The system spans across all four of these elements via the step-by-step activation wizard, which allows users to set and manage their procurement and compliance requirements with consummate ease. All necessary documentation can be uploaded by service providers, linking employees, tools, and equipment to form a cohesive online contractor information pack.

The service provider package assists in speeding up the on-boarding process, and also optimises client engagement and interaction. Online safety packs replace the need to submit hard-copy safety files to clients for every new project.

Company documentation can be uploaded and stored for perusal and validation. Site personnel are then able to view the contractor packs in advance, flagging any discrepancies before problems arise. In addition, the Passport 360 app gives clients full mobility, allowing for easy approvals and uploads in the field.

Whitehead points out that, apart from service providers and corporates, individuals can also create free profiles in order to manage their own compliance records, ensuring a perfect fit with client requirements, which facilitates speedy project completion. “Our system is intuitive and easy to understand to assist individuals secure contract work in the shortest possible time,” she concludes.

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Now might be the time to have a talk with your IT service provider

The Gartner hype cycle provides a simple graphic representation of how emerging technologies are adopted in the market. The principle is quite simple: a new technology (such as augmented reality) will start moving up the hype cycle curve as a result of an innovation trigger. Early development is characterised by increasing expectations as a result of publicity and market curiosity. As the hype increases the new technology reaches a ‘peak of inflated expectations’, after which reality sets in and it rapidly plunges into a ‘trough of disillusionment’. The descent accelerates as early interest wanes and implementations fail. Along the way many of these new technologies simply disappear. Those that survive mature and move up the ‘slope of enlightenment’ as more and more implementations succeed. At this point the technology is proven and gains general acceptance. It is considered to have reached the ‘plateau of productivity’.

There are risks associated with early adoption
Manufacturing IT, particularly that associated with Industry 4.0, is a combination of several emerging technologies each at different stages of maturity along the hype-cycle curve. Some of these (like blockchain, deep neural networks etc.) are still over-hyped, while others, like IIoT platforms, are dropping into the trough as reality sets in.

There is a very real risk to an industrial manufacturing organisation in moving too early on an emerging technology. The risk needs to be managed well to avoid a costly mistake. Only the largest manufacturing organisations have the in-house capabilities to manage this proliferation of emerging technologies. Many do not. Most outsource their information technology initiatives to IT service providers (ITSPs). The belief is that the ITSP will remain on top of things, but is this always the case?

Outsourcing does not solve everything
Outsourcing to an IT service provider might seem like the best approach to gain access to additional capabilities for Industry 4.0. In the past ITSPs used to say that outsourcing will ‘allow you to focus on your core business’. What then if the next generation manufacturing ‘core business’ is technology driven?

Outsourcing does not necessarily mitigate against all the inherent risks, particularly as most emerging technologies will be new to the outsourced partner as well. Success will strongly depend on the capabilities of the strategic partner, the way it is organised and its ability to align, adapt and grow with industry trends.

IT service providers providing a total outsourced service are faced with the challenge of keeping current with emerging technologies in order to adequately serve their clients. But specialised skills are hard to find. ITSPs need to acquire, develop and retain these new skills while at the same time ensuring that their existing business runs profitably. Managing this complex mix of skills is in itself a specialised activity.

In practice most IT service providers are a diverse mix of technical departments and profit driven business units. To succeed as a strategic partner to the modern manufacturing industry, the IT service provider has to align its service offerings to meet the challenging requirements of Industry 4.0. Account managers that understand the manufacturing industry intimately are an essential ingredient to manage the many interfaces between the client and the internal ITSP organisation.

An Industry 4.0 strategy will often involve exploiting new business models. Some industrial manufacturers are shifting from large capital expenditure projects to smaller modular ‘pay as you go’ service models. Emerging technologies are often a necessary part of this transformation. IT service providers therefore need to realign their own offerings accordingly, or face becoming irrelevant. What has worked in the past is not necessarily going to work in the future.

Finding the right balance is crucial
Finding the right balance of in-house versus outsourced IT is important in order to succeed in the world of Industry 4.0. The strategic IT partner will have to have excellent capabilities in cloud deployment, microservices, application lifecycle management, business systems, operational management systems and so on. A strategic IT partner will also be able to develop an intimate understanding of your business. Not all partners are up to this challenge.

For a manufacturer, selecting the right IT service provider is an important decision. As the business starts to rely on emerging technologies to exploit new business opportunities, it is important that the IT partner simultaneously invests in understanding these technologies and developing a strategy to introduce these to clients, while managing the risk. The consequences of not getting this balance right can be severe indeed. The process of selecting, managing and growing this strategic relationship will require exceptional leadership and mutual commitment to making it work.

Gavin Halse

Gavin Halse is a chemical process engineer who has been involved in the manufacturing sector since mid-1980. He founded a software business in 1999 which grew to develop specialised applications for mining, energy and process manufacturing in several countries. Gavin is most interested in the effective use of IT in industrial environments and now consults part time to manufacturing and software companies around the effective use of IT to achieve business results.

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Live insight into production processes

Live Monitoring is a local South African software house that develops MES as well as asset monitoring and energy efficiency systems to provide a competitive edge through cost-effective live insight into production processes.

All manufacturing industries face increasingly difficult trading conditions due to a depressed economy, in South Africa this is compounded by rising input costs, especially electricity and labour. In order for them to remain globally competitive therefore, they need to ensure maximum output value from assets and equipment.

**ProduMax and PowaMon**

ProduMax and PowaMon have been successfully deployed on the shop floor in a number of manufacturing industries. This is especially the case in injection moulding, printing, carpeting and textiles, where clients have indicated they have improved production efficiency by more than 11% and managed to get ROI in a matter of months.

ProduMax is a tool that helps to improve manufacturing efficiencies, reduce downtime and visualise production data. While PowaMon is a live energy consumption data collector, billing, alert and reporting engine, which helps companies visualise their power consumption, set goals and be alerted of issues.

ProduMax enables manufacturers to monitor their production process in real-time. This enables the operators and management to view their efficiency visually and adjust or report on issues as they occur. The data is logged for historical analysis and reporting, which enables the bridging of manufacturing processes between the shop floor and the management processes, an often overlooked link in manufacturing. The ProduMax system also has an alert engine that warns users of events such as machine downtime or performance problems. This allows the timely correction and improves production output before it affects downstream processes.

PowaMon is a specialised module of the LiveMon asset monitoring platform, which collects data from a range of sensors and devices, and is easily extendable when required. PowaMon is also designed to collect data from smart meters installed onsite or remotely. Alerts can be set using the LiveMon core to be sent via SMS or email if data is out of thresholds i.e. low power factor correction etc.

PowaMon and ProduMax enable powerful web services, which allow further data integration and interrogation utilised to produce real data on power consumed per item produced. They allow the fine details to be examined to determine the impact of energy efficiency projects and identify wasted energy usage. Visualisation enables power draw to be monitored against the impact on time of use tariffs for the reduction of consumption during peak periods.

Recent enhancements to the platforms include the Mobile HMI for ProduMax, where users and managers can view and operate the ProduMax or LiveMon solution via a tablet or mobile device. Currently, biometric integration is being added to allow for positive operations identification and tracking via data streamed into an analytical engine.

**Live Monitoring vision**

Even though the current LiveMon platform is already IP-based and can be hosted in a virtual environment, Live Monitoring has secured the first round of funding to develop a proof of concept solution that will see the ProduMax, GreenMon and LiveMon functionality built into an IIoT cloud-based solution coupled with dedicated modular sensors for a full end-to-end cloud hosted system that includes a platform for sharing knowledge and ideas.

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Asset management and compliance

Bosch Munitech, a member of the Bosch Holdings group of multi-disciplinary consulting engineering companies, offers municipalities a smart solution for infrastructure management through assessing assets in the field and transferring the information to a desktop platform.

Engineers, field technicians and geographical information system (GIS) specialists in the Bosch Munitech team, have developed an efficient spatial system to represent fixed assets, in an accessible desktop format.

“The on-line asset registry system includes spatial, technical and financial information, which are used to establish refurbishment costs, routine service and maintenance costs, as well as the costs associated with capital replacement of aged infrastructure,” says Sean Nel, project manager, Bosch Munitech. “The asset register is not only used as a planning and management tool, but also provides accurate data for annual reporting to the Auditor General of South Africa.

“To date, all municipalities we have assisted have received clean audits. Our team’s extensive experience enables us to compile asset registers that are invaluable to our clients, both as an infrastructure management tool and for ensuring audit compliance.”

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SAFETY SYSTEMS

The importance of the safety technologies installed in machines and systems increase over the lifecycle of an application. However, as networking of automation systems with the IT world is becoming more and more commonplace, scenarios are likely to arise where a different approach is required, especially for safety applications.

Security challenges are growing
As production and IT become inextricably linked within the framework of Industry 4.0, the security challenges are also growing. The network interfaces between office IT systems and production networks represent a significant gateway for hackers. Examples of threats that industrial control systems currently face are:

- Infection with malware via the Internet.
- Introduction of malware via removable media and external hardware.
- Social engineering i.e. influencing of people in order to bring about certain modes of behaviour.
- Human error and sabotage.
- Unauthorised access to the system via remote maintenance solutions.
- Control components coupled to the Internet via the IP protocol.

A study by Kaspersky, conducted in 2017, revealed that nearly every third cyber-attack on computers for industrial control systems was directed against manufacturing companies. Experts fear that the number of malware attacks is set to increase in 2019, with the focus being on industrial systems. The worlds of safety and security meet when automated solutions implemented for functional safety become the target of hackers. A common strategy must therefore be developed in future. The Triton malware in combination with a cyber-attack against a Safety Instrumented System (SIS) is a current case, which demonstrates that this is a far from hypothetical scenario.

Indirect effect on the end product
Functional safety refers to the safety component of a system that relies on the correct function of the safety-related (control) system and other risk-reducing measures. In this case, the controller performs the task of initiating the safe state when a critical error occurs. The requirements for the quality of safety-relevant control components are described in the B-standard EN ISO 13849 and the IEC series 61508/61511/62061. Depending on the degree of risk, corresponding risk-reducing measures are classified into different safety levels – Performance Level (PL) or Safety Integrity Level (SIL).

In contrast to functional safety, security protects goods from detrimental impairment as a result of intentional or inadvertent attacks on the availability, integrity and confidentiality of their data. This involves the use of preventative or reactive technical and/or organisational measures. If security aspects in the area of safety are disregarded, this can not only have direct effects on production facilities, it can also indirectly affect the production process and therefore the end product. In the context of pharmaceutical products and safety-relevant components for the automotive industry, it is easy to see how the effects on consumers could be significant. The IEC 61511-1 therefore requires an IT risk assessment to be carried out for safety equipment in the process industry. If operators of process control engineering (PCE) safety equipment perform the IT risk assessment as specified in the attached NAMUR NA worksheets and implement the measures identified, it is likely they will have assessed their PCE safety equipment in accordance with the latest technical standards and will therefore have fulfilled their duty-of-care obligations.

Active search for weak points
When considering functional safety and access security, the potential risk must be considered based on a risk assessment or IT threat analysis. Here, a considerable difference in approaches is already evident. While the risks that design engineers need to consider within the scope of the risk assessment in accordance with the Machinery Directive – mechanical or electrical hazards for example – tend to remain the same, the environment in which IT security experts find themselves is constantly changing. In the latter case, attackers are always actively looking for ways to exploit vulnerabilities, which would be considered systematic errors in the area of functional safety.

Another important aspect to consider is the human factor: The expression ’foreseeable misuse’ is used in the field of machine safety, for example, to describe situations where safety equipment – such as a door switch – is tampered with by operating personnel. With large-scale cyber-attacks on industrial systems, on the other hand, it must be assumed that a high degree of criminal energy is exerted.
Initial approach in a NAMUR worksheet
To safeguard the product life cycle of safety-oriented systems or components, manufacturers, system integrators and operators are required within the scope of Functional Safety Management to adopt an approach to quality management that reflects the requirements of the situation in accordance with IEC 61508. A comparable solution for this exists in the security world in the form of Information Security Management in accordance with ISO 27000. Since there is so much common ground, it should now be possible to interlink the two spheres of safety and security activity in practice.

The worksheet published by NAMUR titled IT risk assessment of PCE safety equipment adopts an initial pragmatic approach which leads in this direction. It describes an IT risk assessment method that uses the IEC 62443 security standard as its starting point to provide a basis for increasing the capability of the PCE safety equipment to avert IT threats. To this end, the three steps in phase 1 were performed once as an example for one system, which reflects the systems typically found in the NAMUR member companies. This allows the user to gauge the usefulness of the method for the PCE safety equipment to be assessed. The fourth step – monitoring implementation of the measures and documenting the IT security requirements and general conditions – must be carried out individually for all items of PCE safety equipment to be evaluated and constitutes phase II.

No adverse effects on functional integrity
From the hardware and software perspective, the system being examined can be subdivided into three zones:
- The core PCE safety equipment in zone A comprises the PCE safety equipment as defined in the IEC 61511-1. This includes the logic system, the input and output modules including remote I/O, and also the actuators and sensors. Connections and, if applicable, available network components – for example cables or switches – that are used to interface with devices located in zone A are also allocated to this zone.
- Components that are not necessary for implementation of the safety function but could nonetheless influence the behavior of the core PCE safety equipment are allocated to the extended PCE safety equipment in zone B. These could be operator/control panels, visualisation stations, the programming unit for the PCE safety equipment, and also devices for sensor/actuator configuration.
- Components and systems that do not belong either directly or indirectly in the same category as the PCE safety equipment but could be linked to the safety function belong in the zone referred to as ‘environment’. This could be reset requirements or the visualisation of the status of the safety function.

The common objective of the zones is to ensure that the functional integrity of the safety equipment is not compromised by feedback effects from the environment.

Comprehensive training of relevant personnel
Measures must be taken to reduce the effects of compromised PCE safety equipment or to counteract threats. The human factor also plays a significant role in this process. This is highlighted by the fact that the blame for more than 50 percent of cybersecurity incidents ultimately lies with employees. It is therefore important that there is an IT security officer responsible for the security equipment. In this regard, all persons involved in the specification and design of the safety equipment should be made more aware of the subject of Automation Security, and trained accordingly. Furthermore, it is advisable for the end user to conclude confidentiality agreements with any contractual partners – i.e. manufacturers, suppliers and external operators – to safeguard information and knowledge in relation to the safety system.

Components, software tools and solutions by Phoenix Contact support users by providing them with a flexible and economic combination of safety and security technology to increase their competitive edge in the international market. This, complemented by a comprehensive range of services, which provides system planners and operators with a service portfolio tailored to their requirements throughout the entire safety lifecycle.

Cloud-based provision of key safety system data
The Proficloud from Phoenix Contact provides companies with important information on optimising production processes. Safety of machinery also remains a critical issue for plant engineers and machine operators. Although safety applications are in the first instance designed to protect users of the machine, they can also cause unplanned downtimes. The ability to access safety system data via the IIoT in real time and convert this into meaningful information has enormous potential.

With Profinet-based control solutions, status information for standard and safety functions is transmitted continuously to the Proficloud. Adopting a holistic approach to resources and machinery gives operators and designers a whole new range of options for increasing operational performance.

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SAFETY SYSTEMS

Safety exhaust valve for emergency stop

Parker Hannifin has introduced a new safety exhaust valve that rapidly exhausts compressed air in the event of a fault condition or when a machine has an emergency stop. The P33 is designed for two-channel control architectures and is externally monitored. The new safety valve has a patented fail-safe design and is suitable for use in applications up to Category 4 performance level.

The valve is available with adjustable soft-start and high-flow exhaust performance, to ensure rapid exhaust of compressed air when required. Designing a control system with diagnostic coverage also provides a means of fault detection within the valve, while LEDs provide operators with a clear status indication of sensor power, main solenoid operation and fault condition.

The design has been optimised for long service life, very high flow rates, high faulted flow rates, compact design and high mean time to failure (MTTF) values. Connectivity is via two M12 connectors that provide solenoid and pressure sensor interfacing.

Compatibility with devices from popular automation providers underlines the versatility and flexibility of the valves, while external monitoring gives greater control at the safety device for the customer’s application. It also reduces the complexity of the machine for start-up or resetting of the valve. The fail-safe design of the P33 family is maintenance-free and requires no additional silencers or mufflers that can clog creating potentially unsafe exhaust conditions.

Ex-rated instruments for explosive atmospheres

In many industries, there are certain areas that are classified as hazardous or Ex areas. This is an area that contains, or may contain, combustible substances such as gas, vapour or dust. Typical hazardous areas include coal mines, grain silos, chemical and petroleum plants, offshore and onshore oil and gas rigs, oil refineries, pharmaceutical plants and paint shops.

During the coal mining process, byproducts in the form of coal dust and methane are produced. The build-up of either of these can be extremely dangerous. Even a tiny spark can set off a disastrous explosion. Similarly, grain silo dust ignited by a spark, has led to tragic explosions.

Safety measures in hazardous areas

In order for ignition to occur, two things are needed: the combustible atmosphere as described above, and a trigger i.e. a spark or flame. Remove one or both of these conditions and an explosion cannot occur.

Removing combustible dust and vapour

Ventilation equipment can dilute or remove dangerous substances from an enclosed area and as a result reduce the risk of explosion. This method is extensively used in the mining and chemical industry.

No trigger

Apart from ‘No Open Flame’ signs, precaution must be taken to prevent electrical equipment from being a source of ignition. A simple electrical switch, for example, can generate an electrical spark every time it is thrown – depending on the type of load. This spark may be enough to act as a trigger for an explosion in a hazardous area. In a similar fashion, sparks can be created by portable electronic devices. In order for devices to be safe for use in hazardous areas, safety precautions have to be built into the design.

Intrinsically safe (IS) instruments

There are several aspects in the design of IS electronic devices, of which reducing or eliminating switch sparking is but one. Other considerations include, fast fuses, controlling component temperatures, eliminating tight component spacing that could lead to a short circuit, and reducing circuit current and energy storage.

R&C Instrumentation is geared to supply a considerable range of intrinsically safe instruments, for instance the Raytek MT4-IS handheld non-contact thermometer for the temperature range -18 to 400°C, the Raytek Mi3-IS 4-wire system fixed pyrometer and the Raytek TX-IS 2-wire loop powered system fixed pyrometer.

As part of the recently launched range of vibration sensors, there is also a wide range of ATEX IEC and Ex certified versions available. Additionally, due to a special request from a mining client, there is now the UT390B+IS laser distance meter available from stock.

For more information contact Lisa de Beer, Parker Hannifin SA, +27 11 961 0700, lisa.debeer@parker.com, www.parker.com/za

For more information contact R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za
RUGGED SAFETY LIGHT SCREEN WITH ENHANCED FEATURES

Intuitive, easy-to-use EZ-SCREEN® LS safety light screens are designed for machine safeguarding and are built to withstand challenging environments common to both manufacturing and packaging. The alignment indicators are highly visible and intuitive diagnostics simplify setup, facilitating troubleshooting and streamlining installation. Each light screen is built with metal end caps, a thick aluminum housing and a recessed window to avoid damage from impact. Standard pairs, cascade systems and extensive accessories are available.

Turck Banner (Pty) Ltd
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SAFETY SYSTEMS

Becker Mining South Africa’s advanced safety device, the intelligent collision avoidance system (ICAS), provides situational awareness to ensure optimum safety on construction sites, open-pit mines and surface operations. The system also enhances productivity and operational continuity and reduces operating costs through the elimination or reduction of damage to assets.

“ICAS is a critical safety system, which encompasses the latest industrial technology to provide real-time, 360° situation awareness for vehicle operators working in potentially dangerous and congested site applications, from coal pits to the ports,” says Andrew Trentelman, senior general manager: electronics, Becker Mining South Africa. “Blind spots, poor visibility and driver distraction are common causes for unwanted vehicle interactions on mine and construction sites, processing plants, rail and road networks and ports. By creating awareness and eliminating blind spots, these hazards are reduced, which means fewer collisions and a lower risk of injury.”

This robust IP67 marine grade device, which consists of three components – the display unit, GPS antenna and radio antenna – ensures equipped vehicles and fixed infrastructure are always visible and identifiable to operators, even in harsh, dusty environments. Applications for ICAS include heavy vehicle (HV) to heavy vehicle, heavy vehicle to light vehicle (LV), medium vehicle (MV) to LV and HV, vehicle to personnel, fixed and mobile plant, advanced train and rail track worker warning and rail level crossing activation.

**Configurable guard zones**

The flexibility of the system enables configurable guard zones to suit each vehicle and specific site regulations, and also facilitates accurate ranging with speed adaptive zoning. The 50 channel GPS receiver provides a high level of GPS coverage and reliable 3D positioning. If there is existing infrastructure, it can be incorporated into the ICAS system to increase system range, minimising the need for surface-based repeaters.

ICAS-equipped vehicles and machines within the configured guard and alert zones (up to 2 km), are represented via an intuitive graphical HMI display. Once detected, the system uses a secure radio wireless network to activate surrounding ICAS systems. The presence of vehicles and obstacles within critical guard zones is automatically advised to operators via visual and audible alerts.

The system can filter out non-priority targets and only displays the vehicles and infrastructure that may be on a collision course, thus removing the risk, uncertainty and stress related to working and interacting with vehicles in congested, low visibility and isolated environments.

A portable worker unit has been designed for use by short-term contractors or visitors to a plant. This system, with magnetic mounts, is quickly installed in a vehicle. The antenna can be positioned on the vehicle’s roof and power is obtained from the cigarette lighter.

The remote worker unit is used to identify hazards or fixed plant issues, until a permanent solution is installed. This mobile unit, which is housed in a carry case, is usually battery powered, or supports 12/24 VDC input. This system contains all necessary components, including the display, GPS and radio antenna.

Although information is logged by each machine, it can also be retrieved remotely via the ICAS radio network. An optional centralised PC based vehicle tracking and event reporting system is available with data collection via the peer to peer in vehicle radio systems.

This fully scalable system, with plug-and-play connectivity, requires minimal installation time, no matter the vehicle type. Other design features include easy screen navigation, low power consumption, no licensing requirements and regular firmware upgrades. ICAS is also suitable for fixed plant, hazard awareness, data-logging or access control at boom gates.

Becker Mining South Africa’s collision avoidance safety systems have all been designed to facilitate future upgrades. These modular systems, which range from a simple, low-cost single technology device, to an integrated multi-technology system, encompass many aspects of advanced communications technology.

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info@za.becker-mining.com,
www.za.becker-mining.com
New generation safety controllers

TwinSAFE: consistently modular, scalable and distributed safety applications.

With the new safety controllers based on the EL6910 TwinSAFE Logic, it is now possible to adapt the Beckhoff system even more specifically to the individual requirements of a machine concept, as well as to a broader spectrum of safety applications. The new I/O components include:

- Terminal EL1918: digital terminal with eight safe inputs.
- Terminal EL2911: safe potential supply terminal with four safe inputs and one safe output.
- EtherCAT Box EP1957-0022: IP67-protected digital combi module with eight safe inputs and four safe outputs.

More options for distributed safety applications

Just like the TwinSAFE logic-capable I/O and motion products that are already available, the three new I/O modules can be used as controllers for the direct execution of customer-specific safety projects. A special feature is their communication capability because like a dedicated controller, the safety project to be executed on the corresponding I/O component can establish direct communication relationships with other safety-relevant devices and pre-process the data internally. This makes it possible to implement highly granular machine modules with distributed safety applications. The central safety controller, if it exists in the application scenario, only needs to process the data that has already been accumulated.

The hardware and software modularity of the system simplifies implementation of even very complex safety applications, and the combination of I/O and TwinSAFE control functionalities in a single I/O component makes it easier to distribute safety tasks across individual machine modules. It also reduces hardware costs. In terms of engineering, the customising function speeds up the process and makes it more convenient. It also ensures minimum validation effort, which in turn further reduces the development costs.

More efficiency through customisation

Safety projects can be modularly designed in TwinCAT as usual. However, with the new customising function, the operating modes ‘temporary deactivation’, ‘permanent deactivation’ and ‘passivation’ can now be configured for each of these modules. With the corresponding configuration of replacement values for the interfaces between the different modules, users can thus implement highly complex, modular and scalable architectures while reducing development costs. For example, a single safety project can be used for an entire family of machines by simply deactivating any modules that may not be needed according to the given requirements.

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Safe protection of humans and installed assets in hazardous areas is prescribed in a multitude of international, regional and company regulations and standards. In order to meet these requirements and find the most efficient control equipment for any specific application, Pepperl+Fuchs supplies a comprehensive portfolio of explosion protection equipment.

The international standard on explosion protection, IEC 60079, defines a multitude of regulations for development, production and operation of devices in hazardous areas. For the European Community these regulations are stipulated in the directives 99/92/EC (ATEX 137) and 94/9/EC (ATEX 95). The latter is the relevant standard for manufacturers of explosion protected equipment and protection systems.

Various types of protection are defined in the IEC standard. For automated plant control ‘intrinsic safety’ Ex i (IEC 60079-11) is popular as it allows work on electrical circuits without hot work permit or plant shutdown. Most modern remote I/O and fieldbus signal transmission systems are based on Ex i. However, the available energy to power the connected devices is very limited. ‘Increased safety’ Ex e (IEC 60079-7) allows far more energy, albeit repair or maintenance work during operation is not possible. Besides these examples the standard specifies several other types of protection. Most have in common that the electrical devices have to be specifically designed and certified for use in hazardous areas. Two types of protection allow the use of standard electrical components in dangerous environments – ‘flameproof’ Ex d (IEC 60079-1) and ‘pressurisation’ Ex p (IEC 60079-2).

**Solution Engineering Centres offer support**

The trick now is how to find the most efficient explosion protection solution for each application. On top of explosion hazards there could be environmental influences such as dusty or corrosive atmospheres, freezing or boiling temperatures, special requirements on hygiene or further preconditions. Pepperl+Fuchs offers products and solutions in all types of protection as well as consultancy and project management. Skilled engineers are based in Solution Engineering Centres (SEC) located around the world to offer expert support for explosion protected equipment project. From the first evaluation of the requirements to final specification and manufacturing, the experienced project engineers will design the most appropriate explosion protected solution in close cooperation with the end user. The result could be an interface cabinet equipped with various IS barriers from the comprehensive Ex i portfolio, a remote I/O field unit complete with all components and accessories, a fieldbus junction box combining barriers, interfaces and solenoid valves or, a ready-for-commissioning integrated control safety system for fire and gas detection, safely protected in either a flameproof or pressurised enclosure. Every solution will be assembled by trained specialists in one of the ISO 9000 certified SECs. Continuous quality control and functional tests will guarantee a fully operative system with customers invited to conduct the factory acceptance tests in the dedicated facilities of the SEC. Every solution will be appropriately packed and shipped, with complete certification and documentation, to the respective plant, ready for connection.

The majority of the utilised enclosures, made of aluminum, stainless steel, cast iron or glassfibre reinforced polyester, are manufactured in specialised Pepperl+Fuchs factories, starting with an in-house foundry for high-quality aluminium casting. All operating elements, from simple pushbuttons and LED indicators to control switches in various contact configurations, are appropriately certified according to either Ex d, Ex e or Ex i as well as Ex td.

A local control unit, for instance a single emergency stop, can come in Ex e or in Ex d, in various enclosure materials, with a choice of different cable glands, accessories and labeling options. A maximum of 56 operating elements can be integrated in one common stainless steel enclosure, thus offering a multitude of configuration options. If standard electrical components, such as power relays, motor starters, MCBs through to complete DCS systems, have to be operated inside hazardous areas, the SEC specialists will design an efficient solution based on the appropriate Ex d enclosure. Complex control and distribution panels will be a combination of the Ex d and Ex e types of protection, thus offering additional benefits in maintenance and modifications to the customer.

Based on Pepperl+Fuchs’ vast portfolio of explosion protection equipment, in conjunction with experience and expert knowledge, the SEC engineers help customers to implement efficient explosion protection solutions that meet any requirement.

*For more information contact Pepperl+Fuchs, +27 87 985 0797, info@za.pepperl-fuchs.com, www.pepperl-fuchs.co.za*
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Maintenance personnel often come across the metrological terms calibration and verification. For some, these two concepts are known and easy to differentiate, for others, they can cause confusion.

**Verification made easy**

According to the International Vocabulary of Metrology (VIM), the term verification is defined as: “Provision of objective evidence that a given item fulfils specified requirements.”

An interpretation of verification consists of checking calibration results as ‘objective evidence’ to comply with a ‘specified requirement’, such as the Maximum Permissible Error (MPE), defined either by a manufacturer, a legal metrology organisation or an end-user (i.e. process application). This situation is illustrated in Figure 1, where the device’s relative measurement errors obtained by the calibration rig turn out to be smaller than the MPE, meaning that the flowmeter (item) fulfils the specified requirement.

**Endress+Hauser’s onsite verification offerings:**

- **Heartbeat verification**
  - Heartbeat technology verifies the correct function of the measuring device according to the specifications and generates a protocol without process interruption.
  - The automatic generated protocol supports the documentation requested by internal and external formalities, laws and standards.

- **Inline ultrasonic clamp-on verification**
  - The inline verification is a comparison of the results obtained from the unit under test (UUT) against the inline ultrasonic clamp-on flowmeter.
  - A verification certificate which indicates the measured error between both the measurements is generated.

**Calibration made easy**

According to the VIM, calibration is a procedure to establish a relation between a quantity value given by a UUT and a reference quantity value (ref) obtained by a calibration rig, within its associated measurement uncertainty. The main objective is to check the accuracy of measurements by comparing the device in question with that of a known traceable reference. One fundamental requirement for carrying out a calibration is that the reference system must have traceability to the fundamental units of measurement needed to reproduce the unit flow. Calibration of devices assists:

- The requirements of industry regulators and standards like FDA, IFS, ISO 9000 etc.
- To prevent influence of inaccurate measurements on the quality of the final product.
- To prevent energy or material losses due to improper control.
- To prevent safety issues caused by poor monitoring.

**Endress+Hauser’s calibration offerings:**

- **Onsite: portable rigs and buffer solutions**
  - On-site calibration is performed by highly trained engineers. It is convenient and cost effective, and removes the need to send instruments offsite as, keeping downtime to an absolute minimum. It also offers the highest flexibility as calibration can be scheduled according to process demands.

- **Laboratory**
  - Laboratory calibration services are one-time or repeat contract-based calibrations of customer instrumentation carried out in a facility owned by Endress+Hauser. Calibration services performed in a laboratory have the advantages of the best calibration uncertainty and wide calibration ranges.

- **Calibration management service**
  - Calibration management service is an optimisation service where Endress+Hauser take day-to-day management responsibility of a customer’s calibration function. Goals of this outsourcing are improving the customer’s plant operations, and securing calibration process compliance to internal and external regulations while reducing its costs.

For more information contact Preston Reddy, Endress+Hauser, +27 11 262 8000, preston.reddy@za.endress.com, www.za.endress.com
Wireless telemetry in plants is a necessity for the data acquisition requirements of modern process efficiency and compliance monitoring. However, cabling costs often push the economic viability of such data acquisition projects onto the list of pending plant capex. The benefit of having the data is undeniable, but often too expensive to implement. Wireless communications provide a cost-effective solution, and the technology is improving all the time.

The wireless spectrum is controlled, requiring a licence to use a specified frequency and transmitter power. However, licence-free bands have been allocated worldwide to cater for wireless equipment. These bands allow vendors to supply devices subject to rules on power and duty cycles, ensuring the sharing of these bands by different equipment.

Wireless licence-free bands are extremely attractive for cable saving in industrial plants. WiFi can be used for very short-range applications and is free to use in the 2.4 GHz band, most commonly. Where more range is required, other licence-free bands like 868 MHz are employed for data transmission. These vary from country to country as legislated for the radio spectrum and are power restricted, usually in the mW range. Distances of up to 20 km are not uncommon with these low power transceivers and the Omniflex Teletterm range offers compliant frequency options to suit the global market.

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

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www.instrumentation.co.za March 2019 61
Metal Work’s new EB80 is an electro-pneumatic system consisting of a solenoid valve assembly with fieldbus or multi-pin control, and modules to manage analog or digital input/output signals. It can accommodate solenoid valves with varying functions (2/2 NC, 3/2 NC and NO, 5/2 monostable and bistable, 5/3), with electric and manual controls, inlet connections with fittings up to 12 mm and output connections from 4 to 8 mm, with 10 mm to be introduced recently. Flow rate reaches 800 Nl/min in the 8 mm pipe version and 1200 Nl/min for the high flow version, which supports pipes of 10 mm.

Maintenance and diagnostics

The EB 80 was designed to be powered electrically with a large voltage range from 10.8 to 31.2 V DC in order to prevent surge or low voltage issues that can affect system behaviour. Powerful diagnostic functions for troubleshooting and replacing damaged parts are also included.

All multi-pin or fieldbus-controlled versions have an error LED for the electrical connection modules in addition to warning LEDs for each individual valve. The LED system shows solenoid valve status when there is a short circuit or a valve is missing or malfunctioning. It also shows surges, insufficient voltage and interruptions to electrical signal transmission. The presence of a fault is transmitted to the island control system, and in the case of a fieldbus connection the type of fault is also shown.

The user interface is particularly convenient. All information to be viewed and elements to be worked on are on one side of the island. Faulty parts can be replaced without dismantling the island, as can fieldbus and input/output modules.

Smart components

The diagnostic functions of the EB 80 and its ability to store large amounts of data and interface with various fieldbuses make it ideal for use in Industry 4.0 environments. Some typical applications that can be achieved with EB 80 functionality are outlined below. The first application is the collection of self-diagnostic data, i.e. the behaviour of solenoid pilots fitted to the valves themselves. The EB 80 processor collects data, stores it in the internal memory, and sends it to the external controller via the fieldbus. It can then be processed in the field or sent to suitable storage systems in the company or a cloud server. This function enables systems to be monitored locally or from a company maintenance centre in another physical location, or even remotely by Metal Work.

The second smart function is the control of cylinder response times. A typical use of island valves is to operate pneumatic cylinders, which normally have limit sensors that read the position of the piston. The digital signals sent from the sensors are read by the EB 80 input modules, completing a control ring on the cylinder itself. The island controls the movement of the cylinder and reads the signal linked to the movement itself. This is done locally without going via the PLC. As a result, the island can assess potential delays in cylinder operation, due for example to faults, pipe interruptions, seized parts or anything else. In the event of changes, an error message is generated, which can be managed locally or remotely.

The third application is the control of cylinder speed. The EB 80 can control the motion of the cylinder in both directions, and read the signals generated by the two limit switches. By doing so it can detect and monitor the average speed of the cylinder and the number of strokes completed. The island can therefore log the distance travelled and monitor speed variations, which could be due to adjustments, an increase in friction, or changes to loads applied. An unexpected reduction in speed can cause a fall in productivity, whereas a sudden increase can break the actuators or mechanical machine parts.

A standard value can be inserted for the speed and a range of tolerance. In the event of unexpected changes an error message is generated, which can be managed by the user. Verification is local, in real time and directly in the field, without the need for developing additional applications on the control system. This makes the EB 80 a very powerful and flexible smart component with no need for additional modules.

The potential applications for smart manufacturing do not end here. Use is limited only by the imagination of developers, and this is the challenge of Industry 4.0.

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The advantages of rolled vs. cut threads for hydraulic fittings

The threads on Fluid Systems’ HAM-LET range of hydraulic fittings are rolled. But what does this mean, and why is this a better method than cutting threads as some other manufacturers do? Rolled threads have improved physical characteristics, greater accuracy and a high degree of surface finish. They are produced with no wastage of material, which also results in cost savings. These advantages account for the increased adoption of rolled threads.

**Physical characteristics**
The cold forging that threads receive during the rolling process strengthens them in tension, shear and fatigue.

- **Tensile strength:** the cold working of the surface increases the tensile strength of the metal, and static tensile tests have frequently recorded increases of the order of 30% in the breaking strength of the parts.
- **Shear strength:** when a thread is rolled, the fibres of the material are not severed as they are in other methods of screw thread production, but are re-formed in continuous unbroken lines following the contours of the threads. Rolled threads resist stripping because shear failures must take place across rather than with the grain.

- **Resistance to fatigue:** thread rolling increases the part’s resistance to fatigue failure in several different ways. Rolling between smooth dies leaves the thread with smooth burnished roots and flanks, free from tears, chatter or cutter marks that can serve as focal points of stress and therefore, starting points for fatigue failures. Rolling also leaves the surface layers of the thread, particularly those in the roots, stressed in the compression. These compressive stresses must be overcome before the tensile stresses can be built up, which alone, can cause fatigue failures. This increase in root hardness of up to 30% considerably adds to the parts’ resistance to fatigue.

  It has been repeatedly demonstrated that any fitting that is properly tightened when it is installed, and remains tight throughout its life, is less likely to fail through fatigue than one that is assembled loosely, or that works loose during service. Threads produced by any of the cutting methods have a surface condition consisting of partly torn-away particles that gradually bear down in service, permitting the fitting to loosen. Rolled threads, on the other hand, are compacted and burnished during threading, making them less prone to loosening, which extends the fatigue life.

- **Accuracy**
The production of accurate threads normally requires that close control be exercised over pitch diameter, thread angle, lead, taper and roundness. There are a number of reasons why it is inherently easier to achieve high accuracy in these parameters by rolling. Equally important, this accuracy is retained over long periods of time.

  - **Thread angle and lead:** the accuracy of the thread angle and the lead produced is almost entirely dependent upon the accuracy of the dies. In most cases, the thread angle and the lead on the die is exactly reproduced on the material rolled. The accuracy of the lead produced can also be influenced by the setup of the dies and the material being rolled. Some types of harder and stiffer materials have a tendency to ‘spring back’ after rolling, with the
result that the lead may be contracted by a very small amount. In such cases, dies with expanded lead may be used, which will uniformly produce threads of the correct lead.

*Roundness:* this is dependent on the roundness and uniformity of hardness of the blank, and upon the rate of application and release of the die pressure. If the dies are designed and set up to apply and release pressure gradually and uniformly, close tolerances on roundness may be steadily maintained.

*Uniformity:* if sufficient care is taken, it is possible to produce extremely accurate threads by any of the common threading methods, but rolling is unique in its inherent ability to maintain the accuracy of the original setup during long runs of high speed production. The thread form of a set of thread rolling dies is faithfully reproduced on the parts and does not change appreciably during the entire life of the dies. Thread rolling dies do not wear out in the same manner as other threading tools. Wear, instead of being concentrated on a sharp cutting edge, is distributed over a broad surface, and the rolling action is relatively free from friction. Therefore, the thread form of a rolling die is not changed by erosion, nor does it fail to reproduce itself because of dullness or adhesion. It cannot be altered by improper sharpening, as sharpening is never required.

The development of the thread rolling process and the thread rolling equipment is by no means complete. On the contrary, there is more interest and activity in the process now than at any time in its history. New types of machines and attachments are constantly being developed, and the process is finding new applications where its speed, accuracy, uniformity, and the strength that it adds to the parts rolled, can be used to reduce costs and improve the quality of an endless number of threaded parts.

**The thread rolling process**

Thread form rolling is a simple cold forging process confined almost entirely to external threads. It is referred to as a cold forging process because most rolling is done on cold blanks. However, rolling of threads on heated blanks has been beneficial on some applications. Today, thread and form rolling is accepted by many industries as a preferred method of producing uniform smooth, precise threads of superior physical qualities.

Hardened steel dies are used to roll the threads. The threaded faces of the dies are pressed against the periphery of plain cylindrical blanks and reform the surface into threads as the blank rolls on the die faces. The working faces of the dies have a thread form which is the reverse of the thread to be produced. In penetrating the surface of the blank, the dies displace the material to form the roots of the thread and force the displaced material radially outward to form the crests of the thread.

For more information contact Fluid Systems Africa, +27 87 551 1677, sales@fluidsystemsafrica.co.za, www.fluidsystemsafrica.co.za

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**Quality in aftermarket fuel filters**

When it comes to replacing the fuel filter element on a light commercial vehicle, such as the Ford Transit, Parker Racor ensures the job is simple, fast and foolproof, thanks to a patented compound bayonet fitting system. The benefit here, however, is that by using Racor aftermarket elements, which are identical to their OE counterparts, fleet managers can achieve the same levels of performance and efficiency.

The element simply clicks into place and locks. This concept prevents anyone from removing it from the bowl and inadvertently driving off without the protection of a filter element. In essence, the Parker Racor element means ‘no filter; no flow’ because it is impossible to close the product without the patented part inside. The system is both tamper-proof and cannot unlock involuntarily.

Replacement filter elements from Parker are supplied as a kit that includes a replacement body seal, the main seal that sits between the filter bowl and head. It is important that this seal is changed at the same time as the element, particularly as it will have been sat in fuel for its lifetime and will likely be suffering from a degree of flattening due to the pressurised interface between the bowl and the head. As an external seal, it is designed to prevent any fuel from contaminating the environment.

The Racor body seal offers high durability and excellent levels of vibration resistance. Moreover, the seal provides high chemical compatibility and, of particular importance, can operate safely across a wide temperature range. These design attributes are important, as if the materials cannot survive in different grades of fuel at different temperatures then serious consequences are likely to result.

The use of a patented filter element on the Transit assures Ford and fleet maintainers that a quality product is being fitted, reducing worries about warranty claims and performance issues/engine damage due to selecting an inferior part. Put simply, Racor replacement filter elements for the Ford Transit are specifically designed to remove the amount of dirt required to protect the injector, i.e. 99% of particles down to 4 μm. Buying a counterfeit product puts this performance level in jeopardy. Parker Racor has worked hard on the specification with Ford to achieve the necessary technical needs, as well as the dirt-loading and long-term testing requirements.

For more information contact Lisa de Beer, Parker Hannifin SA, +27 11 961 0700, lisa.debeer@parker.com, www.parker.com/za
BMG has extended its range of Tsubaki chain wear indicators with the addition of the recently launched large-size gauges. “These indicators enable plant and machinery engineers to measure roller chain condition and determine wear in a simple operation,” says Carlo Beukes, BMG’s business unit manager, power transmission. “These robust gauges are valuable tools to ensure machinery is properly maintained and unexpected chain failures that lead to costly production downtime are minimised.

“We recommend that chain wear indicators are used as part of the regular maintenance schedule of a machine or production line. By regularly checking and replacing chains before they reach 1.5% elongation, shock loads are prevented and sprocket wear is significantly reduced.”

BMG’s new Tsubaki BS large size indicators are available in sizes RS-20B to RS-48B and ANSI large size indicators cover sizes from RS-100 to RS-240. These complement the existing sets, which are used with sizes RF06B to RS-16B and ANSI sets for sizes RS-35 to RS-80. To meet market demand, the new large size indicators are available as individual items, rather than as part of a set.

These corrosion-resistant gauges have one end shaped to mount over a roller, while the tip of the other end indicates the degree of wear by highlighting the total elongation over a number of links. Since the chain might wear unevenly, BMG stresses the importance of measuring on several points of the chain.

Correct chain care involves monitoring chain wear, which can cause a loss of tension, and thus reduced transmission efficiency. Chain wear also affects the alignment accuracy of the drive, which increases noise and vibration levels. If wear is allowed to increase to a critical point, the chain will begin riding and jumping on the sprockets, which causes shock loads, which in turn further accelerate wear.

These problems are avoided with the regular use of BMG’s Tsubaki chain wear indicators, which play an important role in maintenance programmes, to ensure optimum efficiency of the overall drive system. The complete range of Tsubaki power transmission components is available from BMG’s national branch network, which offers a technical advisory and 24-hour back-up services.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
The automated chameleon tongue
Festo’s adaptive gripper can pick up anything.

The unique combination of force and form fitting of the chameleon’s tongue can be observed when it is on the hunt for insects. Once the chameleon has its prey in its sights, its tongue shoots out like a rubber band. Just before the tip of the tongue reaches the insect, it retracts in the middle whilst the edges continue to move forward. This allows the tongue to adapt to the shape and size of the prey and firmly enclose it. The prey sticks to the tongue and is pulled in as though caught on a fishing line. The Festo Bionic Learning Network with researchers from the University of Oslo used these observations to develop a mechanical prototype based on the same principles.

Gripping workpieces just as a chameleon’s tongue grips insects – that is the operating principle of the adaptive shape gripper DHEF from Festo. This unusual gripper can pick up, gather and put down objects of many different shapes without the need for manual adjustment.

The silicone cap of the adaptive shape gripper can fold itself over and grip objects of virtually any shape. This creates a firm and form-fitting hold. The elastic silicone enables the gripper to adapt to a wide range of geometries. When combined with a pneumatic drive, the adaptive shape gripper requires little energy for a secure grip.

Formless, round and sensitive
Unlike the mechanical grippers currently available that can only grip specific components, the adaptive shape gripper is extremely versatile. It can even manage components with freely formed shapes and round geometries. The absence of sharp edges makes it ideal for gripping sensitive objects such as air nozzles or trim strips. In principle, the gripper can pick up several parts in one movement, for example nuts from a bowl.

This means that the bionic gripper can be used to handle small parts in classic machine building, in the electronic or automotive industry, in supply units for packaging installations, and for human-robot interaction during assembly tasks or for prosthetic extensions in medical technology.

Practical product characteristics
The gripper has an elastic silicone membrane that is flexible and pliable; once it is supplied with compressed air and the standardised robot interface with integrated air connections has been added, it is ready to be used as a practical automation component. The standard sensor slot for position sensing, as well as the bayonet lock for easy replacement of the cap, are useful additional features.

For more information contact Kershia Beharie, Festo, 086 003 3786, kershia.beharie@festo.com, www.festo.co.za
Anyone within the agricultural sector will know that operating an irrigation system can be expensive, with one of the primary factors being the cost of energy. The good news is that there are ways to reduce costs and achieve savings.

Significant efficiency can be realised by leveraging available technology to provide an appropriate electric motor and variable speed drive (VSD) combination that reduce costs while providing reliable performance. WEG’s IE3 Top Premium Efficiency motors and VSDs are designed for that purpose.

As a supplier with a solid track record in irrigation applications, the Zest WEG Group can provide examples to show how energy costs can be reduced. In a pivot pump application, which operates for 4000 hours in a single year – two planting cycles – it was possible to do a comparison between a standard efficiency IE1 motor (91% Eff) and a premium efficiency WEG IE3 motor.

WEG IE3 Top Premium Efficiency motors not only offer maximum ingress protection with a higher winding insulation system to increase motor life expectancy, but also offer efficiencies of up to 96.6% and benefits are apparent when compared against IE1 standard efficiency motors. Using a 22 kW 2 Pole at 75% of full load IE1 motor with an efficiency of 91%, measured against a WEG IE3 motor with 93% efficiency, estimated savings of R2100 per year at the current tariff will be achieved.

Much higher savings can also be realised by using a WEG VSD in combination with a WEG motor. An IE1 electric motor, again operating for 4000 hours per year at 91% efficiency, will consume about R93 800 worth of energy, using old valve-based methods to throttle and reduce the output of water volume and/or pressure. The same could be achieved using a VSD to reduce the motor speed while simultaneously further reducing the energy used when compared to running the motor direct online from a power source.

If a 10% reduction in operational speed using the VSD is assumed, further savings of 22% to 27% could be achieved.

For more information contact Zest WEG Group Africa,
+27 11 723 6000, info@zestweg.com, www.zestweg.com

Sensors for motion control

The range of stainless steel housed incremental encoders from ifm electronic is ideal for applications such as conveyor belt synchronisation because of the long maintenance intervals, even when deployed in harsh environments. The IP67 protection rating also qualifies them for use in wet areas in the food industry.

Versatile, thanks to IO-Link
All incremental encoders from ifm operate like absolute single turn encoders when used on IO-Link. They detect and save their position value even if power fails. Process values, parameter setting and diagnostic data, can also be transmitted for easy preventative maintenance.

For more information contact ifm electronic SA,
+27 12 450 0400, info.za@ifm.com, www.ifm.com
manufacturing plants, packaging facilities and warehouse operations often have areas where visibility is not what it should be, and not only can these prove hazardous to both vehicles and pedestrians moving in these areas, but plant operators have limited visibility as well.

A solution, available from leading sensing solutions supplier Countapulse Controls, is the robust LCAM 408i IP camera which has been engineered for use in industrial environments. Correct positioning of the device will allow visibility into hard-to-see areas with the 5 megapixel colour camera delivering live data stream at high image quality through its Gigabit Ethernet interface.

The housing of the robust camera is rated at IP65/67 and features an easy-to-clean glass pane. It is easily integrated into machinery or system controls via M12 connections, and requires only a 24 V power supply. Flexibility of installation is ensured through diverse mounting options including the use of dovetail, threaded holes as well as an extensive range of mounting accessories.

Configuration is simple and is accomplished via a standard browser and displayed via standard streaming tools. There is no need for additional software, and troubleshooting has been simplified in case of failure.

For more information contact Gerry Bryant, Countapulse Controls, +27 11 615 7556, bryant@countapulse.co.za, www.countapulse.co.za

Leuze camera looks around the corner

Background suppression laser sensor

Turck’s Q5X laser sensor solves the most difficult distance-based applications, even at acute angles. The high-power laser sensor features excess gain, which enables the sensor to detect dark objects (<6% reflective black targets) at distances from 10 cm to 2 m.

In addition, the Q5X detects black targets against a black background, black targets against a shiny metal background, clear and reflective objects, multicolour packaging, and targets of all colours.

Combine power and versatility to solve more challenges

With industry-standard rectangular housing and 270-degree rotatable M12 QD, the Q5X sensor meets a wide variety of mounting constraints. In addition, the sensor features stable detection all the way to 2 metres even at an angle, which enables still greater mounting flexibility. The sensor is rated IP67 for reliable performance in wet environments. An extensive range of metal protective brackets is available to cater for the most difficult industrial environments. With an intuitive user interface, the sensor is simple to deploy, saving time and costs. In addition, dual teach mode enables multiple conditions to be verified – such as part presence and orientation – with a single device. This reduces sensor inventory requirements, as well as installation and maintenance costs.

Remote configuration and monitoring

The Q5X is highly configurable and can be programmed via on-board user interface, remote teach, IO-Link, or optional remote sensor display (RSD). The RSD enables remote setup and monitoring, and stores up to six configurations to facilitate product changeover and simplify device replacement. The RSD can remain inline to monitor sensors in difficult-to-reach locations, or it can be removed after configuration.

The Q5X laser sensor solves a wide variety of challenging applications in food and beverage, packaging, material handling, and automotive industries. Applications include:

• Part in place inspections.
• Part motion complete.
• Detection of black plastic, leather, and rubber parts.
• End of line pallet detection.
• Shrink wrap detection.
• Carton full/empty.
• Box, tote, and pallet detection.
• Detection of construction materials.

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za

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For more information contact Gerry Bryant, Countapulse Controls, +27 11 615 7556, bryant@countapulse.co.za, www.countapulse.co.za
Manoeuvring agricultural robots with 2D laser scanners

Modern technology can be harnessed in ways that allow people to collaborate with business intelligently, efficiently and sustainably. An example is the 2D laser scanners, which SICK has applied to crop robots in order to assist a scientific project at Wageningen University and Research Centre.

The problem: how do you navigate agricultural robots through a field? The challenge of this application can be found not only in the wide variety of crops out there, but also in the fact that crop rows are neither completely straight nor all the same width. Wageningen University and Research Centre developed a solution that uses SICK Automation’s LMS111 2D laser scanner.

Precision agriculture

Precision agriculture is on the rise, but what does it mean? It is a practice that marks a move away from the model of subjecting every field to a standard treatment and instead takes a semi-tailored approach that considers the requirements of each crop. Custom sowing, fertilisation, pesticide application and disease control have the potential not only to save money, but also reduce impact on the environment.

However, efficiency benefits that precision agriculture brings are unfortunately not yet enough to outweigh the performance of the large, fast farm machinery that save significant amounts of manpower.

Recently, however, a solution to this problem has been introduced in the form of small agricultural robots that are able to work in fields 24 hours a day, slowing down or stopping as the situation demands, and operating almost entirely without human input.

Navigation without GPS

A good navigation system is one of the fundamental requirements for using agricultural robots successfully. The system must be able to account for deviations in the shape and size of crops, crooked rows of differing widths, as well as other irregularities.

Standard GPS systems are not up to the job. For this reason, the Wageningen University and Research Centre developed a navigation process in which robots would instead be guided by a 2D laser scanner from SICK Automation.

The LMS111 2D collects raw data and then filters the information it needs out of this. A range of practical tests were performed during the growing season to check whether the system was functioning as it should. The results proved that it is indeed a viable solution for navigating crop areas cultivated using conventional methods.

Summing up, the Centre’s Dr Frits van Evert states: “We have invested a great deal of time and energy in this project. Just recently, our efforts put us in a position to publish our findings in a leading scientific journal. I would therefore like to express my sincere thanks to SICK for providing us with the laser scanner for our research.”

For more information contact Mark Madeley, SICK Automation Southern Africa, +27 10 060 0550, mark.madeley@sickautomation.co.za, www.sickautomation.co.za
Turck has added M12 field wireable connectors with integrated push-in connection technology to its connectivity portfolio. The new connectors enable the user to complete rapid and safe manual assembly without the use of any tools e.g. soldering irons or screwdrivers. The customer just has to insert a stripped single wire end into the required contact area and establish electrical contact at the same time through the mechanical locking mechanism. This enables mounting to be completed easily and reliably even in restricted mounting conditions.

Besides field wireable connectors and customised solutions, Turck’s connectivity portfolio also includes field wireable connectors in M8, M12, M16 and M23 designs, as well as valve connectors. Field wireable connectors can be adapted to individual requirements in the field, which simplifies installation wherever cable lengths cannot be estimated in advance.

**M12 field wired push-in connectors**

The E30443 IO-Link master display is easily connected to one port of an ifm IO-Link master with four or eight ports. The display detects sensors that are connected to the same master and automatically indicates the main process value of the first four ports. Each sensor and its process values can also be visualised individually by pushing a button. Furthermore, a favourite view with the requested process values can be created. In addition, the user can easily configure the display and the IP address of the master.

The device is an excellent choice for displaying process values for sensors that do not have a display, which are difficult to access, or are not visible after installation caused by the application. This means that ideal measuring points can be used irrespective of the visualisation.

**For more information contact**
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**Temperature probes for all applications**

Kimo offers an extensive range of thermocouple and RTD temperature probes that come as standard products or can be custom made to suit the measuring requirements. The thermocouple types are fitted with a standard connection head, heat resistant stainless steel sheath, or mineral insulated sheath and operate in a measuring range from -40 to 1100°C.

The Pt100 probe range with standard connection head can be supplied with threaded compression fitting, contact, ambient end, food industry models and penetration probes. Measuring range is from -40 to +400°C.

A large choice of accessories such as mounting brackets, connectors, cables etc. as well as converters and transmitters are available.

Kimo, a French manufacturer with worldwide distribution, is represented in South Africa by ASSTech. Kimo’s range include manometers, vane and hotwire anemometers, air quality solar, lux, sound, humidity, debimo blades, dataloggers and wireless dataloggers, sensors, transmitters, wireless probes and multifunction instruments.

**For more information contact**
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**Process values from IO-Link sensors**

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**For more information contact**
ifm electronic SA, +27 12 450 0400, info.za@ifm.com, www.ifm.com
The new motor starter Christian P-4.0 from Tele is designed for motors up to 4 kW @ 400 V, and includes five functions in one compact unit, requiring only 22.5 mm width. This intelligent instrument offers a soft-start, soft-stop, forward/reverse, overload protection and an integrated three-phase motor contactor.

Offering integrated motor protection, the starter makes the use of an external MCB obsolete. A simple circuit breaker protects the installation against short circuit and faulty wiring. The soft-start and stop function is performed by reliable semiconductors (thyristors) and the reversing function by an internal relay. After performing the start process, the semiconductors are bypassed by integrated relays to minimise power dissipation. The intelligent combination of semiconductors and relays increases the lifetime and efficiency of the unit significantly.

The overall combination of the above-mentioned features protects motors, shafts, and industrial plants from mechanical stress and reduces maintenance and standstill times. Other benefits include:

- Increased system availability through the motor protection function.
- Increased lifetime through hybrid design, compared to traditional contactor-relay solutions.
- Robust semiconductors with 1500 V isolation voltage.
- Energy saving by bumpless soft-start/stop function.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za, www.vepac.co.za

Inductive sensors in a plastic threaded barrel design and with an antivalent output have been added to Turck's uprox series of factor 1 sensors, which offer the same large switching distance to all metals. The new sensors combine the benefits of a one-piece barrel design with those of a closed front and translucent end cap. In this way, users benefit from the resulting increased sealing capacity and long service life. The translucent end cap enables status indication signals to be visible from all sides. This saves the user considerable time during commissioning or troubleshooting.

The threaded barrel and front cap are made from liquid crystal polymer (LCP), and the end cap from Ultem. Both are highly durable plastics that have had proven use in applications involving a high degree of humidity and corrosive media. The new uprox factor 1 sensors offer an additional benefit, since the targets used here are often made from stainless steel. The first six device variants in the new design are now available: Three flush and three non-flush models in M12, M18 and M30. All other plastic threaded barrel devices with an M12 connector will be converted in the coming months.

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za

SKF has announced the introduction of its Lincoln SLC metering device for grease. Developed for use in single-line lubrication systems, this compact metering system boasts a modular design for less jointing and decreased risk of leaking.

Featuring a spring-reset control piston, the device has a high venting capability for compatibility with greases up to NLGI 2 and provides reliable operation in harsh conditions and low temperatures. Delivery volume can be either adjusted via regulating screws or set via dosing adjustment; both options ensure each lubrication point receives the required amount of lubricant.

The SLC is available in two versions – the SLC1 for one to twelve outlets and the SLC2 for one to six outlets. Both are offered with BSP or NPT threads and in C3 corrosion classification. Metric and imperial sizes are included for inlet and outlet fittings.

The system is suitable for use in renewable energy, construction and mining applications, as well as when replacing smaller, mid-pressure, dual-line lubrication systems.

For more information contact Samantha Joubert, SKF South Africa, +27 11 821 3500, samantha.joubert@skf.com, www.skf.com

Compact motor starter with protection

SKF offers new metering device for lubrication systems
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