Developed from solid rocket fuel technology, Pyrogen is designed to protect a variety of electrical cabinets, like switchgear, MCC and VSD cabinets. It almost instantly extinguishes the fire, using a cool discharge to prevent re-ignition.

We believe it to be one of the safest, most effective and widely used solution on the market.

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OUR COVER 22

The terminal is a storage area where petroleum products are received through cross-country pipeline or large ships and stored in tank farms. Yokogawa has accumulated more than two decades of experience in the automation of such terminals and supplied its Terminal Automation Solution to suit a variety of customer needs. See this month’s cover story on page 22 for more on this innovative solution.

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A real case for artificial intelligence

For many manufacturers, the era of mass production is drawing to a close. Changes in consumer behaviour have forced them to rethink their ‘economies of scale’ approaches as they reorganise to answer the demand for more personalised goods and services. This customisation means items have to be produced on demand, rather than sold from stock, and the modern customer is fussy and impatient, so it has to be done fast and with no compromise in quality.

In the automotive industry, for instance, models are becoming available with an ever larger variety in the number of possible feature combinations. This presents a problem for automated robotic assembly lines because each change requires a time-consuming reconfiguration of the equipment. The current limitation of even the most sophisticated artificial intelligence (AI) algorithms is that they are designed to perform one task – and one task only. The software that drives an autonomous vehicle is incapable of playing a game of chess.

In response to this, researchers at Siemens are investigating how robots can teach themselves to perform new tasks. Based on a promising new AI technology called deep-learning, the method makes use of CAD files containing information about desired colour schemes, geometry, final assembly, choice of finish, and the like.

In simplistic terms, the AI algorithms embedded in the robot interpret the various CAD models to generate the appropriate programming instructions in response to a new production order. The robot itself decides the sequence in which tasks should be performed, and also corrects faults as and when they occur during the assembly process. Manufacturing’s Nirvana – aka batch size one – seems almost within reach.

Once these deep-learning techniques are perfected for industrial use, AI has the potential to transform manufacturing much as electricity did some hundred years before it. Until then, though, artificial intelligence’s contribution to the industry will likely remain confined to data mining applications in areas like energy efficiency, quality control, condition monitoring and predictive maintenance. This does not mean these systems are not powerful in their own right, just that they are not ready to take over the world quite yet.

Industry guide
Speaking of predictive maintenance, posted with the magazine this month is the 2019 edition of the Technews Industry Guide: Maintenance, Reliability & Asset Optimisation. This one-stop resource for the modern maintenance professional covers everything from in-situ sensor-based solutions for condition monitoring, through handheld portable devices for periodic maintenance-related checks, through software solutions for analysis and reporting, and on to customised services like reliability management consulting and training. Our hope is that the ideas and insight we have gathered together will help you to solve a problem you may be faced with in your own particular plant.

Steven Meyer
Editor: SA Instrumentation & Control
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LETTERS TO THE EDITOR
Letters to the editor should be addressed to Steven Meyer at steven@technews.co.za. Sending material to this publication will be considered automatic permission to use in full or in part in our Letters column. Be sure to include your name, e-mail address, city and zip code. We reserve the right to edit all letters.

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SA GAUGE receives SANAS accreditation for temperature calibration

Having obtained our SANAS pressure accreditation in 2008, SA Gauge has learned the importance of quick turn around times on instruments handed in for calibration.

Our recently accredited SANAS temperature laboratory will be no different. Typical turn around times will be 3 to 4 working days.

WE CAN CALIBRATE THE FOLLOWING...

- Thermocouples
- Surface Temperature Probes
- Platinum Resistance Thermometers (PRTs)
- Liquid In Glass Thermometers
- Digital Thermometers
- Mechanical Dial Thermometers
- Infrared Thermometers
- Electrical Simulation: Indicators, Transmitters & Calibrators

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National 0860 007 911  www.sagaute.com
Inductive Automation and FreeWave Technologies are taking charge to advance the true benefits of IIoT networks by providing increased data visibility and a more reliable data network for industrial IIoT customers with remote assets.

Ignition Edge MQTT, an edge-of-network software solution from Inductive Automation and Cirrus Link Solutions, can run on FreeWave’s hardened, C1D2 ZumIQ Edge Computer and the ZumLink IQ Intelligent Edge Radio to flawlessly perform edge-based data collection using various industrial protocols and data publishing using MQTT. This publish/subscribe, or pub/sub, architecture provides granular data to anyone on the network and the proven ruggedness of the Zum platform provides a reliable home for applications that place analytics and intelligence alongside remote assets. As a result, the ZumLink IQ is an all-in-one solution that provides both secure data transmission over long distances and application deployment.

Rockwell Automation and Schlumberger have announced an agreement to create a new joint venture, Sensia, the first fully integrated digital oilfield automation solutions provider. The Sensia joint venture will be the first fully integrated provider of measurement solutions, domain expertise, and automation to the oil and gas industry. It will offer scalable, cloud and edge-enabled process automation, including information and process safety solutions. From intelligent systems to fully engineered life-cycle management automation solutions, the joint venture will help customers drive efficiency gains through measurement and data driven intelligent automation.

Under the terms of the agreement, Sensia will operate as an independent entity with Rockwell Automation owning 53% and Schlumberger owning 47% of the joint venture. Sensia is expected to generate annual revenue of $400 million, and will employ approximately 1000 team members with global headquarters in Houston, Texas.
Africa Automation Fair is the premier focused platform for the Automation and Smart Control Industries in the Southern Hemisphere.

THE FUTURE OF DIGITISED TECHNOLOGIES

Explore Industry 4.0 strategies and solutions to drive efficiency, productivity and cost benefits in your operations.

Assess what manufacturers are achieving through the implementation of new technologies and implementable real-world solutions.

The Africa Automation Fair 2019 exhibition will illustrate ways to overcome manufacturing stagnation and fast track growth, by showcasing the latest technologies, solutions and models for next generation manufacturing.

4-6 June 2019
Johannesburg. Ticketpro Dome

EXPECT TO BE DISRUPTED
Connected Industries Conference takes an in-depth look at the Fourth Industrial Revolution and the impact it will have on the South African economy.

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For more information contact us on +27 11 549 8300
Now in its fourth edition, Botswana’s leading mining, industrial and power generation expo returns in September together with the recently launched A-OSH Expo Botswana.

Taking place at the Gaborone Fairgrounds from 10-12 September, this event will showcase the latest technologies, machinery, products and solutions related to mining, industrial and power generation, as well as all issues associated with occupational health and safety. As a forum for trading, networking, learning and product sourcing, the co-located events will provide an excellent opportunity for local and international exhibitors, industry associations, government officials and industry professionals to connect.

“A-OSH Expo Botswana is an ideal vehicle to promote occupational health and safety in Botswana,” says Specialised Exhibitions Montgomery portfolio director, Charlene Hefer.

“In addition to new products and live demonstrations, a full programme of free seminars will also take place. With local and international participants and leading brands on show, Electra Mining Botswana and A-OSH Botswana Expo will be of benefit to exhibitors who want to expand their footprint in Botswana and also to visitors who want to source the latest products and services and to learn about new technologies and solutions.”

Hefer adds that the benefits extend beyond the exhibitors and visitors. The positive impact of these events in Botswana is that they will be contributing in the region of eight million Pula to the national economy, either directly or indirectly. This is through venue expenses, expenditure on products and services, advertising and promotion, logistics, travel, accommodation, meals and drinks, the spend of exhibitors on exhibiting, and the additional local spend of visitors and exhibitors whilst at the trade show. The exhibition also contributes to part-time job creation during the show and add-on tourism for those visiting Botswana. Electra Mining Botswana is endorsed by the Botswana Chamber of Mines, the Botswana Institution of Engineers (BIE), and the South African Capital Equipment Export Council (SACEEC).

For more information contact Leigh Miller, Electra Mining Botswana & A-OSH Expo Botswana, +27 10 003 3060, leighm@specialised.com, www.specialised.com

Mecosa has moved

Mecosa is pleased to announce that it has moved to new premises. The following changes come into effect immediately.

All deliveries and collections must be done via the following address: Mecosa (Pty) Ltd, 76 Fifth Avenue, Fontainebleau, Randburg, 2194.

All mail must be sent to: Mecosa (Pty) Ltd, PO Box 90, Fontainebleau, 2032.

Ten years of emerging enterprise and graduate development

Bosch Ulwazi marks its tenth anniversary this year, with a track record in the advancement of engineering skills across South Africa. The company was established in 2009 as a subsidiary of Bosch Holdings in order to mentor engineers and project managers to achieve professional registration with regulatory bodies. Today Bosch Ulwazi provides a range of technical skill solutions to public and corporate organisations that employ graduate engineers, technologists and project managers who are candidates for professional registration. Professional registration is a key milestone that prepares young graduates for leadership, or even branching out into their own enterprise.

“A critical part of Bosch Ulwazi’s operations is to identify, mentor and develop black-owned businesses,” explains Bosch Ulwazi’s managing director, Balan Govender. “In partnership with leading organisations, including state owned enterprises, we play a key role in the development of small, medium and micro-sized enterprises. Our highly skilled team provides guidance on project and operations management, skills development and the planning and implementation of expansion strategies, in compliance with corporate governance.”

To date, Bosch Ulwazi has developed 78 emerging enterprises in South Africa, which are now profitable and sustainable. Another key focus is graduate development. The company’s Engineer-in-Training (EIT) and project management program provides opportunities for graduate engineers and project managers to enhance their practical engineering and project management competencies, to meet the requirements of ECSA and SACPCMP for professional registration. Since the introduction of the EIT programme in 2010, graduates have worked on projects in South Africa, Brazil, India, Barbados, Tanzania, Swaziland, China, Oman and Kenya.

On completion of the curriculum, candidates have a comprehensive portfolio of evidence that assists in their submission for professional status. To date, 15 graduates have successfully registered as professional technicians, technologists and engineers. Bosch Ulwazi has also assisted ten senior engineers to complete their registrations as mature applicants with ECSA for professional status.

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For more information contact Leigh Miller, Electra Mining Botswana & A-OSH Expo Botswana, +27 10 003 3060, leighm@specialised.com, www.specialised.com
SA Gauge receives SANAS accreditation

Temperature and pressure gauge manufacturer, SA Gauge recently received the South African National Accreditation System (SANAS) accreditation conforming to the ISO/IEC 17025 standard for temperature calibration. “Customers that are already used to the quick pressure calibration turnaround times by SA Gauge's SANAS accredited pressure laboratory will now be able to get the same quick service on temperature calibrations,” says managing director, Chris du Plessis.

Having several heat sources permanently stabilised at dedicated, commonly requested set-points enables the laboratory to ensure quick turnaround times on thermocouples, PRTs and digital thermometers. Dial thermometers, infrared thermometers and liquid in glass thermometers can also be calibrated. Trained and qualified metrologists working under controlled environmental conditions with highly accurate and stable equipment and standards ensure all work is performed competently and on time – usually within two to three days.

What does SANAS ISO/IEC 17025 accreditation mean?
To achieve ISO/IEC 17025 accreditation, the laboratory’s quality management system and technical competence is regularly evaluated thoroughly by the third-party assessment body, SANAS. Audits are conducted on a regular basis to maintain accreditation and to prove compliance. ISO/IEC 17025 accreditation can only be granted by an authorised accreditation body such as SANAS, which is authorised by the Department of Trade and Industry. Accreditation means that the laboratory has met the management requirements and technical requirements of ISO/IEC 17025 and is deemed technically competent to produce valid calibration results.

Manufacturing is our strength
“SA Gauge customers have the right to receive a reliable, accurate product. Our professional pride will have it no other way,” says du Plessis. “In-house production and SANAS ISO/IEC 17025 calibration laboratories allow us to set our own high standards for quality control. Coupled with a ‘customer satisfaction at all costs’ sales team, a ‘results driven’ engineering team and a ‘first time right’ production team, our customers are ensured of accurate, quality instruments made to their specifications at short notice. Our in-house SANAS ISO/IEC 17025 accredited laboratories ensure that our customers can have the same confidence in their equipment after recalibration as when it was new.”

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SEW-Eurodrive drives for Greenfield coal mine

A Greenfield coal mine in the Mpumalanga coalfields region has standardised on drives from SEW-Eurodrive for its entire conveyor belt system. This entailed a massive 27-unit order that was assembled at the OEM’s Nelspruit facility and transported directly to site.

The order consisted of a complete drive package in the form of a simple bolt-on solution for the coal mine’s conveyor belt system. This included the drives themselves, gearboxes, base plates, guards and, in one instance, an ancillary cooler.

The project was facilitated by the Projects Department. This specialist in-house department, which focuses on providing clients with complete solutions, has doubled in size in only a year. Project sales representative, Brett Weinmann explains that the long-term aim of the Projects Department is to establish longstanding relationships with project houses in particular, who put their designs out to competitive tender. “We really go out of our way to offer the best customer service and technical back-up possible,” Weinmann adds. “We do not simply supply products, we also look closely at the holistic application itself.”

Due to the fact that this massive order had to be customised, an important part of the value added service offering was overseeing that the required specifications were met, keeping in mind the strict delivery date. This was essential in giving the client peace of mind. “We like to be on site during this critical phase of a project to ensure that everything is according to specification and installed correctly. For example, we double check the oil levels and the alignment of the units, and are also present at the first cold start-up,” he notes.

Such was the success of the work undertaken that SEW-Eurodrive has subsequently clinched another three cross-border projects with the same client, thereby assisting in expanding its footprint in the African mining industry.

For more information contact Jana Klut,
SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
Endress+Hauser’s power packed marketing conference

Endress+Hauser recently hosted its Annual Marketing Conference. This much anticipated event brought together a delegation of Endress+Hauser experts from across the globe, partners from all over the African continent, as well as industry experts, product specialists, and sales and service teams. Together they shared their knowledge about new technology and digitalisation, as well as new products, solutions and services. The theme for the conference was ‘Data inspired customer experiences’. Among the many topics were IIoT, the cloud and Heartbeat Technology. Industry-specific workshops focused on the innovative technology and application expertise that ultimately help manufacturers to improve their processes.

A major highlight was the presence of Endress+Hauser Group CEO, Matthias Altendorf, who delivered an inspiring and powerful keynote address which left everyone motivated and inspired to conquer the automation industry. Altendorf and Bernard Klöss, managing director of Endress+Hauser South Africa, handed out performance awards for excellence and long service awards to those who have served Endress+Hauser with loyalty for many years.

The knowledge accumulated at this conference left the Endress+Hauser teams with a deep understanding of measurement and automation technology, and made them feel aligned and ready to provide solutions and services that add value to their customers.

For more information contact Natlee Chetty, Endress+Hauser, +27 11 262 8000, info@za.endress.com, www.endress.com

BMG acquires Rustenburg Engineering and Joerg Foundry

Through BMG’s acquisition of Rustenburg Engineering and Joerg Foundry in 2018, the company is now a major player in the foundry industry. “This strategic investment in a dynamic sector of engineering broadens BMG’s product range to include the supply of SG and cast iron components and products to original equipment manufacturers and end-users,” says Anton Kritzinger, general manager of Rustenburg Engineering, which now forms part of the Engineering Solutions Group (ESG) business segment of Invicta Holdings Limited.

This acquisition is also a boost to the Fenner brand. BMG acquired Fenner Power Transmission over 20 years ago and is the exclusive distributor locally of highly acclaimed Fenner products. Joerg Foundry has been manufacturing Fenner Power Transmission components under licence since 2011 and this new agreement provides exciting opportunities for all companies. “Fenner conveyor belt products, which include steel cord and solid woven conveyor belting, are manufactured at the Fenner Isando plant. However, whenever castings are required, we are able to source them from Rustenburg Engineering and Joerg Foundry,” continues Kritzinger.

Rustenburg Engineering and Joerg Foundry operates as a medium-sized iron foundry, producing castings for original equipment manufacturers and end-users in a range of internationally compliant material specifications. Manufacturing facilities include a no-bake resin sand foundry for jobbing and short runs and a green sand foundry for production runs. The company’s expertise covers a range of capital equipment and consumable components used in diverse sectors, including mining, earthmoving, chemical, water, transport, rail, sugar, paper, agriculture, construction, mechanical power transmission and general engineering.

Typical products cast include wheel hubs, rod ends, torque plates, castle nuts, brake shoes, bearing and motor housings, rail components and flange couplings, as well as pulleys, valve bodies and diaphragms. The company also manufactures mill and barrel liners, wear plates, chill moulds, crane wheels, sheaves and bearing housings.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhly@bmgworld.net, www.bmgworld.net
Beckhoff will exhibit innovations in all technology areas at Africa Automation Fair 2019. As an expert in industrial PC design & in-house manufacture, ultra-compact IPCs will be on display, along with One Cable Automation, where users can reduce installation and material costs significantly with the OCT and EtherCAT P technologies. Beckhoff’s extensive range of explosion-proof components providing comprehensive solutions for barrier-free system integration right into Zone 0/20, upcoming TwinCAT Vision as well as TwinCAT HMI and the new TwinSAFE controllers for more efficient implementation of distributed safety applications will be shown along with extremely accurate, fast and robust EtherCAT measurement modules and solutions for Industry 4.0 and IIoT and the evolutionary EtherCAT G.

We look forward to seeing you at the Ticketpro Dome, Booth D11 – D12!
Martec’s new condition monitoring products

Machine Assessment and Reliability Technology (Martec) formally ushered in a new era with a holistic suite of intelligent condition monitoring products and engineered solutions. Heralding the company’s new strategic direction and innovative approach to condition monitoring, Martec’s brand now also boasts a fresh new look. Martec managing director, Johannes Coetzee and Pragma CEO, Adriaan Scheeres unveiled the new brand to much fanfare and applause from the audience.

“Martec has embraced Industry 4.0 and is excited about the possibilities it offers for huge advances in asset reliability resulting in sustainable plant integrity,” said Coetzee.

“We wish to partner with our clients to give them access to class-leading equipment and reliability solutions, including technology and tools coupled with specialist advisory services, field services and training. Our latest offering includes in-time monitoring and analytical solutions as part of a remote monitoring and diagnostics service to detect and prevent downtime, ensuring peace of mind for the plant owner.”

Coetzee further spoke about how companies who have critical electrical and mechanical infrastructure are often worried about the state of their assets with ageing infrastructure and the lack of skills to manage these assets. With absolute specialists on board, Martec is in the perfect position to outsource this specialised skill-set for specific asset classes. This is a great benefit to clients whose resources are stretched.

The long-awaited re-brand launch took place on 21 February and was celebrated with clients, colleagues and partners who gathered together at the Pragma Building in Waterfall Park, Midrand. Martec’s new look ties in with the Pragma identity and demonstrates how Martec is firmly part of the Pragma group of companies offering a comprehensive set of enterprise asset management solutions and technologies.

Martec is an engineering company specialising in turnkey condition monitoring solutions for asset-intensive industries and high energy usage clients. Martec operates throughout southern and sub-Saharan Africa with a team of experts in electrical and mechanical engineering.

For more information contact Martec,
+27 11 848 6940, info1@martec.co.za,
www.martec.co.za

A game changer for MCCs

The replacement of steel by aluzinc in the manufacture of Shaw Controls’ motor control centres (MCCs) is giving a range of benefits to the company’s customers. “Traditionally we used only steel for our MCCs, which needed to be powder coated in order to protect them from corrosion,” says senior manager of operations, Anderson Kohler. “This made it necessary to follow quite a long process in completing our products – a process which aluzinc can now simplify and speed up.”

Kohler highlights the extended lifespan of aluzinc, which comprises 55% aluminium, 43.5% zinc and 1.5% silicon. Manufacturers of the product guarantee that it will last for about 35 years before any major maintenance is required.

“The powder coating of steel panels complicates the earthing requirement on an MCC, as the paint layer insulates the panel and prevents conductivity,” he continues. For instance, the use of star washers must be strictly enforced among installation staff. Alternatively, certain areas of the MCCs are left unpainted to allow for earth connections. Kohler points out that this does raise the concern that it only takes a small oversight and the earthing will not be fully effective.

The use of aluzinc eliminates this issue as there is no longer a paint layer between the earth connection and MCC panel.

There is also the possibility of painted parts being scratched or damaged during transport and installation. When this occurs, it leads to the time consuming task of returning the part to the factory for proper powder coating, further delaying the installation and commissioning process. Indeed, if there is a need to weld again for any reason, then there is a repeat process of grinding and pre-washing before painting again. Kohler highlights that the corrosion-resistant properties of aluzinc allow parts to be kept in stock, ready for quick assembly. He notes that this is not possible with mild steel due to corrosion.

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Building sustainability through local manufacturing

There is enormous potential for southern African manufacturers to increase their market share both locally and internationally. The driving force behind capturing this growth opportunity is the South African Capital Equipment Export Council (SACEEC).

According to Eric Bruggeman, CEO at SACEEC, part of the Council’s mandate is to organise outward selling and inward buying missions. “We identified a need to showcase the offerings of the SADC region’s local manufacturers in an interactive manner. The result is the inaugural Local Southern African Manufacturing Expo (LME) being held at the Expo Centre, Nasrec from 21 to 23 May 2019.”

“Endorsed by the Premier of Gauteng, David Makhura, we believe that the exhibition will enable exhibitors to meet with top decision makers from the inward buying missions already committed to the event. As Industry 4.0 continues to transform the way that manufacturers do business, LME 2019 will provide them with an opportunity to grow their customer base, with the knock-on potential for fostering job creation,” says Charlene Hefer, portfolio director for Specialised Exhibitions Montgomery.

“It is critical for the sustainability of local manufacturing operations that they aggressively pursue opportunities to increase their market share. Not only is this relevant to their increased permeation of the overseas market, but furthermore, they need to capture market share that is currently being monopolised by importers. Recent statistics indicate that South Africa currently imports products to the value of a staggering R1,2 billion ($82.3 billion). If we were able to shift this demand to the local manufacturing sector, we could realistically create 1329 million jobs,” says Bruggeman.

LME 2019 will give local manufacturers from South Africa and other SADC regions a chance to not only display their capabilities and capacities to a captive audience, but furthermore it creates a forum for the exhibitors to network with their peers.

“We are excited about the prospect that local manufacturing operations have to evolve and expand by interacting with the inward buying mission representatives. Added to this are the benefits derived by the support of SACEEC, together with AREI the Association of Representatives for the Electronics Industry (AREI) and the Department of Trade & Industry (DTI). We urge local manufacturing companies throughout southern Africa to capitalise on the unique marketing opportunities of exhibiting at LME 2019,” says Hefer.

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www.localmanufacturingexpo.co.za

Zambian cement producer standardises on SEW-Eurodrive

A major cement producer in Zambia has not only standardised on products from SEW-Eurodrive, but has also invested in a comprehensive stockholding of critical spare units to prevent any downtime and subsequent loss of productivity.

The multimillion-rand order consisted of 40 units, including geared motors, planetary components and industrial gear (IG) units, ranging from 7.5 kW to 250 kW. A total of 15 customised IG units are being supplied by SEW-Eurodrive Finland, while other units are being sourced from Germany.

“This is testament to the internationalisation of SEW-Eurodrive, which can call on its extensive global capabilities to meet the specific requirements of major clients within the required timeframes,” comments head of exports, Marcio Sicchiero. “This long-standing client has had a close relationship with us for the past three years.”

Due to the size and quantity of the order, products are being dispatched to Zambia from Johannesburg in six different deliveries in order to facilitate transportation and logistics. Back-up offered on this project included advice on correct storage procedures. Being critical spares, these products will not be deployed in the plant straightaway and therefore have to be stored correctly to avoid any problems when they are required in the plant.

“The client has opted for the critical spares stockholding due to the impact that any downtime will have on productivity,” explains Sicchiero. This is a proactive approach to maintenance, which works well in combination with the ease of installation of these products."

Commenting on the current state of the cement industry in Africa, Sicchiero points out that the large producers are expanding aggressively. “There is thus significant scope for us to expand in this sector, especially with regard to standardisation of plants and the provision of critical spares;” he concludes.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
Siemens recently held an infrastructure technology day at its Midrand premises. The highlight was the launch of the new Sinamics G120X frequency converter range, which has been specially optimised for the HVAC, water and wastewater industries. “We are very excited about our new G120X range, which is a boost to our drives portfolio,” said vice president of Digital Factory and Process Industries and Drives, Ralf Leinen. “This also demonstrates our commitment to infrastructure development in Africa,” added head of Factory Automation & Motion Control, Vikesh Harikaran.

Portfolio sales professional, Malcolm Pillai identified five global megatrends that are shaping the world today: demographic change, climate change, urbanisation, nationalisation and digital transformation. The G120X range is perfectly positioned to line up with these. It is a specialised solution for the building technology, water and wastewater industries and is particularly suited to infrastructure applications like pumps and fans, as well as other machinery (e.g. for constant torque control).

Portfolio sales professional, Kaylin Pather presented some of the highlights of the new series:
• Outstanding ease of operation – the G120X is seamless, simple and time-saving – and commissioning is easy using the Sinamics smart access module (SAM).
• Operation is cost-optimised, with resource saving being a priority. The operating efficiency level is over 98%.
• The painted module is robust and drip-proof.

From l: Renash Rampersadh, head of Large Drives; Vikesh Harikaran, head of Factory Automation & Motion Control.

• The converters operate with utmost reliability under all network conditions.
• The series is ready for digitalisation by linking to MindSphere, offering users the opportunity to visualise and analyse valuable operating data which can be used as the basis for optimising processes and maintenance strategies.

Other Siemens solutions covered at the technology day included low voltage motors, PLC and HMI products, further control products and soft starters.

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keshin.govender@siemens.com,
www.siemens.co.za

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

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

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

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

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

His work has proved invaluable to plants and has resulted in greatly improved performance and ROI.
Hytec in partnership agreement with GS-Hydro

Hytec South Africa, and GS-Hydro, a multinational non-welded pipe manufacturer, have entered into a non-exclusive partnership agreement. This endorses Hytec South Africa as a sub-Saharan Africa distributor for all GS-Hydro components and piping systems above 42 mm. GS-Hydro is a leading supplier of non-welded piping solutions for hydraulic and other low and high pressure applications with a high demand on quality, reliability and cleanliness. The distributorship increases the company’s product and service capabilities and presents new opportunities for distributing non-welded, leak-free piping systems.

Cost savings through the lifetime of the piping systems are gained because there is a lower total installed system cost, a shorter installation time, less flushing time and reduced need for maintenance and repairs. “These benefits lead to fewer production interruptions and much shorter downtime when interruptions do occur,” says engineering manager, Andre Lindeque. “The flexibility facilitates fast and easy installation, which translates to significantly lower installation costs when compared to a welded piping system.”

The superior technology used, which provides the high-quality, leak-free piping system, is approved by classification agencies. The environmentally friendly pipes provide consistent quality due to machined and prefabricated assemblies, they are suitable for different materials, and they offer the highest level of cleanliness. “As there is no welding involved in manufacturing these pipes, there is no need for post-weld cleaning or costly weld inspections such as X-raying,” Lindeque explains.

Hytec South Africa currently has GS Hydro flaring and bending machines in use at its premises. The flaring machine provides 37° flaring with the capacity of flaring pipe sizes from 6 to 170 mm, and the bending machine has the capacity to bend pipes sized from 16 x 2 mm up to 60 x 6 mm wall thickness. Depending on the outside pipe diameter, the bend radius provided is either 2.5 or 3.0.

For more information contact Andre Lindeque, Hydraulic & Automation Warehouse, +27 11 281 3800, andre.lindeque@hytec.co.za, www.hytecgroup.co.za
BECKHOFF

- Automation Engineers

TwinCAT 3 and TwinCAT 2
Port Elizabeth 7-9 May 2019
Durban 14-16 May 2019
Johannesburg 21-23 May 2019
Cape Town 28-30 May 2019

For more information contact
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+27 11 795 2898, training@beckhoff.co.za,
http://www.beckhoff.co.za/za/support/training

VEGA

- Automation Engineers

Measurement Solutions – Level, Pressure
and Nucleonics
Roodepoort 11-13 Jun 2019

For more information contact
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claudia.olver@vega.com,
www.vega.com

Endress+Hauser

- Instrument Technicians
and Engineers

TC1001 – Process Measurement and Instrument Configuration 1
Sandton 13-17 May 2019

TC1002 – Process Measurement and Instrument Configuration 2
Sandton 20-23 May 2019

TC1003 – Process Measurement and Instrument Configuration 1 & 2
Sandton 13-23 May 2019

For more information contact Nico Marneweck,
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www.za.endress.com

YOKOGAWA

- Automation Engineers

VPOF – Centum VP Engineering
Randburg 13-17 May 2019

PCIW- ISA100.11a Wireless
Randburg 21-22 May 2019

VPMT – Centum VP Maintenance
Randburg 28-30 May 2019

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www.yokogawa.com

FESTO

- Mechatronic Engineers
- Maintenance and Repair Staff

ED811 – Servo and Stepper Motor
Drives - Basic
Johannesburg 15-17 May 2019

PN101 – Basic Pneumatics
East London 15-17 May 2019

PN361 – Energy Saving in Pneumatic Systems
Port Elizabeth 27-28 May 2019

For more information contact Sammy Kanye,
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DidacticTaC.za@festo.com,
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for details
From the President’s desk

In the pursuit of betterment, in an ideal world, we would like to think that every person, can, as a minimum, choose to leave this world in a better state than they found it. For each of us this might mean something different, as we each have a unique focus area and skillset with which to mobilise change.

Within the SAIMC we have seen over the years that our members are people who stand out and want to be a part of change: to change the world for the better for the youth of South Africa, and automation globally, through delivery in business and providing solutions that solve problems to ensure progress.

I want to congratulate each person who has been elected into the different leadership roles within the SAIMC. We are extremely proud to have each one of you as part of our team. I thank you for all the hard work that is done behind the scenes. The networking opportunities and knowledge sharing that is being facilitated is only a small visible aspect of the work you do.

I would also like to highlight additional partnerships where the SAIMC is working together to ensure that we are part of lasting change.

NTIP: his initiative is part of the SAIMC strategic pillar for education; working with the Industry 4.0 team, both Johan Maartens and Marc van Pelt have ensured that we move forward to change the way education is facilitated in South Africa in the future. It makes me proud to know that the result of the team’s work has ensured that the DTI and EU is supporting this effort, and that everyone is working together to make sure we realise this dream. (https://www.saimc.co.za/training-and-development/).

My Future 4.0: this is an initiative that I want you as a South African to note. Jobs for the future are vital, and this platform brings things into focus. Also, it is done in partnership with other organisations which are gearing up for future changes in employment requirements (https://www.myfuture4.com/).

Technews: if you are reading this letter I assume that you also read the rest of the publication. Technews is our media partner and we should never take for granted the work that goes on behind the scenes to ensure that well written reviewed technical information is given to you as an end user. From the SAIMC, all of our branches publish monthly newsletters and technical papers using this partnership, resulting in the publication of valuable information that the readers can enjoy. Thank you Technews team! (https://www.instrumentation.co.za).

FIRST: the SAIMC sponsored FIRST to ensure that the youth have opportunities to participate in an international automation competition. Many of our patron members also sponsor teams and we are all so pleased by their achievements. (https://www.firstinspires.org/robotics/ftc/).

Automation Federation: the SAIMC is a board member of the Automation Federation, which in turn represents more than 130 countries. As such, in August 2018, the board decided to establish an Automation Discipline world-wide. South Africa (the SAIMC) has started focusing on Process and Factory Automation. New positions are being defined and you have the right to ask: “where will I fit in to this new discipline?” (http://www.automationfederation.org).

Africa Automation Fair and Connected Industries: we are once more embarking on an exhibition specifically aimed at automation. If your company is planning to exist a few years from now, it might be worth your while to investigate the impact that Industry 4.0 will have on your business. Connected Industries is aimed at automation. New positions are being defined and you have the right to ask: “where will I fit in to this new discipline?” (http://www.automationfederation.org).

From the President’s desk
Tshwane branch

The branch technology evenings are held on the first Wednesday of the month at our new venue – the offices of IoT.nxt, with invites sent via e-mail. Unfortunately, at present only around 30% of subscribers open the invites and attendance is rather low, so we are looking at changing the behaviour and are open for ideas. For now we will offer a small incentive, probably in the form of a gift voucher from a shop/centre in Tshwane. Those who win this lucky draw at the technology evening will be entered into a competition to join the branch committee at the prestigious national gala dinner.

If one considers www.cbe.org.za it seems that ‘Identification of Work’ will be implemented/enforced soon, which means that CPD points and professional status will have an impact on us. Attending technology meetings will help! Please see below the schedule for the next few months. We still have a few open spaces, so, as always, feel free to propose a topic:

- April 3: sponsored by WIKA. Topic to be advised.
- May 8: sponsored by Swagelok. Topic to be advised.
- June 5: sponsored by IoT.nxt. topic to be advised.
- July 3: sponsored by Endress+Hauser (international speaker).

The branch invites companies (OEMs, agencies, system integrators, consultants etc.) in and around Tshwane who have an interest in industrial automation to join as a branch patron – an entity that supports our organisation. The SAIMC, an ECSA recognised Voluntary Association, strives to promote our profession through focus in three strategic areas: Education and Training; Growth; and Thought Leadership, all of which have project initiatives associated with them. These are implemented at both national and regional level. At national level, emphasis is placed on strategic initiatives and engagement takes place with different government and other bodies, while at branch level, emphasis is placed on ‘grassroots’ development.

Johannesburg branch

Is your data really yours?
This question was posed by Mark Dilchert of Integr8. With cloud-based storage and communication, a company's data goes in one end, (usually) comes out the other, without anyone really knowing whether it has been hacked in the process. This leaves companies vulnerable to industrial espionage and other nefarious uses of its data. This becomes even more open to misuse when radio links are used, as anyone who knows what they are doing can then listen in, even if it is via 4G or 5G networks.

So, what does one do?
The answer lies in encryption. While data generally goes through 128-bit encryption, this has become vulnerable to determined hackers. The better the encryption, the safer the data – so, if 128-bit encryption is becoming vulnerable, how does 2K or even 4K-bit encryption sound? Together with private keys at each end, the claim is that, using the correct router (in this case the Tosibox sold by Rubicon), a totally secure router-to-router link is created through the Internet, for a one-off cost, within minutes i.e. no monthly fees.

This is particularly useful in IoT applications, where one plant needs to communicate with another, going perhaps from one PLC to another. A direct point-to-point link is established, with perhaps the biggest chore being to make sure there are no IP address conflicts.

With security a growing concern in industrial applications, solutions like this can add peace of mind.

Branches

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With security a growing concern in industrial applications, solutions like this can add peace of mind.
Industrial process control is normally achieved by manipulating operating temperatures, pressures, levels and flow rates, with the aim being to produce an end product of proven quality while optimising the operation so as to minimise the production cost. Quality control is generally achieved by using analysis of samples that have been drawn from the plant and transported to a laboratory.

In many industries the use of a relatively remote laboratory to test the samples takes too long for the plant to be optimised when there are possible changes in feedstock or other external factors. Automated process stream analysers may be used to inform operators of quality changes, and ideally to provide an advanced control layer and improve efficiency.

The talk presented by Hennie Prinsloo and John Owen-Ellis to the SAIMC Durban Branch on the 6th March 2019 provided an introduction to what is required to design a complete analytical system. It started with an overview of the large quantity of information that is needed, and then took the audience through sample extraction from the process, sample conditioning to suit the analyser, and finally sample return to the process or other safe disposal point. Emphasis was placed on the need for compiling comprehensive and up-to-date information about the process fluid and potential contaminants so that a complete analytical system can be designed and implemented.

The talk concluded by demonstrating the information and design aspects of an on-line analyser that measures the amount of sulphur in diesel fuel, and which has been operating successfully for several years. The meeting concluded with networking over a meal to the usual high standard of the Durban Country Club.

Lucky Ntul, MUT, winner of the Student Award Scheme for the 2nd Semester seen accepting his award from chairman Hennie Prinsloo. For more information about Lucky’s project please go to: https://instrumentation.co.za/papers/J4343.pdf
Automation education and training in South Africa

By Johan Maartens, chief operating officer, SAIMC.

Part 2: The importance of industry involvement in skills development

Industry needs to take a leading role in curriculum content supply and quality standards development. We need to get the technical experts to the advisory committees to provide input about the course material and equipment the educational institutions will need to transform future graduates into experts on the latest automation technologies. Industry needs to inform the educators about its needs and assist in providing the relevant training material and facilities.

For many years, South African industry supported the local education institutions through initiatives like sponsored research, along with the creation of discipline-specific chairs and the like. So what has changed? The following, amongst others:

1. Technical development is now mostly the domain of the company’s own research and development divisions.
2. The political landscape has changed. This has resulted in a strategy shift and somewhere in the reorganisation the focus on education lost priority.
3. Non-technical managers are taking technical decisions, sometimes without proper consultation with industry experts.

In addition, the tough economic and trading conditions of the last ten years have forced many companies into survival mode, with the short-term pressure to increase market share and EBIT overshadowing everything, including responsible succession and longer term planning. Technology discussions no longer form a strategic item on the agenda at the board meetings of many local manufacturing companies. The result is a gradual erosion of global competitiveness, compounded as the companies of the developed world use the latest digital automation to open a gap to labour-intensive competitors.

Of course there are exceptions. These are led by an enlightened group of MDs and CEOs with the vision to ensure that their boards contain the right mix of technical experts in areas like information and operations technology.

New approach needed

However, when requested by the educational institutions to join their advisory meetings, industry mostly sends its HR representatives who often lack the depth of technology understanding around the skills a graduate engineer or technician requires to ‘hit the ground running’ in a modern smart manufacturing operation.

This has caused a misalignment between
industry requirements and educational syllabuses and the country is now beginning to suffer the consequences – not a problem unique to South Africa. Around the world, industry has realised that its future competitiveness is inextricably linked to technology, and therefore it can no longer afford to stand back with regards to educating and training the workforce of the future.

SAIMC meets the NTIP
For some time now, the SAIMC has been in discussion with various institutions about a possible curriculum for factory automation and the process industry – with little success it must be said.

In the search to provide industry with an education and training solution that meets its requirements, the team found that the tool, die and mould-making industry faced a similar dilemma in the past. A problem resolved over a number of years of close cooperation between industry and government (National Tooling Initiative Programme). Interestingly, the solution they developed could also provide a way out of the automation conundrum.

In April 2018, the government/industry partnership was expanded into a new programme, the Intsimbi Future Production Technologies Initiative (IFPTI) with a mandate to be the South African response to the Fourth Industrial Revolution needs for advanced manufacturing requirements and skills and enterprise competitiveness development.

The SAIMC has joined the board of directors of the governance structure of the partnership and our immediate past president, Oratile Sematle, was nominated to represent the SAIMC. The IFPTI, is a multi-stakeholder initiative that was established under the auspices of the Department of Trade and Industry (DTI) and the Production Technologies Association of South Africa (PTSA), the Manufacturing Circle, the Capital Equipment Export Council and the SAIMC. The focus is presently on clarifying how companies can support this initiative through industry managed complementary funding structures while at the same time aligning with national transformation objectives.

Characterising the requirements – a work in progress
The bullet points below summarise the proposed solution:
• The future qualifications and curriculum content should not depend on current outdated educational qualifications, but rather on modular, stackable competencies as required by future smart factories.
• The training must provide all students with a certificate that indicates the level of mastery that has been attained. By mastery is meant that although the graduate may not have knowledge of a specific production process, (s)he has a clear understanding of the applicable automation technologies including installation and maintenance at the lower certificate level, up to design and optimisation at the advanced level.
• Students must qualify for a certificate, diploma or degree according to the National Qualifications Framework (NQF). They should also be eligible for international certification – the aim is to make use of the qualifications available through the International Society of Automation (ISA) as well as the Automation Competency Model of the Automation Federation.
• Students are able to leave the system once they have achieved their desired level of expertise, but they are free to return and progress higher at any time.
• Although all attempts will be made to make use of the current educational institutions willing to participate in this rapidly changing environment (and we already have the support of some of the best players in automation education), this should not be seen as a limiting factor in the new programme. Various IFPTI advanced training facilities (Centres of Excellence) have already been established across South Africa and these will be expanded based on the new programme mandate to cater for the industrial maintenance and automation requirements of industry.
• Where professional registration is required, the SAIMC will commit to provide the necessary guidance to those individuals wanting to register with the Engineering Council of South Africa (ECSA), as we have done in the past.

Part 3 in next month’s issue will examine possible funding models for the new automation programme.

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www.instrumentation.co.za April 2019 21
The terminal/large depot (referred to as terminal) is a storage area where petroleum products are received through cross-country pipeline or large ships and stored in tank farms. The distribution is carried out using trucks, rail, pipeline or similar means. Yokogawa has accumulated more than two decades of experience in the automation of such terminals and supplied its Terminal Automation Solution to suit varying customer needs. Yokogawa offers focused solutions that address customer operational issues and improves accounting accuracy, asset, inventory and energy management, as well as control, safety systems and information visualisation across geographical dispersed terminals.

Terminal Logistic Suite VP (TLSVP) is an advanced software solution that performs the applications of truck loading, ship loading/unloading, tank car loading, inventory management (loss/gain, reconciliation, result management), stock management, master data management, security control and audittrail, and other movements operations (e.g. pipeline transfer). Yokogawa’s TLSVP is designed and developed to meet the operational demands of main oil, fuel and chemical distribution terminals applicable to oil, LNG, LPG and petrochemical/chemical terminals.

TLSVP manages the complete ordering procedure from assignment of order for loading/transferring to monitoring and control of loading/transferring procedure. The unique nature of Yokogawa’s TLSVP is its ‘adaptability’ to the customer’s environment, which has been achieved by building the system functions using modular blocks, where any individual block could adapt itself to the project specific requirements.

TLSVP features a modular design and easily adapts to customer specific requirements. The Engineering Builder and Engineering Tools make design and configuration easier. Other features include:

- Comprehensive coverage from terminal business management to automation systems.
- Seamless integration with Yokogawa Prosafe-RS system that provides Safety Instrumented System (SIS) and Fire and Gas System (FGS) functions.
- Integrates with SAP and other ERP systems.
- Various interfaces for subsystems such as tank gauging, MOV controllers, card readers and weigh scales.
- Physical and book inventory management and reconciliation function.
- Terminal Operation Support Service to store and distribute products, as typical terminal operations must account for the ownership of products with multiple owners and customers.
- SQL server as open database management system.
- High reliability associated with DCS and easy engineering using templates.
- User-friendly operation using Windows as the GUI.

Critical operational infrastructure for process automation

Yokogawa delivers critical operational infrastructure for process automation, where control platforms can be selected to match the diverse needs of users. For example, a relatively small terminal for truck loading would use PLC (FA-M3), while a larger terminal would use either RTU (Stardom) or DCS (Centum VP). The company offers PLCs, network control systems, web-based scada and DCSs for the terminal business. Examples of functions that can be automated at a terminal include:

- Traffic control.
- Batch and sequence of ship, truck and rail loading.
- Additive control.
- In-line blend control.
- Tank-to-tank transfer control.
- Cybersecurity.

Terminal control strategy could either be manual, semi or fully automatic, together with Batch S88 for which the Centum VP DCS is recommended. Centum VP enables automation and control of industrial processes and enhanced business performance. Design and configuration are modular and integrated to perform basic regulatory control, logic functions, sequence, non-safety related interlocks, process monitoring and alarm management, and trending and reporting. Availability is high at 99.99999%, thanks to a dual-redundant design which offers no single point of failure, online maintenance capability...
“Yokogawa’s system platforms combined with proven execution experience provide the highest quality innovative solutions for secure and optimised process automation and management.”

ProSafe RS is dual-redundant SIL 3 SIS, integrated with Centum VP DCS on the Vnet/IP control network to put an end to control and safety system integration incompatibility. This seamless structure realises true integration while reducing time and cost to implement process safety. Alarms and events are integrated with the DCS alarm and events messages with a real-time 1 ms event resolution on the Sequence of Events Recorder (SOER) function. ProSafe RS system features physical redundancy through dual CPUs with dual circuits on each card, physically redundant I/O modules, redundant power supplies and redundant communication. The system is SIL3 certified by TÜV, even when used in single configuration, and complies with the growing influences of functional safety standards such as IEC 61508/61511 and ANSI/ISA S84. ProSafe RS is a true implementation of one process, one network, one window, one solution concept.

With the release of the new Centum VP R6 and ProSafe RS R4, a solution platform that exceeds the capabilities of conventional production control systems, customers can take full advantage of new features like N-IO (Network-I/O) providing decoupling of hardware and software, and the new Automation Design Suite. The functionality of the new release of Centum VP enables the convergence of all Yokogawa’s strengths, providing an exciting environment where innovative methods provide completely new ways of cost saving and value generation.

Efficient project implementation

Agile Project Execution is Yokogawa’s methodology for executing all projects in a cost-efficient manner that eliminates waste. This results in improved operating efficiency, but also applies to a reduction of waiting time on a project, space optimisation, etc.

For information visualisation solutions across geographically dispersed terminals, Yokogawa’s scada systems/applications combine high-performance, high-availability, broad scalability and platform independence in a manner that maximises ROI while minimising TCO over the entire system lifecycle.

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www.instrumentation.co.za April 2019
When you hear Voice of the Machine, you may imagine a robot from the movies warning of danger in a voice that can be easily understood by the people around it. Today’s IoT-empowered machines – machines with a voice – can warn you of danger, but not quite that dramatically. By empowering machines to ‘speak’, valuable data is generated and captured as these machines perform their intended function, whether that function is delivering compressed air or transferring fluids. IoT enables these empowered machines to communicate with each other and with management systems that consolidate data to provide visibility into components and systems that have, until now, been ‘in the dark’. Much of the focus of IoT development has been on enterprise-level platforms that provide a top-down view of large systems. Yet, enterprise-level IoT, while indispensable to the future, captures only about 10 percent of the data available, limiting the ability to support predictive maintenance and performance optimisation at the component level. Unless supported by discrete-level IoT systems to deliver the remaining 90 percent of data from critical components, enterprise-level systems are unable to tap their potential to transform the business. Fortunately, the reverse is not true: discrete IoT systems can deliver immediate value independent of the enterprise-level system while still supporting the long-term objectives of those systems.

To move forward with IoT, Parker believes an immediate opportunity exists in discrete application areas. Voice of the Machine was created to help you capitalise on this opportunity. It is central to our digital transformation and builds on our 100 years of application experience at the discrete component level. Our extensive history, broad solution set and commitment to IoT through Voice of the Machine, make Parker uniquely positioned to help operators of critical industrial systems implement IoT in the way that makes the most sense for their organisation.

This paper outlines our IoT approach delivered under the Voice of the Machine platform, and how the supporting technology allows industrial operators to begin leveraging the benefits of IoT today while maintaining future flexibility.

Understanding The Voice of the Machine
The Voice of the Machine embodies Parker’s approach to IoT, including our centralised initiative to standardise IoT technology across our businesses, IoT-empowered products that result from that initiative, and our promise to customers. Through Voice of the Machine, we have established a common set of standards, principles and best practices across our operating groups. As a result, all Parker products use the same communication standards and security architecture, and visualise data in the same way. This ensures we deliver value through interoperability and create a consistent user experience.

From a technology perspective, we’ve focused our efforts on minimising the challenges that have prevented operators in critical industries from leveraging IoT to solve operating problems such as downtime and maintenance costs. If you’ve considered this transformation for your operation, you’re already aware of challenges like legacy devices that are not IoT-enabled, competing communication protocols used by various suppliers, securing devices and data, and determining what data to collect and how to present it to the people who can use it to improve operations.

Interoperability
The value of any IoT solution is directly proportional to the level of interoperability achieved. Parker is a founding member of the OPC Foundation, creators of the OPC Unified Architecture (OPC UA). The OPC UA is an open machine-to-machine communication protocol for industrial automation that offers robust security and compatibility across operating systems and programming languages. Parker is also an active member of the Industrial Internet Consortium, a global partnership focused on accelerating the growth of the industrial Internet by identifying, assembling and promoting best practices, including defining and developing the reference architecture and frameworks necessary for interoperability.

Affiliation with these industry associations, combined with our centralised approach, has enabled us to consistently employ open standards and architectures across all of our Voice of the Machine products to provide out-of-the-box interoperability between Parker components. We’ve also implemented an exchange based architecture that simplifies integration with third-party products, platforms and services.

Security
All Voice of the Machine-enabled products have been designed with a consistent security architecture that provides device and user authentication and maintains device and user
identities in a secure fashion. We employ best practice data encryption in motion and storage to create an end-to-end secure ecosystem. We use best-in-class security practices that protect device communications both up and down the stack. Our cloud-based solutions provide strong encryption, transaction authentication, segregation of user and device data, and application logic and logging systems to monitor proactively for vulnerabilities.

Scalability
There’s little doubt IoT will become an increasingly important tool in managing industrial technology as it continues to evolve. That’s why it’s critical to deploy technologies today that can scale as your use of IoT expands. Our commitment to interoperability ensures you won’t get locked into a proprietary technology at the product, application or platform level. Across the spectrum, we can work with third-party products or platforms, delivering meaningful data in a form they can use. In addition, our Voice of the Machine development partners allow us to quickly customise an IoT solution to your application globally.

Data access and visualisation
Critical to the success of any IoT implementation is knowing what data is necessary to achieve the objectives of the implementation. Our approach prioritises quality over quantity so you don’t get bogged down with meaningless data. Our growing library of visualisations is portable across all Voice of the Machine products to ensure a consistent experience. We provide data and alerts in a form that makes sense for your business.

While the technology itself is impressive, Voice of the Machine is more than a suite of products; it represents our commitment, expressed through our cohesive strategy, to deliver solutions that make it easier and more cost effective for you to monitor assets remotely to reduce risk, maintenance cost and unplanned downtime, while uncovering hidden opportunities to improve efficiency.

Voice of the Machine in action
Voice of the Machine is being implemented across a broad range of Parker products. Here are three examples:

- Connected factory compressed air systems: In manufacturing, compressed air is critical to keeping lines operating. With IoT-empowered compressed air systems, you can quickly deploy condition monitoring and predictive maintenance routines for factory compressed air piping systems. The condition monitoring system uses advanced sensors, software and wireless or Bluetooth connectivity to provide a comprehensive picture of system performance through both real-time and historical data. By providing data on vital operating metrics, such as pressure, temperature, humidity, power and flow, through an easy-to-use interface, users can rapidly diagnose problems, such as leaks, and employ predictive maintenance routines that allow them to address seemingly minor issues before they snowball into serious problems.

- Electro-hydraulic control: Parker’s IQAN Connect solution integrates intelligent hydraulic components with electronic control hardware and software to create a seamless digital system. With IQAN Connect, equipment performance is optimised and remote monitoring is simplified for OEMs and fleet managers. The system’s building block approach reduces development time and enables advanced functions to be added without custom programming.

- Asset management: The Parker Tracking System (PTS) is an innovative component tagging and asset management solution that focuses on critical wear components to drive new levels of productivity, efficiency and reliability. Ideal for companies looking to plan for and perform asset management and replacement services for a wide variety of product types, PTS can establish detailed asset location data, create and deploy custom inspection templates, store and retrieve historical inspection results and schedule and personalise MRO alerts and notifications. PTS has been engineered with key industries and user profiles in mind. What makes PTS unique is the ability to move asset records between accounts or create affiliate relationships between users.

Getting started with discrete IoT
Before getting started with any IoT implementation, first consider what you’re trying to accomplish and whether IoT is the best technology to achieve your objectives. It’s easy to get caught up with the promise of IoT, but not every operating challenge requires an IoT solution. The right partner can help you determine the correct approach for your operation at this time.

With that caveat, it’s important to note that by ‘lighting up’ assets that have previously been dark, IoT is proving capable of addressing some of the core issues that have troubled operators for years. It represents a new solution to problems you may have simply learned to live with.

First-time IoT users often start with a condition monitoring solution for one or two critical assets. This addresses the common problem of downtime and its expense while allowing a controlled pilot of IoT that can impact the bottom line and inform future IoT implementations.

Here are six steps to help ensure success with your first IoT implementation:

1. It’s often beneficial to engage with a knowledgeable partner early in the process to brainstorm the problems that are holding you back. What are those problems that you’ve lived with for so long that you don’t even think about solving them any more? Addressing those issues through a focused IoT solution may represent the best path forward.

2. Determine what business metrics are relevant to the solution and work with your partner to develop a solution that addresses the identified problems. First time IoT users often start with a condition monitoring solution for one or two critical assets. This addresses the common problem of downtime and its expense while allowing a controlled pilot of IoT that can impact the bottom line and inform future IoT implementations.

3. Consider a strategy in which you listen to the most critical machines or processes without necessarily attaching a sensor to every machine or component. List the assets of critical importance to your operation and identify a small subset of those assets to begin gathering greater operational insight. Machines that are difficult to repair or have rare parts should be added to the short list, as well as assets that could present a danger to employees if conditions go unchecked.

4. Identify the conditions most critical to each asset on your shortlist, such as temperature, pressure, humidity and vibration. What are the conditions that allow operators to predict that asset’s health? Focus on the quality of the data you’ll be getting, rather than the quantity.

5. You’ll need an Internet infrastructure to support data transmission to the cloud. Our Voice of the Machine platform provides a centralised collection server to receive and transmit data from all sensors in the network. If sensors are out of range, repeaters can be installed to extend the signal without interference.

6. Find a balance between monitoring frequency and operational costs. Cloud-based solutions allow for more constant monitoring, as well as alerts for when conditions breach a threshold. Leaving cloud-based sensors active on an asset allows users to zero in on problem areas with large, complex equipment. You can also connect to the sensors to plot data trends and diagnose where the problem is occurring quicker and more easily than if the operator was using manual gauges and manifolds.

By beginning with business problems, identifying critical assets that benefit most from condition monitoring, and employing a cloud-based solution, you can get IoT up and
running with minimal disruption. Parker IoT
experts are available to assist you in developing
an IoT strategy and implementation plan.

**Industries with the most to gain from
discrete IoT**

Industries that derive the most value from
IoT Today are those that have operations or
equipment located in hard to get to places.
where there are safety concerns, where
downtime is expensive, where the operations
and processes themselves are expensive and in
highly regulated environments.

These include:

**Mining:** Mining equipment operates in a
harsh environment and often in remote places.
IoT-empowered solutions in operation on
equipment ranging from roadheaders below
ground to dump trucks above provide the
visibility to decrease downtime and increase
safety.

**Oil and gas:** Parker has been providing oil
and gas solutions for decades. By enabling
data from a connected pump, we have virtual
flowmeters and help direct maintenance staff
to remote problem sites more efficiently.

**Medical devices:** Parker makes a number of
medical device components and solutions.
Patient care and monitoring are areas where
insights from connected products can have a
major impact on patient outcomes.

**Power generation and renewables:** Grid
stability is always important. This is getting more
difficult to manage as renewables comprise more
of the grid. Parker's energy storage solutions not
only keep the grid stable when disparate power
sources enter the grid, they also allow these
systems to be managed remotely in ways not
previously possible, ensuring maximum uptime.

**Automotive manufacturing:** Compressed
air is essential to automotive manufacturing.
Delivering it and maintaining constant pressure
throughout the system consumes significant
resources. To address this, Parker has created
Transair Scout, which helps manage and
optimise compressed air system performance.

**Municipal water treatment and waste
management:** Water treatment and waste
management facilities are subject to a high number
of safety and regulatory requirements. Parker offers
wireless condition monitoring solutions that can
be used to monitor water treatment processes to
ensure compliance with regulatory demands and
increase safety for workers.

**Mobile industrial:** Mobile industrial vehicles
are built with a purpose, and that purpose can
be critical to a company's profitability. When
hydraulics are essential to that purpose, Parker
can provide insights and direction to best
optimise their operation.

**Chemical processing:** With regulatory demands
and increased safety concerns for workers
in plants that either produce or work with
chemicals, connected products can be used to
enable visibility into critical operating parameters.
IoT solutions will empower plant operations to
report regulatory data in real time all the time.

**Conclusion**

While IoT can be seen as early in its maturity,
the technology has reached the point in its
evolution where it can deliver significant value
in industrial applications if the right partner
and right approach are selected. Our Voice
of the Machine initiative and solutions were
created to enable a focused, cost-effective
and secure approach to IoT. Through Voice of
the Machine you can target your most critical
assets for condition monitoring, realising
immediate benefits while laying the foundation
for expanded use of IoT in the future.

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**Faster results with a digital twin**

High tech company Grenzebach’s portfolio
includes the simulation of material flow
in complex plants in the glass industry. To
achieve this, Grenzebach uses Siemens’
simulation solutions. Together, the two
companies have developed the most recent
product from Grenzebach, the tin-air speed
stacker, a machine for stacking all types of
glass sheet. This expertise has produced a
Siemens digital twin for the first time, as
well as the motion control. This allowed
all the functions and permutations of
the stcker to be simulated while simultaneously
developing the initial motion control program
to provide an optimum starting point for
virtual commissioning. By running what were
previously sequential development steps in
parallel, it was possible to reduce both
development times and costs significantly.

The tin-air speed stacker is a three-axis
stacker which can selectively pick up
glass sheets from the tin side or the air side
and rapidly place them vertically on a glass
rack – up to 20 times a minute. This represents
a 30 percent improvement in stacking
performance and makes the tin-air speed
stacker the most powerful stacker in its class.
The motion control is provided by a Simotion
D445 motion control system with the Handling
Advanced universal library as well as Sinamics
S120 modular converters and Simotics S
servomotors. Grenzebach was venturing
into completely new ground with this
development. “In order to get to grips with the
potential singularities of the kinematics, which
were similar to those found in articulated
robots, we decided to build a digital twin for
the first time,” explains Roland Jenning, head of
Innovation at Grenzebach.

**Erring on the side of caution**
The digital twin was produced using the NX
Mechatronics Designer software from Siemens
PLM Software. The initial motion control
programs were created at the same time as
the digital twin, which reduced the
development time and time to market
significantly. To make the simulation of the
programmed movements in the digital twin as
close to reality as possible, Grenzebach
chose a ‘hardware in the loop’ design in which
the control is connected to the kinematic
modal in NX via a Simit simulation unit. The
program is then tested using the Simit
Scout engineering system; Simit picks up
errors and highlights weak points. This allows
processes to be optimised long before the first
actual commissioning. However, this is not
the end of the digital twin’s usefulness. Future
modifications to the plant or changes to the
product can be played out virtually in advance
and checked for errors without disrupting
continuous operation.

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Global trends such as Industry 4.0 are transforming the traditional methods deployed to extract ore from rock. Mining operations are instead looking at innovations such as automated drilling in high risk areas underground to enhance safety. This is where software solutions like Pitram from Micromine can assist mining operations to automate, and thereby boost efficiency dramatically.

As a leading software solutions provider for the mining industry, Micromine strives to stay ahead of the curve in terms of trends such as Industry 4.0, commonly referred to as the Fourth Industrial Revolution. Industry 4.0 refers to the current trend in automation and data exchange in manufacturing technologies, including cyber-physical systems, IoT, cloud computing and cognitive computing.

“Currently Pitram is being developed with AI and machine learning functionalities in the software in order to take the product to the next level,” says Africa marketing coordinator, Craig Sternslow. “Pitram is a fully-configurable solution that captures, monitors and reports on operational and production data.”

According to global marketing manager Kate Gilbey, there is an ongoing trend towards increasing automation and even AI to assist mining operations in terms of smart optimisation. In an industry such as mining, where improving productivity is crucial to profitability, even small improvements in yields, speed and efficiency can make an extraordinary impact. AI and machine learning can assist mining companies to find minerals to extract, a critical component of any smart mining operation. Although AI and machine learning are still relatively new in the mining industry, many companies are excited about the prospect of being able to reduce personnel risks, obtain real-time data and make processes more efficient through these types of advances.

“As a client’s operation evolves and needs change, our solutions can be adapted to evolve with the mine. This represents a capital saving to clients, as they can continue using elements of their original, familiar application. Our solutions span the entire mining process, from exploration through to mine production, and cater for all mining operation needs through the provision of our suite of products, friendly and customer-driven staff, services and post-implementation support,” she explains.

Micromine’s research and development teams work around the clock to forecast what its clients and future clients will need in their software toolkit. “This means we have to think about where the industry is going. Our products are evolving constantly. Every major update comes with multiple service packs to fine tune that product,” Sternslow adds.

In this regard, Micromine is developing new underground mining precision performance software that uses machine learning to refine and enhance loading and haulage processes. It will be released early this year as part of the Pitram fleet management and mine control solution.

Using the processes of computer vision and deep machine learning, onboard cameras are placed on loaders to track variables such as loading, hauling, dumping and travelling empty time. The video feed is processed on the Pitram vehicle computer edge device, following which the extracted information is then transferred to Pitram servers for processing and analysis.

In environments where network connectivity is intermittent or does not exist, field computers become critical for computations and integration. Geobank Mobile is designed to operate in this edge computing environment. It has the ability to integrate directly with field measurement devices to deliver a practical and efficient solution to the user. “An exciting new development in terms of Geobank Mobile is its integration with DSLR cameras to capture imagery of the drill hole core,” Gilbey continues. For example, AngloGold Ashanti Australia is using this technology with a camera mounted to a mechanised track that sits above the chip tray. It automatically takes photographs of drill hole geological chip samples. Through seamless integration, these photographs are fed from the camera to the Geobank Mobile solution, which has been configured to rename the file based on the hole identifier.

“As an industry leader in mining software, with offices located strategically all over the world, we are trusted advisors to our clients and can offer sound advice as well as solutions for every need throughout the mining cycle. Our main aim as a software provider is simply to ‘Make Mining Easier’. Mining operations must not be afraid to change and to adapt to the changing mining environment,” Sternslow concludes.

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Every company that makes use of modern field and control engineering has data that could be utilised to monitor things better and improve efficiency. It is worth taking a look at which solution suits which application. Implementation is easier than it looks – even when big data analysis and artificial intelligence come into play. New or modernised process plants should be fun places to work: they are equipped with reliable instrumentation; the latest control engineering makes operation easier; and they feature marking and wireless solutions that mean maintenance and inspection rounds can be documented electronically.

If you stop improving …
Now is the time to take the next step. A functioning, safe plant is a compulsory component. But in the global race for competitive prices, it is the most efficient processes that win the race. Process owners cannot afford to ignore a commodity that they already have access to – tons of data, information and knowledge. Knowledge, if used correctly, can lead to even greater plant efficiency, safety and reliability.

Every plant operator is familiar with the problem of installing expensive fieldbus or HART-compatible measuring devices, which constantly provide more data in addition to the actual measured values. But the vast majority of this information is never used – where do you start?

Artificial intelligence and mass data: a fertile partnership
Often it helps to get a different, outside perspective. Stephan Sagebiel, head of industry management process technology and engineering at Phoenix Contact, has already been involved in several projects where varying perspectives have provided valuable input. He says that the huge variety of diagnostic information available is not all useful to every user group. Many monitoring solutions simply serve to notify the maintenance team of a malfunction. “But there are some application areas, such as motor monitoring, where the data does not provide the maintenance engineer with enough information to draw up a maintenance schedule,” he says.

Operating pumps and compressors in particular generate a huge amount of data, which must then be analysed in a time-consuming process. The operator gets the most benefit from this if the data is not just sent to the on-site notification system, but is made available to a cloud platform, together with data from thousands of other pumps. Patterns can then be identified and investigated. Ultimately, artificial intelligence can turn a heap of measured data relating to vibrations,
performance and other parameters into reliable predictions: when will which pump sustain what damage?

“The endless computing capacity that the Internet is able to harness through outsourced cloud services enables it to provide predictive maintenance better than any on-site control system or application could,” continues Sagebiel. But he qualifies this by saying it is by no means always necessary to have the Internet and artificial intelligence to make process plants more user-friendly and efficient to run. For other plant components such as trace heating, you might simply want to know if it still works, and for this you don’t need to analyse mass data. Monitoring – by measuring current, for instance – is easy; but a failure noticed too late could be catastrophic.

NOA and OPA need time and brownfield plants cannot wait

One can throw money at the problem and assemble a large workforce to carry out additional monitoring and optimisation tasks. Structures such as those put forward by Namur (NOA, Namur Open Architecture) or Exxon Mobile (OPA, Open Process Automation) can be helpful here. Both approaches enable extra sensor signals to be retrieved via an open interface such as OPC UA, and several large corporations are currently laying the foundations to do this. But for countless smaller firms, this approach is a long way off. “This doesn’t have to be the case,” counters Sagebiel. “Every plant operator can do something about plant availability and better maintenance processes. And not necessarily just by shifting everything to the cloud. Plant operators can do this with modest means. We can provide support to help implement local alert systems or enhance the collection of measurement data in brownfield plants.”

If a plant already has full coverage WLAN and performs paperless inspection rounds, it is not far away from taking the next step of introducing augmented reality to assist its fitters.”

50 to 60% of all unscheduled plant failures. This is true for many plants, but not all. We help our customers to find the right solution for the application in question on their plant, and then to implement it.” He adds that many maintenance teams in large factories spend a great deal of time regularly inspecting all the wells and shafts. Simple solutions can offer an alternative means of continuously monitoring the shaft and report both unauthorised opening and the level within the shaft. “All it takes is one measuring device with a modem and a battery – the staff just have to stop by every six months to change the battery. Even better, personnel will be notified when it is time to carry out this task,” he continues.

It is just as easy to monitor, whether hand valves are in the open or closed position. Simple technical solutions are all that are needed to record the end position, based on the NAMUR limit switch, for example. The signal can be transmitted into the control system wirelessly, so errors made by production workers, whether from actuating the valve incorrectly or simply neglecting to enter information in the software, can be avoided.

Sending diagnostic data to the cloud

Things become much more complex if a plant operator wants to squeeze maximum availability from valves and positioners, since these provide hundreds of items of diagnostic information that cannot be readily assigned to an ageing process. But there are software tools that can make reliable predictions based on mass data analysis. If the provider of such a tool is granted access to the HART signals of all positioners, the software can warn of leaks or a deteriorating valve lift in good time. A valve app, which each user pays a small fee for, facilitates the scheduling of maintenance work, thus optimising system availability.

Maintenance 4.0 in a demo plant

Together with other equipment suppliers and service providers from the chemical and pharmaceutical industries, Phoenix Contact is working in a demonstration and test plant to gain experience in developing and realising Industry 4.0 applications. The plant was built by Bilfinger Maintenance in 2017 in Frankfurt-Höchst, Germany, for the Interessengemeinschaft Regelwerke Technik (IGR) consortium. It generates process and diagnostic data for cloud applications so that Maintenance 4.0 concepts, for instance, can be tested out. Sagebiel says: “The plant gives us manufacturers the chance to show what we are capable of. Here we can test our cloud platform under real conditions, prove our IT security skills, and make use of artificial intelligence mechanisms.”

Network intelligence for columns

This could revolutionise how distillation columns are controlled, for example – an issue that has still not been solved satisfactorily. If IT specialists had access to all available variables and disturbance variables, they would be able to create the ideal closed-loop control. All they need are these variables and enough computing capacity. The ProfiCloud coupler gives them access to both. Any online services the IT experts like can be used on the Internet or intranet. Some new set points are returned, e.g. as Profinet variables or as a recommended action, depending on the application. Taking pump analyses as an example, diagnostic data is fed into the network as big data, and what comes back is something like: “Please replace pump 27 within the next three months.” Anyone choosing ProfiCloud will benefit from the option to integrate it directly into the Profinet or other networks.

Other potential applications will be a welcome playground for IT and automation graduates joining the industry today. For anyone used to using a Raspberry Pi in their private environment, Phoenix Contact’s latest PLCnext generation of controllers will be right up their street. People can carry on working with the PLCnext controllers just as they do with their Raspberry. This platform is open for open source software, apps and other future technologies. It has intrinsic real-time and fieldbus capabilities, making it suitable for industrial use – one more building block that can help to make brownfield plants fit for the future.

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Stepping carefully into the Fourth Industrial Revolution

By Aalia Manie, partner, Webber Wentzel.

Rapid advances in technology and artificial intelligence in the mining industry raise issues like data protection, intellectual property ownership and legal liability. In the current absence of specific legislation to govern emerging technologies like artificial intelligence, businesses must continue to rely on existing laws and ensure that they enter into robust contracts.

In December, government invited the public to nominate candidates to serve on the Presidential Commission on the Fourth Industrial Revolution (4IR). This development should be of interest to the mining industry, where artificial intelligence, big data and technology are rapidly converging in various ways.

Need for regulation

The 4IR is creating a need for regulation on issues such as unemployment, intellectual property (IP), data privacy and security, and liability for defects and loss of control.

The commission, announced in President Cyril Ramaphosa’s state of the nation address earlier in the year, will identify what strategies, policies and plans SA should put in place to position itself as a leading country in the technology revolution. However, these regulations have yet to be drafted and their nature and scope is not yet known.

In the mining sector, some companies are using digital twinning, a virtual reality environment that mirrors the mining environment and is used for training employees on potential risks in the workplace. They are increasingly investing in autonomous vehicles and equipment. There are also intelligent data analytics systems enabling valuable analysis of data, which are collected using the internet of things (IoT) technology. For example, the latest mining equipment can be fitted with sensors that generate messages about breakdowns or safety issues. With better data, capital and labour can both be optimised, allowing for better decision-making.

Artificial intelligence legislation

Artificial intelligence is being deployed in a number of other industries too. Yet at present there is very little specific legislation, either in South Africa or anywhere else, to manage its effects. For companies wishing to access the latest emerging technologies, there are key issues that need to be addressed, no matter what business model is used.

When using or licensing technology

“The technology evolution is exciting, but it also presents challenges which must be carefully considered and addressed as part of effective business planning and strategy.”

be aware of the implications of IP ownership

Companies can also access or develop technology through commercial partnerships and joint ventures. A critical issue from an intellectual property perspective is ensuring clarity on ownership of jointly developed intellectual property and databases, and who owns and/or may use them if the relationship terminates – which may be particularly problematic if the termination happens on acrimonious terms.

A second way of procuring technology is through acquiring or ownership of the IP in the technology, which gives rise to typical merger and acquisition issues such as the necessity for a due diligence to confirm the rights of the seller in relation to the technology. Companies can also build new technology by developing it in-house or with an academic institution, as some mining companies are already doing.

Companies using university facilities for research and development must be aware of the IP implications of engaging in publicly funded research and development through academic institutions, which are governed by the Intellectual Property from Publicly Funded Research and Development Act (IPR) Act.

Align with global best practice

The technology evolution is exciting, but it also presents challenges which must be carefully considered and addressed as part of effective business planning and strategy.

Whatever approach SA takes towards regulating artificial intelligence and emerging technologies, it should align itself as closely as possible with global best practice to ensure uniformity. SA has to remain competitive as a jurisdiction for technology investment, research and development.

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Hygrometer for environmental management and control

Fluke and Hart Scientific have revolutionised environmental monitoring for calibration laboratories with their model 1620A DewK which offers Ethernet and wireless connections and upgraded LogWare III software.

**Accuracy**
Two types of sensors are available. The high accuracy sensor (H model) reads temperature to ± 0.125°C over a calibrated range of 16 to 24°C. Relative humidity readings are to ± 1.5% RH from 20% RH to 70% RH. The standard accuracy sensor (S model) reads temperature to ± 0.25°C over its calibrated range of 15 to 35°C. Relative humidity readings are to ± 2% RH from 20% RH to 70% RH. All DewK sensors come with NVLAP accredited certificates of calibration for both temperature and humidity, complete with data and NIST traceability.

**Ethernet and wireless capability**
The DewK features built in Ethernet RJ45 jack, and multiple DewKs can be monitored from the same screen using the new LogWare III client-server software. Ethernet also allows for the possibility for remote connectivity over the Internet, so that critical conditions can be monitored from a remote location and data can be sent to a printer through the RS-232 interface in real time.

**Mathematical and statistical functions**
In addition to temperature and humidity, the DewK calculates dew point, heat index and rates of change for both temperature and humidity. Min, max and a variety of other statistics are also calculated and can be shown on-screen. Daily summary statistics, including min, max and maximum rates of change are stored for the most recent 60 days.

**Calibrated sensors**
The DewK has inputs for two sensors, each measuring both temperature and relative humidity, so that the DewK can monitor two locations simultaneously. Both sensors can be run via extension cables to remote locations up to 33 metres away, or one sensor can be directly mounted to the top of the DewK.

Each sensor is calibrated for both temperature and humidity at Fluke Calibration. The calibration constants assigned to the sensors reside in a memory chip located inside the sensor housing, so sensors may be used interchangeably between different DewKs. Sensors may also be assigned a unique identifier up to 16 characters to facilitate record keeping by matching the sensor identifier with the collected data.

**Memory**
The DewK has an impressive memory capacity – enough to store up to 400 000 date and time stamped data points. This translates to two years of data for both measurements from two sensors from readings taken at ten minute intervals.

**Alarms and battery backup**
Alarm settings are easily made, based on temperature, the rate of change in temperature, RH, the rate of change in RH, and instrument fault conditions. Alarms can be both visual (flashlight display) and audible (beeping). Likewise, alarm settings can be set up and events triggered in LogWare III. The DewK is also equipped with a 0 to 12 V alarm output that can trigger a process control system. A backup battery shuts down the DewK's display but maintains measurements for up to 16 hours in the event of a power failure.

**Variable display**
Finally, the DewK can be configured to display in up to 16 different setups that can be stored, recalled and easily modified.

**Features at a glance**
- Superior accuracy
- Network enabled
- Powerful logging and analysis tools
- Two interchangeable calibrated sensors
- Huge memory

*For more information contact Comtest, +27 10 595 1821, sales@comtest.co.za, www.comtest.co.za*
Utilities are rarely the focus of attention in industrial production, but without them very little would be possible. At the same time, utilities offer enormous potential for liquid analysis measuring technology.

What is actually meant by the term utilities?
One possible definition is that utilities form part of the plant as a service to production, but not part of the core manufacturing process. Water is one of the most important raw materials for industrial production. It is needed in the production of almost every single product in use on a daily basis. Industrial plants producing anything from chemicals, oil and gas to food and beverages, all need vast amounts of water.

Water in utilities involves the various auxiliary processes that go into the provisioning of process water, boiler feedwater, steam, cooling water or wastewater. Of the mentioned processes, steam generation has the highest costs associated with it, and therefore the most potential for savings.

As a rule, water needs to be treated before it’s introduced into a process, to ensure water quality and compliance to the specifications of the industrial process. There is a strong demand for facilities to recycle and reuse wastewater, for financial, legal and regulatory reasons. By reusing water in industrial processes businesses can decrease the amount of wastewater they produce and reduce the negative impact on the environment. Water recycling can also lower costs in regions where the price of potable water is high, or where water supply is unreliable. Recycling is one of the key ways to reduce water consumption since water can be reused many times over.

Inadequate water treatment and inferior water quality can critically impact equipment and products. Analytical measuring technology is therefore very important for utilities. While utilities may be ‘auxiliary processes’ they are in no way insignificant. Depending on the industry, utility applications account for a large portion of the liquid analysis instruments used in industrial water plants. A few examples from the food industry are illustrated below, but similar examples apply just as easily to other industries such as chemicals, mining etc. All these industries use vast quantities of water, which must be treated before and after it enters the core processes.

Water treatment in the food and beverage industry
The food industry requires high-quality water, which often exceeds drinking water quality
standards. Whether it is used as product water, cooling water or for cleaning and hygiene – the importance of pure water in food production cannot be overemphasised.

The water quality often directly affects the quality of the product. In enzymatic processes, the pH value is a critical factor. For example, if the pH value of brewing water is too high, this adversely affects the taste and colour of beer. Minerals and residues dissolved in water impact processing, and cause deposit formation and corrosion on wetted parts. Corroded and lime-scaled piping systems encourage the build-up of dirt and microorganisms, and therefore the formation of biofilm. Water that is properly treated not only ensures high product quality, but also guarantees disturbance free operation and increases system reliability. Depending on the quality of the raw water and the requirements, water treatment is often a multi-step process.

A variety of filters, ion exchangers, reverse osmosis and other treatment techniques are used to remove impurities and create purified water. Analytical measuring devices include:
- ConduMAX CLS16D to monitor conductivity as a key parameter for assessing water purity.
- Ceragel CPS71D to regulate the pH value.
- Turbimax CUS52D to check the efficiency of filtration processes.

**Industrial wastewater treatment**

Due to the volumes of wastewater produced and the variations in the load, particularly the pH value, wastewater needs to be treated both in the case of direct and indirect discharge. Direct dischargers usually have a biological treatment stage in addition to facilities for neutralisation, oil and grease removal (e.g. dissolved air flotation plants) and mixing and equalisation basins. In the case of indirect discharge, the wastewater treatment technology needed will depend on regulatory requirements (e.g. municipal codes and by-laws). As public wastewater treatment plants are often not designed for high loads, wastewater – such as produced in dairy processing – must be pre-treated through an in-house wastewater treatment facility before it is discharged. Analytical measuring devices include:
- pH measurement during neutralisation e.g. with CPS11D.
- Oxygen measurement during sludge activation with COS61D or COS51D.
- COD measurement in the outlet of indirect dischargers with CA80COD or CAS51D.
- TOC measurement with CA72TOC.

**A clean solution**

Biological wastewater treatment using regenerated activated carbon saves disposal costs.

Finding an optimum way to treat wastewater in the oil and gas industry is a crucial issue. With its Wet Air Regeneration (WAR) system, Siemens is providing a method which works in combination with the powdered activated carbon treatment (PACT) system to recycle more than 90 percent of the required activated carbon, reliably destroy adsorbed contaminants, and convert sludge to ash. This avoids costly and laborious disposal to landfill.

Both a resource and a by-product, water plays a vital role in a whole range of different industries. The wastewater produced as a by-product naturally has to be disposed of or treated responsibly. In upstream and downstream activities, water management is highly complex and has to comply not only with global standards but also with environmental legislation and the relevant regulations governing energy consumption. For this, Siemens Water Solutions offers its customers a particularly efficient and also environmentally sustainable process: the Wet Air Regeneration (WAR) system.

**Less fresh carbon required**

The solution is based on the world-class Zimpro Wet Air Oxidation (WAO) system, which oxidises contaminants in an aqueous solution using oxygen as the oxidising agent. By combining a WAR system with a biological PACT system, the amount of fresh carbon required can be substantially reduced.

**No costly disposal**

The PACT/WAR system can be used to treat the most difficult to treat wastewaters, which can then be discharged or even reused in the refinery. This is done by adding powdered activated carbon to the wastewater during the biological treatment step. The WAR system is not only used to regenerate the spent activated carbon, but the process destroys both non-biodegraded organics and biological sludge. Use of the combined system consequently avoids the need for costly sludge dewatering, disposal and liability.

For more information contact Kaylin Pather, Siemens Digital Factory and Process Industries and Drives, +27 11 652 3652, kaylin.pather@siemens.com, www.siemens.co.za
Solution for wastewater treatment

Industrial gear units and geared motors from SEW-Eurodrive South Africa are ideal for demanding applications such as agitators, mixers and aerators. Local OEM, Wamechsi Group has standardised on SEW products for a range of wastewater treatment plants it has built throughout the country. This is largely due to the quality and reliability of the SEW technology.

The OEM manufactures a range of mechanical equipment for the various stages of the treatment process at a wastewater treatment plant, ranging from mechanical screens to washers and screw presses that wash and compact the material to be removed. Ancillary mechanical equipment includes screw pumps, surface aerators and clarifiers.

The biological aspect of the treatment process results in sludge that is processed further by digesters. The final stage of the treatment process involves removing the sludge with dewatering machines. Manufacturing equipment for thickening and dewatering applications is a particular area of expertise for Wamechsi. Established in 1997, the company has transformed into the largest OEM of its kind in South Africa. Its extensive manufacturing capability includes state-of-the-art laser and plasma cutting, CNC lathes and milling machines, submerged-arc and robotic welding, and ancillary equipment such as 24 five ton overhead cranes. The OEM acquired its first SEW products in 2012, in a long-standing partnership predicated on good design, reliability, quality and excellent aftermarket support and service.

The OEM’s latest projects to feature SEW products are Virginia Phase Two (six 75 kW industrial gear units specifically for aerators), an additional 22 geared motors for Theronia, and 15 geared motors for mixers at Buschkoppies. Phase One of the Virginia project has already been completed, while Phase Two is being commissioned. “The main reason that we have been so successful in this industry to date is largely due to our innovation and SEW’s reliable product range,” explains Wamechsi CEO, Jurie Niemand.

SEW sales representative, Willem Strydom adds that SEW’s extensive experience and track record in the wastewater treatment industry means the company is able to offer flexible and highly reliable total solutions. It is a leading manufacturer of industrial gear units and geared motors, as well as a large range of optional equipment, which ensures reliable drive solutions for the wastewater treatment industry.

Commenting on the current state of the wastewater-treatment industry, Niemand stresses that it is growing exponentially due to the rapid population expansion and high rate of urbanisation. “The need for infrastructure is coupled to the universal right to access water and sanitation services, which commits the government to significant capex in these sectors.”

A major challenge in this regard is that South Africa is classified officially as a water stressed country, which means that this valuable resource has to be conserved as much as possible. “We are now busy with projects where final effluent is being treated to become potable water. Therefore it is critical for our major component suppliers like SEW to be at the cutting edge of technology,” Niemand explains.

“With aerator and mixing applications, our projects and engineering teams have to double check all of the loads and bending moments. These loads are supplied to us by the client, based on their designs. We then ensure that the gearboxes selected are suited to the application at hand,” Strydom continues.

This goes hand in hand with commissioning and maintenance support as required. SEW employs a special program designed specifically to determine if the gearbox selection is adequate, based on the loads and bending moments. This is particularly important when it comes to aerators and mixers. SEW therefore selects the optimal gearbox for the application at hand.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
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Water blasting is the use of water with high pressure and high speed to clean and treat various surfaces. It can also be used to cut through different solid materials like steel and concrete. The advantage with water cutting compared to laser cutting is that the heat generated is transported away by the water, hence it works for sensitive materials where a laser cannot be used.

The high pressure is achieved by an engine and a pump. When the water passes through a small nozzle or orifice it attains the speed that makes it effective for blasting. If needed the water can include additives like detergent chemicals or abrasives. However, in many applications plain clean water can be used, which makes it an environmentally friendly method.

The equipment for water blasting consists of a motor, pump, water tank, valves, hoses and nozzles. Since the pressure rating is up to 6000 bar, the requirements for the included components are high. It should in some applications also withstand extreme temperatures and abrasives, and also work in harsh environments with abrasion, seawater, ozone, chemicals and extreme temperatures.

WOMA has been producing water jetting equipment for more than 50 years for removal, cleaning and cutting, and can supply stationary as well as mobile units. These are delivered all over the world.

WOMA relies on Parker hoses
WOMA relies on Parker hoses and fittings when building the equipment. The choice of Parker components is based on Parker’s reputation for high quality and the fact that WOMA delivers products worldwide, so it is an essential requirement that the hoses and fittings are globally available. The hoses that WOMA uses are Blastopac 1.25 cm rubber hoses and Blueline 1.25 cm thermoplastic hoses with pressure rating up to 6000 bar. This meets the requirements of the global specification DIN EN 1829/2.

Parker Blueline hose range
Blueline is Parker’s series of thermoplastic ultra-high pressure hoses. These hoses have up to 35% less weight compared to rubber hoses, which greatly facilitates daily work. They are resistant to many chemicals and abrasion in tough environments, which guarantees a long service life. The Blueline series with the hose types 2388N and 2580N provides a coherent series together with the matching fittings from Parker Polyflex. Another advantage of Parker hoses is their worldwide availability.

Parker Blastopak
Parker Blastopak hose is a completely new hose range with improved performance for water blasting applications. The high performance is a result of the design, with four or six spirals that meet the requirements of water jetting and blasting applications. With its high working pressure from 800 bar in size 16 up to 1100 bar in size -4 to -12, flexibility combined with dedicated interlock fittings ensures superior performance and safety. The safety factor burst/working pressure of 2.5:1 allows the hose to meet the requirements of global specification DIN EN 1829/2 (impulse) in all common hydraulic applications.

WOMA–certified distributor
WOMA is a certified distributor of Parker’s ultra-high pressure hoses and fittings, with a facility in Durban. In this facility, hoses and fittings are assembled in order to serve the South African market. Its presence in South Africa gives WOMA an advantage over its competitors.

“We have supplied Parker’s Thermoplastic and Blastopak products with our unit builds for over 25 years. It gives us a sense of security that enables us to guarantee the quality of our products to our customers, with aftersales service beyond the norm,” says WOMA’s Andrew Stocks. “With our longstanding service to the industry, coupled with a vast knowledge and experience gained over this long period, WOMA is rightly perceived as a reliable partner, together with our experience, knowledge and proximity to our customers. We are also quick to respond to customer requests and we can deliver both components and spare parts in a short time period.”

For more information contact Lisa de Beer, Parker Hannifin SA, +27 11 961 0700, lisa.debeer@parker.com, www.parker.com/za
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Using IIoT technology to reduce water loss

Abstract
A client of AI2SA oversees the management of key infrastructure distributed across South Africa, which includes the responsibility to create an environment that promotes a pleasant experience for its consumers. To do this, extensive use is made of large heating, ventilation and air conditioning (HVAC), systems which in turn requires a significant amount of municipal water as input for its cooling process.

Given the client’s vast geographical distribution across its sites, these systems are not under constant supervision and at times during the manual ‘top up’ and drain processes, the operators would forget to close the respective valves, or valves would fail, both of which resulted in a significant amount of water being discharged to the drain, incurring substantial financial losses. The first system consists of seven cooling towers each with a nominal consumption of up to 500 litres per minute, which equates to a potential loss of around 30 kL per hour dumped to drain. At an average cost of R24 per minute, which equates to a potential 30 kL per hour, this excludes the reputational damage of not being able to provide the required quality of environment for consumers.

To overcome the wastage problem, flowmeters were installed and inlet (make up) valves automated using an industrial PLC, which is also used to visualise the process via the built in Web server. The solution is designed to monitor the drain flow rate and if a valve is detected as open for too long, the system isolates the valve and sends an SMS to the operator via a GSM modem connected to the Internet. Since the PLC is connected to the Internet, it allows for remote support of the complete system with built-in error escalation that brings problems to the facility manager’s attention.

The ROI of the system is around thirty days of lost water, which while it sounds like a lot, is only a few weekends where a few of the valves are left stuck open. The next phase involves automating the process further and linking all of the systems to a central portal for remote client management.

The main engineering lessons learned were to make use of a dedicated drawing tool meant for this type of work, not simply any drafting tool, and to consider using IO-Link protocol to connect instruments, specifically flowmeters, as this provides more information as well as saving on wiring. AI2SA’s scope included all aspects from design to commissioning in conjunction with the client who supplied and installed the instruments.

Conclusion
Since the project was only recently commissioned and handed over, it is early to determine if the solution has achieved all the desired objectives. However, it is hoped that the benefits of using a Web-based IIoT system are clear irrespective, and that such systems will attract acceptance in due course. It is also hoped that the approach shared here may assist others in avoiding similar pitfalls.

The full project write up can be viewed at https://instrumentation.co.za/papers/J4335.pdf

For more information contact Petrus Klopper, AI2SA, +27 12 348 6124, petrus.klopper@ai2sa.co.za, www.ai2sa.co.za

Keller’s water level monitoring systems

The Grib Mine, located in Russia’s Mezensky District in the Arkhangelsk Oblast, is one of the largest diamond deposits in the world. During winter, temperatures can drop to -25°C and sometimes -37°C. The ‘Arhangelskgeolrazvedka’ exploration crew bores wells and monitors underground water levels and temperature. Keller has equipped the wells with water level monitoring systems. The use of automatic water level monitoring systems allows for savings on special purpose vehicles as well as additional staff, who would otherwise have to conduct manual monitoring in remote and hard to reach wells.

Water level and temperature is monitored within a radius of 5 km around the deposit area. Recently, a total of 81 wells with depths of 20 to 270 metres were bored in order to monitor water levels. The wells were equipped with 81 Keller water level monitoring systems comprising PAA-36 X W hydrostatic pressure (level) and temperature probes as well as 59 GSM-2/GSM-2 BOX modules for automatic data registration and transfer by GSM.

As long as the monitoring net consists of cluster water wells, it is possible to use just one GSM-2 BOX module to register and transfer data from two to three wells placed at a distance of five to ten metres in the same cluster. This allowed the mine to reduce the number of GSM-2 modules required for monitoring 81 water wells from 81 to 59. Thus the mine needed 22 GSM-2 modules fewer than anticipated, a 15% saving on monitoring equipment for the project. The battery of a GSM-2/GSM-2 BOX module is able to supply several level probes. The module on the other hand can register and transfer data once a day in a low temperature environment of -25 to -35°C with a low level or unstable GSM signal for several years. For the duration of the exploitation period the mine did not find it necessary to change the equipment batteries.

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Endress+Hauser People for Process Automation
Oil and gas are still indispensable fuels for the global economy, and exploring for new sources of oil and gas remains a lucrative and attractive endeavour. New oil platforms, rigs and pipelines are constantly being constructed to meet the demand for oil, with a corresponding growth in the number of factories and control centres used to process and manage crude oil.

To maximise efficiency and safety, these systems are becoming more integrated, but unfortunately the traditional scada systems used by the oil and gas industry are difficult to integrate because they are highly independent and have limited connectivity to other systems. This limitation will need to be overcome as oil facilities grow more complex, and safety and reliability grow ever more important. Moxa’s complete range of industrial networking, monitoring and computing products are engineered for harsh mission-critical environments and provide the reliability, flexibility, and safety needed to maintain and operate oil and gas facilities.

**Industrial grade robustness**

Moxa offers a complete range of automation and networking products specially developed for use in oil and gas facilities, each meeting global certifications such as UL/cUL C1D2, and ATEX Zone 2, IECEx or marine classifications like DNV GL, ABS, LR, and NK. Whether you require Ethernet switches, computers, gateways or I/O devices, Moxa has a product that best fits the hazards of the oil and gas industries.

**Assured network reliability**

Moxa’s high reliability, high availability networking solutions are founded on three key pillars: advanced network redundancy, high bandwidth portfolio and enhanced network security. For wired LANs, the Turbo Chain and Turbo Ring features deliver millisecond order network recoveries, while for wireless LANs Moxa provides zero packet loss guarantees and network level wireless redundancy enabled by AeroLink Protection. The Ethernet switches provide up to 10 gigabits of bandwidth for future-proof scalability. Finally, all of Moxa’s Ethernet products support strong security protocols that include 802.1X, HTTPS and SSL, alongside industrial secure routers that feature strong firewall, NAT and VPN functionality.

**Efficient remote monitoring**

Moxa’s industrial networking, monitoring and computing products help network administrators to overcome the challenge of integrating a variety of IA protocols like PROFINET, EtherCAT, and Modbus TCP with central HMI/scada systems, and to combine them in ways that enable the receipt and response of field data with high efficiency.

**Easy asset manageability**

Moxa provides a number of easy to use software optimisations for remote administration. MXstudio is Moxa’s integrated network management and diagnostics tool for Ethernet products. With MXstudio, users can speed up the process of field device configuration and troubleshooting. MGate Manager is a powerful automated utility that allows the control centre to take over gateway configuration from on-site personnel. With Moxa’s software enhancements, controllers can better collect data, evaluate component and network health and monitor devices for unexpected events.

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There are many different levels of hazardous areas. There are also many different types of Ex-rated calibration equipment. This article is an edited version of a Beamex calibration white paper, the original unedited document can be downloaded at https://instrumentation.co.za/papers/J4324.pdf.

What is a hazardous area?
A hazardous area is an area (indoors or outdoors) that contains or may contain flammable substances. The flammable substance may be a liquid, gas, vapour or dust. The area may contain a flammable substance all of the time, most of the time, or only in specific situations, such as during shutdowns or accidents.

In such a hazardous area, an explosion or fire is possible if all three conditions of the Explosion Triangle are met. These three conditions are fuel (a flammable substance), a source of ignition (or heat) and oxygen (air). The situation is often presented as a triangle, hence the term Explosion Triangle. Often, eliminating the flammable substance is not possible, and therefore the oxygen (air) or source of ignition has to be eliminated.

How to prevent an explosion
Keeping in mind the Explosion Triangle, we can conclude that one or more of the three elements must be eliminated. Many times, eliminating the flammable substance is not possible, and therefore the oxygen (air) or source of ignition has to be eliminated. However, it is also often impossible to eliminate the air. Therefore, the most practical solution is to eliminate the source of ignition, spark or heat.

In the case of electrical calibration equipment, it can be specially designed to use in hazardous areas. There are many ways to design electrical equipment suitable for hazardous areas. Calibration equipment is often designed in such a way that it cannot provide enough energy to cause the source of ignition, spark or heat.

Brief history
Some of the first hazardous areas were discovered in the early coal mines. Being flammable substances, both the coal dust and the methane absorbed created a hazardous area. The lighting in early mines was produced by candles and torches, generating a source of ignition. This led to many accidents.

Later, when miners began to use electrical equipment (lighting, tools), many accidents occurred due to sparking or heating. Eventually, design standards were developed to guide the design process to prevent the sparking and heating of electrical equipment. This was the first intrinsically safe electrical equipment and it led the way to the standards compiled for equipment used in hazardous areas today.

Typical industries with hazardous areas
There are many industries that have hazardous areas. Some plants have large hazardous areas, while others have only small sections classified as hazardous areas. Typical industries with hazardous areas include chemical and petrochemical industries, offshore and onshore oil and gas, refining, the pharmaceutical industry, food and beverage, energy production, paint shops and mining.

Since a flammable substance may be a liquid, gas, vapour or dust, there are surprisingly many different industries that may have some areas where these substances may be present during the normal operation or during shutdown. Even some seemingly safe industries may have hazardous areas. In plants, all areas classified as hazardous should be clearly marked with the Ex logo.

Flammable and combustible liquids
There is often discussion about flammable and combustible liquids. But what are they precisely? Generally speaking, they are liquids that can burn. They may be gasoline, diesel fuel, many solvents, cleaners, paints, chemicals, etc. Some of these liquids are present in many workplaces.

Flashpoint and auto-ignition temperatures are also often discussed. Flashpoint is the lowest temperature of a liquid at which it produces sufficient vapour to form an ignitable mixture with air. With a spark or enough heat, it will ignite.

Auto-ignition temperature is the lowest temperature at which a liquid will ignite even without an external source of ignition. Most commonly, flammable and combustible liquids have auto-ignition temperatures in the range of 300 to 550°C. However, there are liquids that have an auto-ignition temperature as low as 200°C or even less.
Based on their flashpoint, liquids are classified as flammable or combustible. Flammable liquids may ignite at normal working temperatures, while combustible liquids burn at higher temperatures. Often 37.8°C is considered the temperature limit. Flammable liquids have a flashpoint below 137.8°C and combustible liquids above.

To be more precise, flammable and combustible liquids themselves do not burn, it is the vapours that burn. More precisely, it is the mixture of the vapours and air that burns.

There are also limits of the concentration within which they can burn. If the concentration of the mixture is too low (too thin) it will not burn; the same is true if the concentration is too high (too rich). The limits are known as lower and upper explosive limits (LEL andUEL).

It is good to remember that some liquids may have a rather low flashpoint. For example, gasoline has a flashpoint as low as -40°C. It produces enough vapours in normal environmental conditions to make a flammable mixture with air. Combustible liquids have a flashpoint way above normal environmental conditions, and therefore they have to be heated before they will ignite.

Various protective techniques
As mentioned earlier, in order to prevent an explosion, one of the three elements of the Explosion Triangle should be eliminated. In practice, eliminating the source of ignition would be the most sensible. There are various techniques in electrical equipment that make them safer for hazardous areas. These different techniques fall into two main categories: eliminate the source of ignition (Exe, Exi) or isolate the source of ignition (Exd, Exp, Exq, Exo, Exm).

The Exi intrinsically safe technique is the most commonly used and most suitable protective technique for electrical calibration equipment. Intrinsically safe equipment is designed for any situation; it will not provide enough energy to generate sparks and excessively high surface temperatures, even in the case of a faulty device. The equipment is designed to be intrinsically safe. Inside an Exi device, the Encapsulated (Exm) technique may also be used for certain parts of the equipment, as in a battery pack.

Hot work permit
Using non-Ex calibration equipment in a hazardous area may be possible, but it requires special approval from the safety personnel in the factory. Often this also involves the use of safety devices such as personal portable gas detectors, to be carried in the field while working. Using equipment correctly rated Ex is easier, as it does not require any special approvals. Naturally, the Ex-rated calibration equipment must be suitable for the hazardous area to which it is taken.

International/North American legislation and differences
There are two different standardisations specifying hazardous areas and classification of the equipment used in hazardous areas. One is the International IEC standard and the ATEX directive used in international and European legislation. The second is the North American legislation.

The international standard family of IEC 60079 defines the different standards for related regulations. The IECEx scheme involves international co-operation based on the IEC standards. The objective of the IECEx system is to facilitate international trade in equipment and services for use in explosive atmospheres, while maintaining the required level of safety. Today, there are approximately 30 member countries in the IECEx, including the USA.

The ATEX directive was introduced to unify hazardous equipment and work environments within the European Union. It was established about ten years ago and is based on the directives introduced in the ’90s.

Hazardous zones classification
The zone classification specifies how likely it is for a certain flammable substance to occur in the atmosphere in a certain area. The classification has been developed to specify the different hazardous areas (zones). (Table 1.)

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<thead>
<tr>
<th>Zone (gas, vapour)</th>
<th>Zone (dust)</th>
<th>Description</th>
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<tr>
<td>Zone 0</td>
<td>Zone 20</td>
<td>Area in which an explosive substance in the atmosphere is present continuously or for long periods or frequently.</td>
</tr>
<tr>
<td>Zone 1</td>
<td>Zone 21</td>
<td>Area in which an explosive substance in Zone 2 the atmosphere is likely to occur in normal operation occasionally.</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Zone 22</td>
<td>Area in which an explosive substance in the atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only.</td>
</tr>
</tbody>
</table>

Product category and Equipment Protection Levels (EPL)
In ATEX-directive Group II, equipment is divided into product categories specifying the use of the equipment in different zones.

The product categories of the Group II equipment are specified as following:

- **Product category 1:** Very high safety level. Can be used in Zone 0 and Zone 1 and 2.
- **Product category 2:** Can be used in Zone 1 and 2 but not in Zone 0.
- **Product category 3:** Normal safety level. Can be used in Zone 2 but not in Zones 0 and 1.

In the IEC standards, the same thing is expressed using Equipment Protection Levels (EPLs). EPLs are specified using nearly the same categories.

EPL a: Very high safety level. Can be used even in Zone 0 and Zone 1 and 2.

EPL b: High safety level. Can be used in Zone 1 and 2 but not in Zone 0.

EPL c: Enhanced safety level. Can be used in Zone 2 but not in Zones 0 and 1.

The zone classification specifies how likely it is for a certain flammable substance to occur in the atmosphere in a certain area.

Equipment grouping
Electrical equipment for explosive atmospheres according to the IEC 60079-0 standard is divided into the following groups:

- **Group I**
  Electrical equipment in Group I is intended for use in mines susceptible to firedamp.

- **Group II**
  Electrical equipment in Group II is intended for use in places with an explosive gas atmosphere other than mines susceptible to firedamp. It is subdivided according to the nature of the explosive gas atmosphere for which it is intended. Group II subdivisions are:
  - IIIA: a typical gas is propane.
  - IIIB: a typical gas is ethylene.
  - IIIC: a typical gas is hydrogen.

This subdivision is based on the maximum experimental safe gap (MESG) or the minimum ignition current (MIC) ratio of the explosive gas
atmosphere in which the equipment may be installed. Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

Group III

Electrical equipment in Group III is intended for use in places with an explosive dust atmosphere other than mines susceptible to firedamp. Electrical equipment in Group III is subdivided according to the nature of the explosive dust atmosphere for which it is intended. Group III subdivisions are:
- IIA: combustible flyings.
- IIB: non-conductive dust.
- IIC: conductive dust.

Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIIA or Group IIB equipment.

Temperature class

The temperature class specifies the maximum surface temperature in the equipment. The temperature class is important to take into account and ensure that it matches with the flammable gas that may be present in the plant’s own hazardous area.

The temperature classes and temperatures are shown in Table 2.

Some equipment may also have a maximum surface temperature specified as a certain temperature being in between the classes. Depending on the type of flammable substance in a certain area, the flashpoint and auto-ignition temperatures will be different. The equipment selected to be used in that hazardous area must have a temperature classification that suits the substances in question. The temperature class of a device is included in its marking, for example T4.

Environmental conditions

Finally, it is important to ensure that the equipment is suitable for the environmental conditions where it will be used. For example, the safe operating temperature of the device must match the temperature in which the equipment is used in a plant. In wet and dusty conditions, the protection rating of the equipment casing needs to be considered; this can be classified Ingress Protection (IP) or NEMA. Different protective techniques may require different classification on the casing.

It is also important to remember that the casing of some Ex equipment is made out of non-static semi-conducting material to avoid accumulation of any static electricity.

Depending on the classification, there are limits on the size (static) of labels that can be put onto the device. For example, Group I equipment, for Zone 0, with gas Group IIC, may have a label sizing an area of maximum 4 cm². It is important to keep that in mind before attaching any identification labels on Ex equipment. An unedited version of this white paper can be downloaded at https://instrumentation.co.za/papers/J4324.pdf

For more information contact QTEK Instrumentation & Calibration Solutions, +27 11 391 4598, jacques@qtekics.co.za, www.qtekics.co.za

<table>
<thead>
<tr>
<th>Temperature Class</th>
<th>Maximum surface temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>450°C</td>
</tr>
<tr>
<td>T2</td>
<td>300°C</td>
</tr>
<tr>
<td>T3</td>
<td>200°C</td>
</tr>
<tr>
<td>T4</td>
<td>135°C</td>
</tr>
<tr>
<td>T5</td>
<td>100°C</td>
</tr>
<tr>
<td>T6</td>
<td>85°C</td>
</tr>
</tbody>
</table>

For more information contact QTEK Instrumentation & Calibration Solutions, +27 11 391 4598, jacques@qtekics.co.za, www.qtekics.co.za
Gas monitoring in explosive areas

Becker Mining South Africa has extended its range of safety and communications systems to include a new atmospheric and environmental monitoring system, designed for use in industries where the presence of gases may pose a safety or health risk for employees and the environment.

The high accuracy Becker Varis Smartsense gas monitoring system, which meets stringent quality, safety and environmental specifications, enhances safety in diverse sectors. Adherence to Intrinsically Safe (IS) certification means this system can be safely deployed in hazardous and potentially explosive areas. Environments which require dependable atmospheric and environmental monitoring include general industry and manufacturing facilities, petrochemical, oil and gas plants and the mines.

“Becker’s high accuracy Smartsense system – with integrated features for the detection of ambient temperature, humidity and barometric pressure – forms an essential part of critical communications and safety systems in the workplace,” says electronics senior general manager, Andrew Trentelman. “Some factories make use of manufacturing methods that can produce high levels of poisonous gases, or even explosive gases. In these environments, it is important to monitor gases emitted into the atmosphere in real time and have a reliable system to take immediate automatic action to eliminate the possibility of poisonous environments, as well as explosions.”

Apart from the accurate detection and monitoring of ambient temperature, humidity and barometric pressure, every device can monitor up to four gases, including oxygen, methane, carbon dioxide, carbon monoxide, hydrogen sulphide, chlorine, hydrogen and nitrogen dioxide.

The Smartsense unit can be fitted with different gas monitoring heads to suit specific environmental monitoring needs. An important advantage of the Smartsense device over conventional monitoring systems is that all features are integrated into one compact device. There is no need for complex cable connections, troublesome programming or difficult calibration. Additional analog/digital input ports provide compatibility with other devices to accommodate a plant’s expansion requirements.

Smartsense gas monitors/controllers allow for localised use or for implementation into a system-wide installation using industry standard communication protocols such as Modbus RTU and OPC connectivity or for integration into legacy systems using 4-20 mA. This hybrid system is customisable to all installation requirements, including copper (RS-485/Ethernet) Radio Frequency (UHF – VHF data radio / Wi-Fi) and fibre optics data connectivity. There are various graphical representation methods to display data, including the Becker Mining Systems application for smartphones, or integration into existing scada systems.

Web-based remote viewing of an entire environmental monitoring system is made possible through an OPC interface over a customer’s existing LAN network.

The Smartsense fixed monitor has three fully programmable alarm set points for alarm and output controls, with a short-term exposure limit (STEL) and time weighted average (TWA) limits, displayed on a large LCD screen. It is possible to view the reading from up to five metres away. An adjustable backlight makes this device suitable for both underground and above ground applications.

This system, with low power consumption, has an Index Protection IP67 rating for protection against the ingress of dust and liquids. The Smartsense system, with its integrated controller functions, operates as a ‘black box’ and stores critical information, which could be vital in a post-accident investigation. Stored information includes the calibration record, alarm history and data logging. The watchdog feature alerts the user/maintenance team of any system errors, for example, if the system has detected inaccurate measurements or calibration errors. This information is communicated both locally through the maintenance LED and remotely on the supervisory platform.

Preventative maintenance of this low maintenance system requires simple procedures – between monthly and quarterly – to ensure optimum performance and extended service life. It is important that sensor intake areas are kept clean, with no obstructions. The device is supplied with three types of mounting brackets for easy installation – panel, roof bolt or cable mounting.

Becker Mining South Africa’s commitment to providing a critical service to local industry encompasses the design and manufacture of products and systems using the latest technology. Plant safety is significantly enhanced by the implementation of one, or a combination of Becker’s specialised multi-technological energy distribution, automation and communication solutions.

The Becker Varis Smartsense, which is able to monitor up to four different gases, also has integrated features for the detection of ambient temperature, humidity and barometric pressure. This easy to configure system has a patent pending on a 360˚ alarm function for reliable visual alarm visibility.

For more information contact Andrew Trentelman, Becker Mining South Africa, +27 11 617 6300, info@za.becker-mining.com, www.za.becker-mining.com
Setting the target of sealing every major highway in New South Wales by 2023, as outlined in this 2018-19 state budget, the New South Wales Government has set the bar high. The onus is not just on government, industry and the companies set to deliver on this goal, but also on the various material producers that will supply these projects. For asphalt plants and quarries to meet such demand, material supply firms are seeking the best equipment to ensure constant resources and high quality. At the forefront are service providers like Fleming Electrical, a Queensland-based firm specialising in a range of industrial electronics solutions and maintenance services, particularly in the asphalt production sector.

New developments in level material measurement technology is an area which could potentially achieve productivity gains on material supply operations, and help contribute to the major national road infrastructure task at hand. Kyle Flynn-O’Brien, an electrician with Fleming Electrical, says the VEGA brand of level measurement instrument products is at the cutting edge: “We’ve used their equipment for level indication and production on a range of asphalt operations, especially bitumen tanks. VEGA is our go-to name and we use their instruments for most of our customers.”

Since 1991, the family-run German business has provided radar level measuring sensors for material production, such as those used in road construction. In 2014 the business introduced its first radar level instrument with a transmission frequency of 80 GHz to the Australian market. In 2016 it followed that up with an 80 GHz version for liquids – the Vegapuls 64. When VEGA Australia released the new instrument, it increased the demand for this kind of measurement tool for bituminous materials, which have traditionally proved a challenge given the high temperature and viscosity of the material.

Flynn-O’Brien says VEGA’s transition towards non-contact liquid radar measurement technology has been a major point of difference for him in regards to maintenance and operation of such instruments: “Most older model instruments use level guided radar, which is similar technology, but the difference is that the old models have a rod or cable to guide the waves that measure the material.

On the Vegapuls 64, the sensor emits a continuous radar signal through the antenna, which is reflected by the material and received as an echo back at the antenna. The phase difference between the emitted and received signal is proportional to the distance, which depends on the filling height. The instrument then converts the height into a respective output signal. The new software also presents advantages. For instance we no longer have to jot down all the dimension of the tank. It does all the calculations for you.”

Since the instrument operates with a transmission frequency of 80 GHz, this ensures the sensor receives only distinct reflections from the product surface. The focused 80 GHz beam also avoids internal installations and build-up on vessel walls. The sensor operates with an antenna aperture of 75 mm and a beam angle of just four degrees – ensuring reliable and certain measurements.

“With guided radar instruments in bitumen applications, what would happen is you’d get material build up on the rods, which resulted in false signal and readings,” elaborates Flynn-O’Brien.

One of the key features of the Vegapuls 64 is the ability to adjust the transmitter wirelessly, using Bluetooth technology. This enables a smartphone or tablet to access the setup and adjustment functions of the sensor, which are all integrated in the VEGA Tools app. The sensor can be adjusted from a distance of 25 metres and the app gives the user access to all the operation data, including measured value, event memory, sensor status displays, echo curve and Bluetooth range information. If VEGA has been granted access to a particular sensor, it can also access the tool remotely to assist with any technical issues or questions.

For Flynn-O’Brien, the simplicity of the design also contributes to its ease of use from an installation and maintenance perspective: “You don’t have lots of parts to deal with as it’s just a probe and the radar, and the only thing you have to clean is the antenna. It is easy to install and extremely reliable, so it ticks the boxes for me. I’d say our clients are happier because we’re no longer getting the false readings.”

For more information contact Leandi Hendrikse, VEGA Controls SA, +27 11 795 3249, leandi.hendrikse@vega.com, www.vega.com
Insertion resistance thermometers

Instrotech is offering Kobold’s MMA range of industrial temperature probes, or insertion resistance thermometers, with or without transmitter. The MMA is engineered using 316 stainless steel and incorporates high accuracy Pt100 resistance sensors with analog output options. The MMA is delivered standard with M12 or DIN plug electrical connections, as well as a wide variety of popular process connections.

Temperature sensors with transmitter are capable of transmitting measuring signals noise-free over long distances. The two-wire transmitter is integrated in the resistance thermometer. The output signal is 4-20 mA. The transmitter range is configurable from PC through the KM-HART interface and the KM-Soft software. Other features include:

- Economically priced digital thermometer with optional plug-on display.
- Compact construction with or without transmitter 4-20 mA output and PC-configurable range by software.
- Measuring range of -198 to 250°C (more on request).
- Pt100 sensor class A, 1/3 DIN, 1/10 DIN or cryogenic.
- Process connection threaded clamp DIN 32676, VARIVENT or union nut DIN 11851.
- Electrical connection DIN 43650, or M12.
- Stainless steel.
- Vibration resistance.

This quality range of economically priced temperature instruments is suitable for a wide range of industrial applications such as heating installations; furnace and apparatus construction; machine construction and building installations; marine engineering; food and pharmaceutical industries; and other general industrial applications.

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

Plug-and-play solution for flow monitoring

Ease of flow monitoring with low maintenance benefits is a given with the compact plug and play EGE SNS 450 thermodynamic flow sensor from Countapulse Controls – the sole southern African agent for EGE’s full range of flow sensors and controllers. According to managing director, Gerry Bryant the innovative screw-in adaptor on the EGE thermodynamic flow sensor allows for universal use in a variety of applications. The adaptor is screwed into a T-piece or a welding sleeve and the probe is then secured in this adaptor using a union nut. Users are reassured of the integrity of the connection, which is sealed up to 100 bar.

The EGE sensor, which includes an LED display for ease of use, can function in temperatures from -20 to 80°C and is suitable for controlling the flow of fluids such as water, glycol mixtures and chemicals. Ingress protected to IP67 standards, the design of the sensor, which features no moving parts, is focused on elimination of any failure that would be caused by oxidised bearings, torn impellers or deflector deformation.

With a robust construction, the EGE flow sensor is resistant to corrosion and is ideal for use in both liquids and air, as well as in hazardous environments. “This is a welcome addition to the Countapulse Controls product line-up and complements the company’s existing range of sensing solutions. All are geared around reliability and longevity, combined with uncompromising accuracy,” says Bryant.

Countapulse Controls offers a comprehensive range of sensing, measurement, counting, switching, monitoring and positioning instrumentation, with customer support provided through a round-the-clock technical advisory service hotline.

For more information contact Gerry Bryant, Countapulse Controls, +27 11 615 7556, bryant@countapulse.co.za, www.countapulse.co.za
Fixed thermal imaging for process heating

Noncontact temperature measurement is widely used for industrial process monitoring and control. Infrared (IR) thermal imaging can provide detailed information to help improve product quality and increase productivity. Recent technology innovations, combined with lower cost, make fixed mounted, high resolution IR thermal imaging systems the preferred solution for a variety of process industry applications.

The basis for infrared thermal imaging technology is that any object whose temperature is above 0°K radiates IR energy. The amount of radiated energy is a function of the object’s temperature and its relative efficiency of thermal radiation, known as emissivity. Radiated energy can be detected with a thermal camera, and with the use of sophisticated computer software, converted into an image that is visible on a screen. A thermal imaging camera can easily identify hot or cold spots in production line operations by measuring surface temperature variations.

Infrared thermal imaging equipment is used in the process industries for a wide range of manufacturing, quality control and asset management tasks. It enables plant operators to adjust process parameters for greater productivity and throughput, find defects on materials non-destructively, and improve their quality control procedures. Infrared thermal imaging systems provide an area temperature measurement as compared to spot sensors, which are only capable of a single-point temperature reading. There are many applications where the desired location to measure the target temperature will vary. In the tobacco industry, for example, IR thermal imaging helps to reduce waste from improperly dried tobacco and prevent fires caused by smouldering tobacco stored in bunkers. A fixed thermal imaging camera and software can also detect unquenched clinkers on coke conveyers, or identify hot spots during pressboard manufacturing and garbage incineration.

**Latest technology developments**

As IR thermal imaging solutions become easier to integrate into process control applications (thus lowering the total installed cost), more plants are choosing to implement the technology. Within this field, new developments have resulted in shorter response time, while others have taken advantage of faster communications between the camera and the process monitoring/control system. There is also a drive to simplify the user interface, so that infrared imaging becomes as easy to use as machine vision systems.

Recent technology advances in infrared thermal imaging allow for an expanded view of process performance. Fixed-mounted process imagers provide a real-time view of thermal images, allowing plant operators to shorten process startup times and lower production line changeover costs. These cameras are paired with intuitive system software, which minimises or eliminates the long learning curve associated with many earlier process imaging systems. The most sophisticated fixed infrared thermal imagers, when integrated with process control and process monitoring software, offer multi-point control flexibility corresponding to areas of interest on the product with independent alarm settings. This provides the ability to reduce heating costs by applying heat to only the areas that need it. Users can also tell immediately when a product changeover is made if their process is under control. Process problems that show up as temperature anomalies are instantly detected and conditions are captured together with images and time date stamps. Modern fixed thermal imaging systems provide easy networking over long distances using a standard Ethernet interface, which transmits multiple frames per second of imaging data from the camera. Additional fibre optic Ethernet accessories eliminate the need to place PC operating system software in a hazardous area. These features reduce the user’s capital investment costs by doing away with the need for specialised enclosures and expensive industrial computers needed to survive in a harsh field environment. In addition, thermal imaging software can be employed for real-time viewing, archiving and playback of both on-line and off-line thermal images. Multiple cameras can be supported simultaneously in a single software package, where upwards of 200 process alarms can be assigned as relay outputs. As a result, users are able to minimise the total system footprint on the factory floor and control room with a single PC installation.

Infrared thermal imaging helps industrial plants save money and improve efficiency by optimising process operations based on precise temperature measurements. Fixed IR thermal imaging systems for automated temperature monitoring and control are more affordable and easy to use than ever before. Recent design innovations allow fixed thermal imaging to be used as a cost-effective process control and predictive maintenance solution for many process industry facilities.

For more information contact R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za
Low volume rotating vane flowmeter

Instrotech is offering Kobold’s DTK rotating vane flowmeter for small quantities, a versatile, efficient and very economic piece of equipment. This flowmeter was specially developed for use in low viscosity liquids. Its compact construction means it can be used in machines with restricted space as well as in industrial systems. A special advantage of this gauge is its long-term stability and robust construction.

In the DTK flow gauge, the medium flows through a specially formed flow casing, causing the impeller to rotate. Two magnets on the impeller generate electrical impulses in a Hall sensor. The frequency emitted by the electronics is then directly proportionate to the flow velocity. Down-line electronics can use these signals for measuring, monitoring and dosing.

With a measuring range of 0.05 – 0.6 litres per minute to 1.0 – 12 litres per minute and a measuring accuracy of 2% from measuring range full-scale value, the measuring device can be used universally. The maximum medium temperature is 140°C and the maximum pressure 30 bar. This means it can also be used under harsh industrial conditions. In order to cover a wide range of applications the housing, nozzles and axle have been made of high quality steel and the impeller is made of PVDF. Mechanical connection is provided by means of either a G thread or an NPT thread.

Areas of application of the DTK rotating vane flowmeter include low viscosity and non-conductive liquids, volume dosing with external electronics, laundry machines and PCB manufacture machines, and agriculture.

For more information contact Instrotech, +27 10 595 1831, sales@instrotech.co.za, www.instrotech.co.za
Electromagnetic flowmeter for conductive fluids

Instrotech is offering the Kobold electromagnetic inductive flowmeter for conductive fluids – the model DMH – with a standard accuracy of ± 0.3% of reading stability of zero. It is used specifically for the measurement and monitoring of the volume flow rate of potable (drinking) water, waste water, acid or alkaline fluids, pulps, pastes and other electrically conductive materials, without loss of pressure.

When an electrically conductive medium passes through a directional magnetic field, a voltage is induced in accordance with Faraday’s Law of Induction. The size of this measurement voltage is proportional to the mean rate of flow and consequently also to the volume flow rate.

A flowmeter consists of a sensor that picks up the measuring signal generated from the induced voltage, and a transducer that converts this signal into a standardised output signal (4-20 mA or pulses). The measurement transducer can be affixed to the sensor or mounted separately. Pressure, temperature, density and viscosity do not affect the volume measurement. Solid fractions and gas bubbles should be avoided.

The microprocessor-controlled UMF2 converter guarantees the highest of accuracies, and with its alphanumeric backlit LCD terminal, 6 keys, plain text response and plausibility check of entries, it is very easy to operate. Empty pipe detection, coil current monitoring, and plain text error messages guarantee full control over the sensor and measuring point at any time. Pulse, status and current outputs, as well as HART communication are standard features, all of them electrically isolated. Lining materials such as hard rubber, soft rubber, PTFE or PFA are available. A wide range of standard and special electrode materials are on offer, including Hastelloy, platinum and tantalum. The DMH is available for a nominal width of DN10 – DN1200 and flow velocities up to 10 m/s.

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

New pressure sensor with IO-Link

Besides continuous process value monitoring via IO-Link, the new PV type pressure sensor from ifm electronic offers two switching outputs.

It also features a compact design with G ¼ process connection and is distinguished by a switch point accuracy of < ± 0.5% and a repeatability < ± 0.05%.

Miniaturisation for industrial applications

The new sensor features a thin-film measuring cell directly welded with the process connection. This technology guarantees high accuracy in a very compact housing with only 19 mm across flats at an optimum price/performance ratio.

With the sealless design of the process connection, the sensors can be used not only in hydraulic applications but also in inert gases. In industrial applications, the laser labelling on the housing is advantageous. Even in adverse environmental conditions, the sensor remains permanently identifiable. Another benefit is the integrated IO-Link interface. Thanks to IO-Link, the new pressure sensor continuously transmits process values and other important data, e.g. a pressure peak counter. Moreover, the digital measurement results are more accurate because there are no conversion losses by D/A converters or external influences (e.g. cable lengths). So thanks to IO-Link, the user is well prepared for Industry 4.0.

For more information contact ifm – South Africa, 086 143 6772, info.za@ifm.com, www.ifm.com
Foxboro’s vortex flowmeters designed for harsh process environments

The 84 series measures volumetric and mass flow of saturated and super-heated steam.

The Foxboro Model 84 series intelligent vortex flowmeters are among the best performers on the market and designed for flexibility and reliability in harsh process environments. Available in flanged (84F), wafer (84W), and sanitary (84S) configurations, there is a meter for nearly every application. The 84S meets 3A sanitary requirements per specification 28-03.

The accuracy of the Model 84 excels in liquid, gas, and steam applications for process temperatures up to 430°C. These instruments incorporate the patented DirectSense technology with Flexible Tuning for outstanding performance. DirectSense technology eliminates unreliable, mechanical sensor linkages used in some other vortex meters. The result is a simple, reliable design that is more sensitive to flow and less sensitive to noise. Combined with Flexible Tuning, the Model 84 has wide flow range capability. Other features and benefits include:

- Real-time Reynolds number correction.
- Correction for piping effects.
- Adaptive filtering for noise rejection at varying flow rates.
- Automatic low flow cut-in.
- Tuneable for specific operating conditions.
- K-factor corrected for temperature.
- HART communication protocol for measurement integration.

Accuracy in the field
The meters utilise Flexible Tuning to compensate for operating influences and maintain accuracy under conditions outside the calibration laboratory:

- Process piping: installation parameters such as pipe bore, location of valves, proximity to elbows, etc.
- Process temperature: correction for K-Factor shift due to change in the process temperature.
- Operation at low flow rates: an algorithm, utilising values for density and viscosity is embedded in the meter to correct for nonlinearity in K-factor at low flow rates.
- Low flow cut-in: eight user defined selections of LFCI. The instrument also includes an automatic low flow cut-in feature that can be configured to automatically select LFCI.
- Signal conditioning: a digital smoothing algorithm can be enabled to condition the raw vortex signal. This results in improved performance, particularly at low flow.
- Low and high frequency filters: these filters are set automatically based on the flowmeter configuration.
- Adaptive filtering: the meter provides an adaptive mode which automatically adjusts the high and low frequency filters.

For more information contact
Johan van Jaarsveldt, EOH, +27 87 803 9783, johan.vanjaarsveldt@eoh-pas.co.za, www.eoh-pas.co.za
The Movitrans contactless energy transfer system from SEW-Eurodrive, in conjunction with its Movipro SDC decentralised drive, position and application controller, has played a critical role in an assembly line extension at a major automotive producer in Port Elizabeth.

The big advantage of the Movitrans system is that it is based on contactless energy transfer. In this system, electrical energy is transferred without contact from a fixed conductor to one or more mobile consumers. The electromagnetic connection is made via an air gap. Not being subject to wear has the added benefit of it being maintenance-free. In addition, this type of power supply is emission-free, and therefore environmentally friendly.

"Movitrans is the ideal supply system for all mobile applications, and has been tested according to BGV B11. It is perfect for equipment that has to cover long distances at high speeds, for example, or if maintenance-free operation is required. It is also suited for applications in sensitive environments where outside contaminants are not permitted, and in wet and damp environments," explains electronics support technician, Juandré La Cock.

Wherever a trolley/skillet (conveyor) system is implemented, such as with an automotive assembly line, a custom designed drive concept is required that must correspond to the necessary load bearing capacity, the desired transport speed, the existing space restrictions, and the specific ambient conditions of the application.

Here the Movipro SDC is an ideal solution for both horizontal and vertical trolley/skillet applications. It not only integrates all necessary functions, but allows for decentralised installation of up to 15 kW. The solution is characterised by its design robustness, especially in terms of reliability and precise positioning requirements. With its modular, standardised design and freely configurable software components, this decentralised drive and positioning control system facilitates the integration of numerous functions, while reducing the complexity of the machine or system.

At the Port Elizabeth plant, SEW-Eurodrive was required to replace an existing Movitrans system installed originally in 2006 in order to be able to add a further four skillets to the existing line. La Cock explains that this was done in order to upgrade the technology to the latest iteration developed by the research and development department in Germany.

The Movipro SDC provides wireless communication for the Movitrans system, based on WiFi routers. Adding to the complexity of the solution required is the fact that the 30 different stations along the assembly line have different height requirements. "This means we had to design a height table into the system," La Cock points out.

SEW-Eurodrive’s scope of work on this project was not only to commission the extension of the assembly line, but also to ensure that the entire plant was up to date with the latest technology. "This involved resetting all of the Movipros, replacing and extending the leaky WiFi cable, and then replacing the Movitrans system with the latest version," La Cock continues. He adds that since its original installation in 2006, the entire system has functioned flawlessly.

While SEW-Eurodrive’s Maxsolution has developed products and solutions specifically for the automotive industry, La Cock stresses that the system supplied for the Port Elizabeth project has been customised specifically for the automotive manufacturer. "This demonstrates our flexibility in being able to adapt to specific client requirements, and also how we ensure our long-standing clients remain up to date with the latest developments," he concludes.

For more information contact Jana Klut,
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jklut@sew.co.za, www.sew-eurodrive.co.za
VSDs drive cost saving in pumping systems

WEG variable speed drives (VSDs) offer the agricultural sector the ability to reduce the operating cost on automated water collection systems with a reduction in motor energy consumption when the motor speed is reduced. In addition, they allow the monitoring of all functionalities of a pumping operation, including special functions that will not only save operating costs but will optimise, control and protect the entire irrigation system.

Just as significant is the VSD’s ability to automatically send commands to the electric motor, thereby facilitating optimum control of the pumping installation. This allows greater effectiveness when irrigating.

The WEG CFW 700 frequency inverter provides accurate speed variation for the electric motor, ensuring it operates according to the irrigation system pressure needs (PID), and with the necessary field telemetry it can also take different land inclinations into account.

Another important benefit is the ability to detect low pressure indicating leakage in a pipeline. With this early warning, end-users can eliminate the need for specialised equipment and can take remedial action as soon as possible.

Where water is being pumped from a river to a dam for further irrigation, use of the WEG VSD will allow optimum control of the water level. It will prevent overflow situations, and dry pumping can be set up without the addition of flow sensors. It can be used to facilitate sleep and wake modes in the pump operation. This facilitates significant cost savings as pumping can then be done on a demand driven basis only.

Where there are multiple pumps in use at the same pump station, it is possible using WEG Pump Genius Software and the WEG CFW11 VSD to automatically alternate motor usage to ensure that each motor/pump combination has equal operation time. This avoids one pump being subjected to excessive wear and regulates the wear across all the pumps, resulting in the lowest total cost of ownership for the installation.

Optimisation of water use in the agribusiness undoubtedly improves product quality and production between harvests and allows optimum use of land, and WEG VSDs will assist in achieving this.

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

RELIABLE PRODUCTS & SOLUTIONS
for the entire agricultural sector.

Zest WEG Group has been servicing the agricultural sector for more than 35 years with its range of robustly engineered products.

All products, designed using modern technology, offer farmers optimum reliability coupled with excellent energy efficiency. From WEG Premium Efficiency electric motors to WWash electric motors with WEG Variable Speed Drives, all have developed a reputation for solid performance in the most demanding conditions. Low maintenance requirements as well as ease of serviceability allow reduced total cost of ownership to the agricultural sector.
TDK Corporation has announced the introduction of the DRM40 series of DIN rail mount redundancy modules. Two 10–30 V DC inputs are rated at 20 A each and the output at 40 A. A 150% peak load capability for four seconds is provided for capacitive and inductive loading. The internal MOSFET reverse current protection devices have a low 200 mV drop, reducing voltage losses in the module.

An LED on the front panel provides a visual indication when both input currents are balanced and equally sharing the output load. Applications for the DRM40 modules include factory automation, process control and test and measurement equipment where two power supplies are used in a redundant configuration, paralleled to obtain higher power or for battery charging purposes.

In addition to two front mounted LEDs, the DRM40 has two isolated DC Good PhotoMOS relays to remotely monitor the presence and status of each input voltage. For cost sensitive applications, the DRM40B model provides the same reverse protection functionality, without the DC Good and current balancing circuitry.

The DRM40 series is housed in a metal enclosure, measuring 124 mm in height, 125 mm deep and a width of 35 mm. The modules are rated for full load operation in -40 to +70°C ambient temperatures. Both units are safety certified to IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 62368-1 and UL 508, and CE marked for the Low Voltage, EMC and RoHS Directives.

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

Powering a world that’s always on

At the recent Middle East Electricity (MEE) exhibition held at the Dubai World Trade Centre, visitors could discover a range of the latest power products, systems and components, all built with the quality and reliability that comes only from Cummins.

A highlight was the new HSK78G natural gas generator series. With a power density of up to 2,0 MW from a 78 L engine, the HSK78G series offers reliable power no matter how extreme the fuel source or operating conditions. This new series is a bold step into the natural gas area for Cummins, showcasing new technology in a new engine that pushes new levels of efficiency, transient performance and gas variation well beyond former natural gas generators.

The HSK78G generator models are suitable for a diverse set of industries from mining to manufacturing to shopping malls and hospitals, and have been designed to operate in extreme conditions while achieving a low total cost of ownership. The HSK78G models run cleaner whilst delivering a high electrical efficiency up to 44,2% (50 Hz) and 43,5% (60 Hz) on a wide range of pipeline natural gas down to 70 methane number (MN), without impacting power and efficiency output.

Alongside the physical HSK78 engine showcased on the stand, an interactive touchscreen was available, allowing visitors to explore the complete HSK78 generator model in 360 degree mode, while learning more about the key features and benefits of this new series.

To complement this display, visitors could step into the HSK78G Experience Pod room, which took them through a journey of different extreme and urban environments, from blistering hot deserts to cityscape settings, to highlight the extreme capability of the HSK78G series.

Cummins also displayed the Digital Master Control (DMC) 8000 remote monitoring simulator, a fully automatic, distributed logic controller suitable for remote applications, making it easier for users to integrate and adapt their varying power needs. The new DMC system can control diverse power sources such as solar, genset and wind. With remote access and monitoring available, users can securely access the control system and view up to 90 days of data logging at any time, anywhere.

The Cummins Load Control Module (LCM) was also on show. This is a load management controller regulating loads on standby generators to maximise their power potential via a smart and cost-effective package deal for the light commercial building industry. Visitors were able to experience a simulation in real time of how all system components are monitored.

For 100 years, Cummins technology has powered success around the world. The company’s comprehensive portfolio delivers innovative power projects and solutions for unique power needs.

Power module with load sharing

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

Cummins technology and innovation

For more information contact Angela Papageorgiou, Cummins, +44 1843 252099 angela.papageorgiou@cummins.com, www.cummins.com
Testing the grounding components of equipment in hard to reach spaces, including areas that are indoors or fully paved and do not permit driving auxiliary test stakes, is always challenging. Comtest is offering the Fluke 1630-2 FC Stakeless Earth Ground Clamp, a high quality, heavy duty clamp jaw that stays in alignment and in calibration even in industrial environments. It can also identify ground loop resistance without the need to disconnect then reconnect the earth electrode from the system.

Stakeless measurement

The 1630-2 FC clamp measures earth ground loop resistances for multi-grounded systems using the dual clamp jaw. This test technique eliminates the dangerous and time-consuming activity of disconnecting parallel grounds, as well as the process of finding suitable locations for auxiliary test stakes. Users can also perform ground tests in places that were previously difficult: inside buildings, on power pylons or anywhere there is no access to soil to place auxiliary test stakes.

Fluke Connect wireless system

The 1630-2 FC supports the Fluke Connect Wireless System. Fluke Connect wirelessly connects the clamp to an app on a smartphone or tablet. The app shows the ground resistance measurements on the smartphone or tablet display. These measurements, as well as the GPS location from the phone, and the images, can be saved to Fluke Connect Cloud storage and shared with the project team.

The Fluke 1630-2 FC has the following features:

- **Earth ground AC leakage current measurement:** It identifies AC leakage currents without disconnecting the earth ground stake from the grounding system – this is ideal for system troubleshooting.
- **Rugged:** The heavy duty clamp jaw stays in alignment and in calibration even in every day, on the job industrial environments.
- **Logging measurements:** The earth ground clamp saves time by automatically recording data at preset intervals and saves up to 32 760 measurements in memory at the set logging interval. It saves time by recording and storing measured values.
- **Alarm threshold:** It has user-defined high and low alarm limits for rapid measurement evaluation.
- **Band-pass filter:** The selectable band-pass filter function removes unwanted noise from the AC leakage current measurement.

For more information contact Comtest,
+27 10 595 1821, sales@comtest.co.za,
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Web data logger

There is ongoing tightening up of regulations that impact upon industries where the monitoring of measurements of illuminance, temperature, atmospheric pressure, humidity and CO₂ is critical in the manufacture and storage of electronics, pharmaceuticals, frozen foods, comfort conditions in buildings and other temperature sensitive applications. This is making South African industry take a new look at how accurately its processes are monitored. To ensure that temperature spikes outside of accepted parameters are recorded and acted upon immediately Delta OHM is offering the HD50 Web Data Logger instrumentation.

The HD50 is a measuring device that stores data in a memory that can be located locally in the instrument, in a database on a PC or server, or in the cloud. The HD50 was developed for use with one logger, which can be extended to an unlimited network of loggers.

Settings can be opened from a Web browser, as it has a built-in Web server. This way it is also possible to monitor the actual measurements. Delta OHM already has the HD35 series, based on RF communication. In some cases when networks are very wide or complex or divided into more than one building, a mix of cabled, WiFi and radio frequency loggers can be the best solution. The HD50 series can be integrated into such hybrid networks.

“As apart from easy-to-use Web browser access and the ability to be applied as a stand-alone or linked to numerous networks with hundreds of loggers, the HD50 can support practically any signal. Universal inputs make it possible to integrate any transmitter with standard output,” says Jan Grobler, managing director of GHM Messtechnik South Africa.

“Additional software is available for all solutions: database locally on PC, database on local server, or cloud based. We also offer optional software for CFR21part11, utilised in the pharmaceutical market. The HD50 has a wide range of standard sensors (°C / RH / LUX / Atm / CO₂) and the logger sends an email alarm when a value is higher or lower than the set threshold;” he adds.

Features of the HD50 include:

Connectivity: The Web data logger can be connected to a local network either via WiFi or Ethernet interface.

Logging: A measurement and logging interval can be set up inside the data logger. When the data logger memory is full, it can be selected to stop the logging or to continue overwriting the older data (cyclic logging). It is possible to log all the available quantities or, in order to increase the memory capacity, only the quantities of interest.

Alarms: For each detected quantity, two alarm thresholds can be set. The exceeding of a threshold is signalled acoustically by means of the internal buzzer, visually by lighting the alarm LED on the front panel and remotely by sending alarm emails. An alarm hysteresis and a delay in the generation of the alarm can be configured for each detected quantity.

Integrated Web server: The integrated Web server allows configuration of the data logger and view real-time measurements from any PC, tablet or smartphone. Connectivity to the same local network of the data logger is by simply using a Web browser and typing the IP address of the data logger, without the need to install specific software. Measurements can be seen in the form of a graph or in a table.

Cloud: The integrated Web server can connect data directly to the logger and display the actual measurement. The data logger automatically sends the data to an HTTP server at regular intervals, and in particular to the Delta OHM portal, www.deltaohm.cloud. The data sending interval is configurable.

“One of the unique features of the HD50 Web data logger is its ability to store variables accurately and effortlessly. The data logger can be applied in any industry requiring measurements over time.”

“Reliability is what the Delta OHM HD50 Web data logger instrumentation offers. It has the latest available software, giving the HD50 the edge for absolute accurate measurement readings;” concludes Grobler.

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

HD50 SERIES

The data loggers of the HD50 series allow indoor monitoring of various physical quantities. The data loggers are available for the monitoring of:

- Temperature
- Humidity
- Atmospheric pressure
- Carbon dioxide (CO₂)
- Illuminance
The mechanical engineering sector is working constantly to find ways to optimise machinery, improve machine availability and minimise fluctuations in production. Integrating high-performance measurement capabilities into control systems can help initiate new development approaches that overcome performance limitations once considered insurmountable. The new ELM314x Economy line of EtherCAT measurement modules opens up this path to innovation for an even broader diversity of machinery.

Programmers and engineers looking to advance machine development often run into at least one technological hurdle at some point or another that stalls further performance gains. The problem areas can be many and varied – physical as well as electrical – and they broadly affect all the machines of a given type, even from multiple vendors. The key question is how machine planners can deal with these challenges they are faced with. When it comes to controlling machines in a closed loop or gaining greater visibility into machine processes, the EtherCAT measurement modules from Beckhoff offer a right-fit solution by allowing high performance measurement technology to be incorporated directly into the control systems.

Integrated measurement technology benefits machine builders and users in various ways over the entire life cycle of a test or production machine. Examples include:

- During first-time commissioning, installation troubleshooting and process fine-tuning.
- During operation, to monitor operating sequences and production quality, measure vibration, monitor power, check results and predict the need for maintenance.
- In maintenance, to verify that the work carried out has achieved the intended outcomes.

In all these cases, measurement technology adds value by delivering insights gained from carefully planned measures to achieve greater visibility into a machine’s inner workings. But for this to succeed, measurement applications must be planned in from the outset, during a machine’s conceptual design phase. After all, if there are no sensors in place to measure something, either directly or indirectly, no measurements can be made. Only users who are thoroughly familiar with a given process can make informed decisions on where it would make sense to take measurements within a machine. That said, novel types of measurements can also produce surprising new findings that allow processes to be optimised further.

Economy line modules open up a wide range of applications

The 1 ksps Economy line of EtherCAT ELM measurement modules is the second category of integrated measurement technology to be released by Beckhoff. The basic ELM3x0x line rolled out previously, with sampling rates of 10 to 50 ksps per channel and an accuracy of 100 ppm, is designed to support highly dynamic measurements – rapid sequences of movements, load reversals or alternation.
of the kind that often occurs on test rigs and benches. The same terminals can provide compelling insights into processes in high speed production machines as well.

However, many production processes do not require such fast sampling rates. This is why the new ELM314x Economy line with 1 kbps per channel was developed. It fits perfectly with the movement sequences of mechanical machinery yet offers the same capabilities and works in exactly the same way with TwinCAT software. Plus, there is the compatibility advantage as well. So if, for example, a machine should become substantially faster at some point in the future, the EtherCAT measurement modules can simply be replaced with faster ones with minimal effort, and measurement can continue as before.

The new ELM314x Economy line currently comprises 2, 4, 6 and 8-channel variants. The modules allow high precision measurements with 100 ppm accuracy over a wide temperature range, at low per-channel cost, and can process analog signals in the ranges from ±1.25 to ±10 V, from 0 to 10 V, from ±20 mA, and from 0/4 to 20 mA.

Measurement modules with diagnostic capabilities
The ability to monitor and diagnostically analyse measurement performance is of key importance for any user. This applies not just to machines operating continuously but also to test rigs that need to run over the weekend, and even short-term testing tasks. Cable breakage, short circuit, overheating and disruptions to the power supply are just some of the issues which, at best, might cause an interruption of the measurement process and, at worst, falsify the measurements recorded without being noticed. Measurements of the kind taken unattended, deep inside production machinery, must therefore be able to anticipate such faults from the outset and report them reliably in the event that flawless measurement results can no longer be obtained.

The EtherCAT measurement modules from Beckhoff are designed to do just this. Self-diagnostic capabilities account for a significant proportion of the device firmware and hardware. For users, this means that they can rely on the modules to detect and report commonly occurring faults and only ever return reliable measurement readings to the control system.

Making the most of EtherCAT’s advantages
The fast, high precision measurement modules benefit from the following field-proven EtherCAT capabilities, which are ideal for industrial measurement systems:

- The transfer rate of 100 Mbit/s is sufficient for several 100 analog channels, each with a sampling rate of 10 kbps.
- The distributed clocks system allows synchronised data capture on a large number of channels and terminals, at long distances, with an accuracy of up to ±100 ns.
- The proven, consistent parameterisation of EtherCAT slaves via CoE, and data transport via PDO is already familiar to the users.

Given that PC-based control technology has always been used to equip even extended plants with EtherCAT, the Beckhoff portfolio not only incorporates measurement terminals and the means to implement TwinCAT functionality, it also includes numerous EtherCAT infrastructure components spanning the entire measurement chain. The latter include the following: optical transmission equipment such as couplers and fibre-optic media converters for environments with a high EMC load; the CU2508 family of port multipliers for parallel EtherCAT data streams requiring transmission rates in excess of 100 Mbit/s; and couplers with ID switches to support flexible topologies and in general, the fault-tolerant redundant EtherCAT cabling.

Measurement technology and simulation
In many fields, computer-aided simulation is used to trial a wide range of ideas in advance, thus reducing subsequent testing time, effort and expense. It can be highly worthwhile, especially with the kinds of complex systems that cannot be tested extensively in advance. With systems like these, simulation may be the only viable way to find the right approach to a solution. It can also help to identify the best locations for sensors within a machine, or, alternatively, show that certain sensors could be left out if the information they would provide can be obtained by other, possibly indirect, means.

This might sound as if measurement technology could become redundant in the long term. Doubtless, simulations can be run under a wide range of repeatedly changed starting conditions, and can save a lot of time. However, the fact remains that applications must always be tested, time and again, against real-life conditions as well. A simulation model has to be compared repeatedly with how the actual machine it represents behaves. Precise measurement data obtained from the machine itself showing actual timings and quantities is essential. Without this feedback, the model would evolve in isolation, and any simulations run would produce unrealistic results. High quality, built-in measuring technology ensures a steady flow of information from the machines, and the various measurement channels, if set correctly, provide exactly the control data needed to refine the simulation model.

High quality measurement data is also crucial in another entirely different field of application where virtual world data and real world data are combined: hardware-in-the-loop testing. Here, tests and measurements are conducted on a device, and the data collected is fed back into a test model in real time. If incorrect measurements, dynamic inaccuracies or deviations occur, testing is no longer possible. HIL tests of this kind are now performed on many production machines, and this calls for measurements to be conducted under production conditions, with short cycle times. These are genuine high speed measurement tasks where precision is essential, and Beckhoff increasingly is equipping test benches with EtherCAT measurement modules for this very purpose.

Conclusion
Looking ahead, the emphasis placed on equipping various types of machines with measurement technology may shift as machine vision systems and advances in sensor technology give rise to new solutions for new requirements. However, continuous measurement in some form will always remain part of the process. Beckhoff, with its EtherCAT measurement modules in general and the new ELM314x Economy line in particular, has successfully introduced a valuable class of component to electrical measurement technology that serves this purpose well. With the addition of machine vision technology to TwinCAT, optical measurement is becoming increasingly important too, and Beckhoff will continue to rank as an important equipment supplier for advanced and sophisticated machinery, helping to future-proof not just production machines, but end customers’ processes as well.

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No operator ever wants to experience an emergency shutdown (ESD). Not only does that mean something went wrong on the line, but if the critical shut-off valves malfunction, it also could place personnel and the environment at risk, not to mention putting a heavy financial burden on the company. The failure of these valves in crucial moments can be catastrophic, potentially rendering useless a Safety Instrumented System (SIS), put in place to reduce the possibility of an accident. Though static or dormant for long periods of time, these valves must work when the time comes and operators do not want to question the reliability of the installed control equipment. Therefore it is important that some type of valve monitoring takes place within the processing plant on a consistent basis, and partial stroke testing (PST) has become the go-to method.

There are three PST techniques currently available, each offering different benefits, but all contribute to increased confidence in the equipment. But which one is best for emergency shutdown? Thanks to continual advancement in smart technology, a new PST method has emerged as the most comprehensive solution for ESD applications. Representing an evolution in valve testing, digital control transmitters combine the features and benefits of other PST techniques to offer a broader diagnostic ability, an easier implementation, and a more cost-effective maintenance programme. While not yet completely understood or adopted, their benefits offer solutions at key pain points in ESD which cannot truly be grasped without first reviewing PST in detail.

Partial stroke testing allows processing plants to test the installed base of valves without having to actually close the valve and shut down the plant, as is the case with Full Stroke Testing (FST). Through PST, the valve’s movement is checked via position control devices and only the most critical failure modes are tested. During the PST, should a valve not move out of its end position within a specified period of time, the test is cancelled and an alarm is output, thus ensuring a blocked valve does not go unnoticed.

Before PST was introduced, FST was the sole monitoring technique available. However, since this method required a complete plant shutdown, it was not only costly, but valves weren’t being tested as frequently, leading to more emergency shutdowns as a result of isolation valve failures. This testing method also did not offer any diagnostic insight into what was happening inside the valve, unlike the PST techniques of today. Now certain PST methods, including those that utilise transmitters with pressure profiling, are able to provide valuable predictive maintenance data (i.e. the occurrence of valve friction) that can assist maintenance teams in prioritising tasks and implementing corrective action before it becomes a problem. Thus if repairs are needed, a scheduled, non-emergency shutdown can be implemented or the valve can be temporarily bypassed. By implementing a routine PST process, the SIS is protected and reliability of the isolation valve is improved, resulting in longer periods between required FSTs, and reduced maintenance costs.

Mechanical jammers
For many years, there were two PST techniques available, each offering specific benefits for different uses. Firstly, mechanical jammers are the simplest and least expensive option. They are highly reliable because of their ability to resist vibration, but they are also the most manual option, requiring the device to be physically inserted into the valve assembly to prevent it from closing completely. This manual placement is subject to human error, placing the entire process...
in jeopardy of an accidental full stroke. This technique also poses a problem should an ESD occur during the PST process.

**Modulating valve controller**

The second, more popular technique employs a modulating valve controller, or smart positioner. This is a more innovative technique that utilises modern technology to automatically generate the PST function, either locally or remotely. Smart positioners monitor valve movement proportionally, measuring the speed of its response and its position. It is capable of cancelling the test should the response not occur within a specified period of time. They typically have a small flow factor, making them appropriate for applications where valve movement is very small.

This poses a problem in the ESD application because when a valve strokes during an emergency shutdown, it is generally required to move from a fully opened state to a fully closed one rather quickly. To compensate, solenoid valves (SOV) can be installed to achieve the required closing time, venting the actuator at a faster rate to close the valve. However, the SOV is not always tested during a positioner-based PST, which poses the original problem of potential malfunction because problems are not identified before the ESD valve is needed. Additionally, smart positioners do have the ability to capture diagnostic data for use in maintenance, unlike mechanical jammers, although they will not capture the ESD event. To compensate for this, limit switches or additional transmitters can be utilised, thus requiring the installation of even more equipment.

**Utilising the solenoid valve**

The third and most comprehensive PST technique utilises the solenoid valve. As the final element that is called upon to ensure the valve returns to a safe state, the SOV needed to be tested along with the valve/actuator combination which was not possible with the smart positioner-based PST method. When originally introduced to the industry, the SOV-based PST method involved an operator physically pressing and holding a switch to de-energise the SOV to relieve air from the actuator and allow for valve movement. It was the operator’s responsibility to visually monitor the movement of the valve and release the switch once the movement was confirmed. Though it allowed for SOV testing and did not require an expensive positioner, this labour-intensive technique had several drawbacks, including variability in operator decision making, the potential for holding the switch too long and causing a shutdown, and the risk of human error in the manual recording of the event.

**Digital control transmitter**

So over time the technique was improved upon, which brings us back to the digital control transmitter. The digital control transmitter is an automated SOV-based PST technique that can functionally test the complete automated valve package, including the SOV as already described, either locally, remotely or on-schedule. Additionally, it has the ability to capture diagnostic information on the valves (including the ESD event), as well as the FST, solving problems posed by both mechanical jammers and discrete valve controllers (smart positioner).

How it works: the digital control transmitter confirms the valve position prior to start and the SOV is de-energised through a solid state relay. The air is relieved from the actuator while the device’s electronics monitor the valve position changes. The SOV is re-energised at the correct moment to re-open the valve after a predetermined percentage open is achieved. This process reduces or eliminates the active labour requirement of the previous process, increases precision to the desired PST set point, decreases the potential for over travel and provides electronic reporting and feedback to control the system.

Digital control transmitters can be mounted to rotary and linear valves and are approved for use in hazardous areas. With only a few suppliers offering this solution, one in particular has been leading the way with advanced products that have expanded on these benefits and provide even more diagnostic features.

**An intelligent valve position transmitter**

Westlock Controls has an intelligent valve position transmitter called the Digital EPIC-1. This product offers discrete position control, as well as reliable, non-contact position feedback with digital communication via HART protocol in an integrated package. Recently, the company launched its second generation Digital EPIC-2 product which introduces pressure profiling technology to monitor the supply and actuator pressure, confirming adequate supply pressure prior to initiating the PST. Unique in the added features it offers, the Digital EPIC-2 can record multiple variables, including the time and pressure required to break from the full open position, providing an early indication that there may be an issue with the valve/actuator integrity. The Digital EPIC-2 also has improved electronics and complies to the most current HART 7 protocols. The most interesting of the expanded features offered, and an approach unique to the Digital EPIC-2, is the ability to record valve signatures before and while the valve is functioning in the process line. Users can review maintenance and baseline signatures on their host system via DD/DTM technology to make determinations on valve health and schedule maintenance accordingly.

Integrator and installation signatures are also available. When the valve is tested at an assembly shop prior to going on site at a plant, the integrator signature would be generated to ensure the whole package was tested and functioning when the digital control transmitter was integrated with the valve and actuator at the distributor location. The final installation signature is generated while installing the integrated valve package in line, assuring traceability of the entirety of the valve package commissioning process.

**Conclusion**

To summarise, the digital controls transmitter is designed to combine continuous monitoring of valve travel with other valve control functions to keep the operator continuously informed. With more advanced product offerings, the level of diagnostics that can be captured has been elevated, enabling plant operators to make better assumptions and informed decisions regarding their ESD maintenance programs. Plant operators who have experienced problems with PST in the past, or who have not implemented it for various reasons will find digital control transmitters to be an effective and easy implementation compared to other techniques. Being able to predict maintenance needs before they are required can save costs and enable plant operators to implement more efficient, proactive maintenance programmes as opposed to reactive ones.

For more information contact Desmond Delport, Valve & Automation, +27 11 397 2833, sales@valve.co.za, www.valve.co.za
Turck’s enhanced Li linear position sensors measure position values at a frequency of 5 kHz at measuring lengths of up to 2 metres. Turck has updated its contactless Li Q25 positioning systems and has now added new extended variants to the program. The inductive measuring principle offers improved shock resistance and sampling rate compared to alternative measuring systems. With measuring lengths of up to 2 metres, the Li sensors outperform magnetostrictive linear position sensors, which, due to their operating principle, sense at a slower rate as the measuring length increases.

The Extended series of the IP67 sensors are not only resistant to harsh environmental conditions such as from humidity and dirt. These devices reliably output a position signal when subject to vibration or shocks of up to 200 g. The 5 kHz scan rate keeps positioning errors to a minimum—something that was previously unachievable in rugged applications. Precision has also been further increased with a 16-bit D/A converter.

Li sensors, with their immunity to magnetic fields, are generally ideal for closed-loop control tasks in the metalworking industry, as the metal shavings accumulated here do not stick to the positioning element inducing linearity errors. Thanks to their shock resistance, they can be used for position measurement in presses and punching machines without any problems, as well as in wood processing or injection moulding machines.

The Li linear position sensors always supply their output signal twice: as a 0 – 10 V signal and as 4 – 20 mA signal. This makes it possible to connect diagnostic systems and also reduces the number of device variants to be kept in reserve. Turck is offering the new devices in measuring lengths of 100 to 2000 mm.

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Thin clients increase flexibility across the enterprise

With many applications on multiple displays throughout a plant floor, manufacturers struggle to manage numerous sources of content. VersaView 5200 from Rockwell Automation uses ThinManager software to help manufacturers more easily manage their applications.

“The latest additions to the VersaView 5200 portfolio allow end-users to choose a single display or multiple displays with a variety of resolution options,” says business manager, Christo Buys. “Customers leveraging ThinManager software can now match the right thin client hardware to their specific application needs. The VersaView 5200 thin client portfolio from Rockwell Automation helps simplify management of devices and users.”

The expanded VersaView 5200 portfolio includes five thin clients: single display, dual display, dual 4K display, multi 4K display and integrated display. The multi 4K is the first in the industry to offer seven displays and is exclusively supported by ThinManager software.

The new thin clients each offer unique benefits. The single display offers a compact design, with a single DisplayPort video output. The dual 4K display includes a high performance quad core Intel Atom CPU for more demanding applications. The multi 4K display offers a high performance quad core Intel i5 CPU for applications requiring multiple displays.

The VersaView 5200 non-display thin client options are ideal for use with VersaView 5100 monitors. This two piece solution separates the monitor and thin client, so either can be replaced independently. VersaView 5200 thin clients are designed to be used exclusively with ThinManager software. The software centrally manages content and visualisation for every aspect of modern industrial operations. It can help reduce downtime and maintenance by simplifying the management of all devices and users. The location-based Relevance technology from Rockwell Automation can deliver targeted content based on role and location.

When used with the ThinManager software, the VersaView 5200 thin clients can start receiving information as soon as they are plugged in. Device configuration is not needed, resulting in faster device replacement. Information is stored on a server to help protect sensitive information. The ThinManager software also provides multifactor user authentication, including biometric authentication using fingerprint scanning.

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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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Inductive sensors with Teflon coating

With switching distances of up to 50 mm and magnetic field resistance of 200 mT, Wenglor’s inductive sensors with correction factor 1 come in a total of eight new welding-field resistant models, with four housing designs providing impressive performance for the detection of ferrous and nonferrous metals. Applications are in the steel and automotive industries.

Inductive sensors with correction factor 1 detect ferrous metals as well as nonferrous metals such as copper, cobalt, nickel and tin. The sensor always has the same switching distance, even for different metals. In combination with extended switching distances of up to 50 mm, the sensors can be used to implement a great variety of applications. The Teflon coating increases availability, especially when used in welding equipment where deposits resulting from welding splatter often have a negative effect on sensor performance. The extended temperature range of -40 to 80°C also permits use in cold and very hot environments.

This new inductive generation is also resistant to DC and AC electromagnetic fields with strengths of up to 200 mT. Where conventional sensors are used, these magnetic fields often result in malfunctions and erroneous switching. This is not possible with Wenglor’s devices. In combination with large switching distances of 4 to 50 mm, high frequencies of 1500 to 4200 Hz result in impressive performance and permit use in high speed applications. In addition, all four housing designs (M12, M18, M30 and 40 x 40 mm) are available in flush and non-flush mounting variants. The switching status LED is additionally equipped with an error indicator which is activated in the event of a short circuit or excessive temperature.

These sensors are suitable for all industry sectors where different types of metal need to be reliably detected. In the steel industry they can be used in the production of castings and in the automotive industry (auto-body fabrication, pressing plants and chassis components).
SICK Automation South Africa, one of the country’s leading sensor solution suppliers for industrial applications, recently installed 120 image-based 2D barcode readers across multiple scanning stations in a South African-based tobacco manufacturing plant. The cigarette manufacturer was looking for a solution to move from its manually intensive marking and tracing system, which facilitated human error and lacked a satisfactory verification process, to a modern technological one.

The client’s objective was to ensure the plant retained its ability to produce world class products. This would be achieved through increased product traceability and improved quality control. SICK recommended its Lector 620 Professional image-based barcode readers, part of its Lector 62x product family, and specifically designed for improved product and process traceability.

The installation of these barcode readers has ensured that the plant has up to date unit level traceability on all product elements. This incorporates the container stored tobacco blends through the entire production process, ending with cartonised cigarette boxes contained in palletised containers for distribution. The Lector 620 range includes a failsafe microSD card in case of device failure, which automatically loads all required device settings when inserted into a new device.

“Product traceability allows for safe products to be manufactured while protecting the production process,” says marketing manager, Mark Madeley. He adds that among the benefits of the Lector 620 Professional is its automatic parameter switching ability. This allows the barcode reader to change its settings between four different modes, thereby accommodating variances in lighting conditions. The software used can also artificially enhance the barcode to ensure the highest possible read rates, while its image capturing ability conducted simultaneously to scanning is another advantage. “No-read images are saved, providing our client with the ability to ascertain the cause of the fault diagnostically and implement timeous remedial action,” he continues.

All devices were pre-programmed according to the manufacturer’s standards with the plant’s maintenance engineers receiving device competence training. Used in the packaging and pharmaceutical, automotive, electronics and solar industries, as well as the document handling industry, the Lector 62x family decodes all common 1D, 2D and stacked codes and has optical character recognition. The readers come standard with industrial, compact housing with swivel connector, flexible interfaces and microSD memory card, while the function buttons include aiming laser, focus adjustment, auto-setup and green feedback LEDs.

For more information contact Mark Madeley, SICK Automation Southern Africa, +27 10 060 0550, mark.madeley@sickautomation.co.za, www.sick.com
Alarm visualisation by Omniflex

Plant diagnostics is a key element to ongoing plant reliability and productivity. Identifying some plant abnormalities is akin to spotting an individual animal in a herd of moving animals. It is dynamic and difficult to pinpoint.

The key to identifying abnormalities is:

1. Monitoring: tracking changes be they switches/contacts, analog range change or rate of change.
2. Speed: ability to discriminate to the ms what happened first.
3. Order of events: ability to view the list in accurate chronological order.
4. Visualisation: ability to review events rapidly to make corrective action.

This is an over-simplification as plants can have large interactive processes, but the order above is critically important. Being able to visualise alarms is useless if the order is inaccurate. Certain portions of the process can be viewed independently too – one large system is often less efficient that several smaller ones.

Monitoring is self-explanatory: analyse the process and monitor to key parameters.

Speed: depending on the process, use an event recorder to capture time with every event recorded.

Omniflex provides cost effective and simple alarm visualisation on a touch screen for quick in-plant diagnostics, complementing its Alarm Management product offerings. Using a Gantt chart as an HMI object, events and alarms can be visualised graphically by time of occurrence and duration. With a chart, users can clearly understand the time at which an event occurs and its duration in relation to other events on the system. Combining of the event log into a chart helps users to compare the frequency of events and alarms.

Other benefits of using Omniflex touch screen HMIs for alarm visualisation include:
- Over 250 different PLCs are supported.
- Customise existing alarm system for improved productivity.
- Operators can evaluate new alarms in relation to existing ones.
- Reduces operator stress by presenting a chronological view, which allows root cause diagnostics.
- Operators can discriminate the status of more alarms timeously.

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

High speed, future proof data transmission.

Compact fiber optic splice boxes for DIN rails.

The new splice boxes from Phoenix Contact ensure continuously reliable data transmission in real time. With their compact, uniform design, the splice boxes ensure ample interior space for secure connection of fiber optics.

For more information:
JHB: 011 801 8200
CT: 021 930 9666
DBN: 031 701 2701
PE: 041 364 0415
www.phoenixcontact.co.za
Rugged panel computers and displays for tough environments

With the thousands of different monitors available on the market today, you might wonder why industrial users can’t find a suitable monitor for their industrial applications. The reason is simple: The vast majority of these thousands of different monitors are designed for commercial uses, and consequently cannot stand up to the harsh environmental conditions characteristic of industrial applications. Harsh conditions could include vibrations caused by machinery, dust from manufacturing processes, as well as rain and strong sunlight for monitors located in outdoor environments. Under such harsh conditions, commercial monitors can only be expected to operate reliably for a relatively short period of time, whereas a properly designed industrial monitor should provide several years of reliable service.

Operating in harsh and hazardous environments poses many critical challenges that include blistering hot or freezing cold temperatures, high exposure to dust and water and exposure to explosive atmospheres. Moxa offers rugged panel computers and displays that are ideal for deployment in extreme operating environments for HMI applications such as:

- Rig-floor monitoring.
- Drilling control.
- Wellhead/pipeline monitoring.
- Marine deck/bridge monitoring.
- Monitoring hazardous factory environments.

Control systems in the field can consist of various PLCs and scada systems. Moxa’s extensive experience in providing HMI solutions enables it to offer panel computers that work smoothly with different scada software and HMI applications such as:

FactoryTalk View SE/ME, SIMATIC WinCC, Wonderware InTouch, GP-Pro, Ignition, PcVue, TwinCAT and FreeSCADA.

For more information contact RJ Connect, 27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za

New pressure switch for process industry

WIKA has released a new pressure switch with high switch differential adjustability for the process industry. The model PSM-700 mechanical pressure switch has been designed for control and monitoring applications. The measuring element is a fully welded bellow made of stainless steel 316L. This corrosion-resistant pressure switch is suitable for a broad range of media used in the process industry.

The case consists of a high grade aluminium alloy which allows the pressure switch to withstand the harsh operating conditions of the process industry. The model PSM-700 is equipped with UL listed micro switches to ensure high endurance with durable operation and long service life.

The model PSM-700 has a high switch point repeatability of ≤ 0.5%, which enables reliable switching. The switch differential is adjustable to a wide range of up to 60% of the setting range to realise flexible on/off controls. This wide setting range is often needed for the on/off control mode of cyclic applications. The switch point can be specified on site. With tamper proofing, which is available as an option, unauthorised adjustment of the switch point can be prevented.

For more information contact WIKA Instruments, +27 11 621 0000, sales.za@wika.com, www.wika.co.za

Compact splice boxes for future-proof data transmission

Phoenix Contact has extended its range of splice boxes with the new FO range. These FDX 20 series splice boxes ensure continuously reliable data transmission in real time.

With their compact and uniform design, the splice boxes provide ample interior space for the secure connection of fibre optics. They are available in connection versions with 6x ST duplex, 6x SC duplex, 6x E-2000- (LSH), or 12x LC duplex connections. The patented pigtail tray in the device interior enables the convenient splicing of the FO conductors, as well as minimum and yet safe bend radii.

The ready-to-splice pre-assembly significantly reduces mounting times and improves the clarity of the splice boxes in the control cabinet, thanks to the intuitive front operation and consistent product design.

For more information contact Sheree Britz, Phoenix Contact, +27 11 801 8200, sbritz@phoenixcontact.co.za, www.phoenixcontact.co.za
**Wireless controller**

With three times faster processing speed and eight times more memory than previous models of the DXM controller, the new DXM700 provides expanded ScriptBasic programming capabilities and faster script processing that allows for more complex solutions to solve even more applications in the factory.

**Become a smarter factory**

DXM wireless controllers are designed to facilitate Ethernet connectivity, as well as enabling IIoT applications. As smart factories become more prevalent, IIoT technologies are in high demand to connect manufacturing assets to the Internet.

The DXM700 can be used for various IIoT applications such as remote monitoring, predictive maintenance or process optimisation. It is compatible with Banner sensors and Connected Data Solutions software to create complete end-to-end IIoT solutions.

**Save DIN rail space**

The DXM700 wireless controller takes up less space on a DIN rail due to its compact 70 mm width. Despite the smaller footprint it still includes most of the features and the same reliable performance as the rest of the DXM series.

**Get actionable data when and where you need it**

The DXM700 also offers advanced features that offer flexibility in communicating, logging and using data from the factory floor. For example, it includes communication protocols like Modbus RTU, Modbus TCP and EtherNet/IP to enable communication between PLCs, HMIs and other local hosts. Alerts, alarms or data log files can be sent via secure email so that operators do not miss important notifications.

A removable SD card can be used for on-board data logging and the easy to follow interactive programmable user interface includes an LCD screen and LED indicators. A cellular modem provides cellular Internet connectivity and four sourcing outputs are available for local triggers.

The DXM700 can be used in numerous factory automation and IIoT applications including pick-to-light assembly, kitting or order fulfillment, remote monitoring and predictive maintenance.

**Stafsjö introduces Linak electric actuator**

Linak’s electric actuator is a compact maintenance-free unit for on/off operations with a speed of 7-11 mm/sec. It is available as standard in a 24 V DC version but it can also work on 230 V AC or 120 V AC if it is supplied with a control unit or transformer. The actuator unit features a solid stainless steel structure holding the actuator in exactly the correct position during operation. It can be supplied on Stafsjö’s WB11, WB14, WB14E and MV knife gate valves from DN 50 (2”) up to DN 300 (12”).

The Linak actuator can be supplied with three different control units or transformers, all three can either be operated manually on the unit or remote operated via a cable of which two are available with push buttons for open/ stop/close. An external battery backup WCU-UPS can be connected to the WCU to ensure the valve unit is fully operational in case of a power failure.

**Advanced programmable time switch technology**

Legrand’s AlphaRex³ and MicroRex time switches are designed for easy programming and ensure high clock precision in industrial, commercial and domestic environments.

Based on advanced time switch technology, they are used to switch an electric circuit on or off at selected times during a pre-programmed time period.

The AlphaRex³ series has a user-friendly standardised text-guided programming facility, with a high resolution digital display and backlight. Programming with clock precision to the second is controlled using Legrand’s AlphaSoft programming software. Other features include an EEPROM memory, which prevents settings being lost.

Typical applications for this series include industrial pump stations, security alarms, lighting, air conditioners, heating and ventilation systems.

MicroRex time switches offer easy plug and play installation for daily and weekly programming. By simply setting the analog switching dial during startup, the time is automatically set using the fast-run mode. In the event of a power failure, the time is automatically reset.

With analog and digital dials, there are 24 hour and seven-day time switches for DIN rail and wall mounting, with a five-year running reserve. These units have the capability for multiple programs, which ensures optimum time setting flexibility. MicroRex time switches have an LED status indicator, a precision clockwork of 0.2 s/day and are controlled by either a quartz or synchronous motor. For increased safety and user convenience, there is an automatic and manual and advance/over-ride facility. The MicroRex series is designed for use in applications, including periodic lubrication of machines or regularly repeated switching of pumps, feed conveyors and sprinkler systems.

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**For more information contact**

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legrand.south-africa@legrand.co.za,
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*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 on these and other suppliers please see www.ibg.co.za
Intelligent Water Systems

Talk to us about using Africa’s #1 SCADA System to measure and optimise your entire value chain. The Adroit SCADA software suite supports all telemetry, M2M and various IIoT sensors allowing you to use your standard Adroit SCADA to take advantage of the digital revolution. Alarm and event management, Big Data and Reporting delivers real-time value to operations and management through dashboards and operational reports.