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.

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Imagine a production process where devices monitor themselves for faults. Thanks to built-in Heartbeat Technology, Endress+Hauser’s new instruments allow plant processes to take their own pulse and send an alarm when things go out of limits. See this month’s cover story on page 24 for more on this innovative new self-diagnostic capability.
Digital transformation is more than just technology

While digitalisation offers new ways to increase operational efficiency, we see many companies battling to overcome the challenges. Particularly, they struggle to get past the ‘pilot’ stage, and are therefore never able to upscale into the game-changing benefits alluded to in the Industry 4.0 ‘marketing brochures’.

There are a number of things that make the process complicated. Firstly, there is the choice of a suitable IIoT platform, secondly, there are the worries around cybersecurity, and thirdly, there is the small matter of organisational culture. This is the elephant in the room, since successful digital transformation depends as much on new attitudes as it does on new technologies to connect plant devices to analytic packages in the cloud. In other words, no digital strategy is ever going to deliver meaningful ROI until company employees at all levels embrace its ideas.

Like any transformation, success depends on a culture that supports strategy. If leaders are serious in their objectives, the first step is to address the insecurity that comes with change. The message is that the new high-performance digital culture is designed to foster collaboration and empower people across divisions to deliver faster results through teamwork. Employees must be aware that far from making them redundant, these new information-based tools will enable them to make better informed judgement calls and on-the-spot decisions in an organisation that values common purpose over structure and managerial hierarchy.

Digitally mature organisations are those that deploy the technologies of Industry 4.0 to achieve a more outwardly focused approach. The emphasis is on breaking down old-style divisional silos to create a new level of customer experience through coordinated operations and enhanced supply chain management. They avoid the trap of ‘technology for technologies’sake’ by incorporating automation as a fundamental component of their business processes, rather than a hoped-for patch to conceal the shortcomings of outdated legacy practices.

Most of all, they understand that transformation is an open-ended quest for improvement, rather than a project with a fixed completion date. In the manufacturing context, this often involves the ongoing convergence of OT and IT. Of course this will happen differently according to company objectives and the industries in which they operate, but all of them must prepare to manage the inevitable collision of cultures building on the horizon. The successful ones will realise early that people are as important an element of digital transformation strategy as the technologies of the fourth industrial revolution. These companies stand to unleash the full potential of Industry 4.0 within a culture of collaboration and teamwork on a scale not achievable before. They will likely invent new ways to work because the old methods simply aren’t competitive any longer. See this month’s feature on IT in manufacturing for more on this much overlooked aspect of digital transformation. You’ll find it on page 36.
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.

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Emerson appoints new president for Middle East and Africa

Emerson has appointed Vidya Ramnath as the new president for its Automation Solutions business in Middle East and Africa. A 24-year veteran of Emerson, she was most recently vice president for Emerson’s measurement and analytical business in Asia Pacific.

Ramnath started her career at Emerson in business unit operations and subsequently held positions of increasing responsibility in a variety of functions. She recently served as global sales leader for Plantweb, Emerson’s portfolio of Industrial Internet of Things technologies and services. She led the growth of wireless business in Asia Pacific and expanded industry solutions and the lifecycle services portfolio for the region.

With a bachelor’s degree in mechanical engineering from the University of Madras in Chennai and a master’s degree in industrial engineering from the University of Texas at Arlington, she is passionate about mentoring young leaders, is an active member of the Emerson Automation Solutions Diversity Council and sponsors Emerson’s Middle East and Africa Women in STEM Council. For her new role, Ramnath will be based at Emerson’s Middle East headquarters in Dubai, UAE.

Emerson and Repsol form strategic alliance

Emerson and Repsol have announced a strategic alliance to deliver advanced subsurface geophysical technologies to significantly reduce the time to prospect and produce first oil. To achieve this critical industry goal, Emerson will work collaboratively with Repsol to implement and deploy advanced subsurface imaging technologies, with core technologies developed by Repsol as part of Kaleidoscope, its 10-year innovation project. These advances will be used by a broad range of the geoscience community within Repsol, and in all oil and gas companies that choose to license the technologies. The solution combines the latest in high-end visualisation, high-performance computing and cloud delivery.

These technologies have contributed to the exploration success ratio of Repsol, with special significance in settings of complex geology in countries like Brazil, Peru and Bolivia. The partnership, which includes joint investment in research and development, will enable Repsol and Emerson to produce commercially available software products for license to help other oil field operators and service companies.

Yokogawa establishes Yokogawa Norge

Yokogawa Electric Corporation has announced that it has established a subsidiary in Norway to engage in the sale of control products and provision of related services. The subsidiary, Yokogawa Norge, was established on 14 February.

In the Norwegian market, Yokogawa has relied to date on distributors and a representative office to provide and promote control systems, field devices and related services to the oil & gas industry. Through the establishment of Yokogawa Norge and the creation of synergy with Yokogawa operations in Aberdeen, Scotland, Yokogawa will be able to solidify its sales and service organisation in Norway and accelerate growth not only in existing markets but also in the renewable energy, pharmaceutical and food industries. Herman van den Berg has been appointed as president.
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!
Local manufacturing key to economic growth

The manufacturing sector in southern Africa is primed to take a more active role in supplying goods to the continent and internationally. Characterised by a pioneering diehard attitude, this sector has a solid reputation of developing products that can readily compete with the best the international market has to offer.

Eric Bruggeman, CEO at the South African Capital Equipment Export Council (SACEEC), says that in the majority of cases there is simply no reason for the African market to source products outside the continent. “The innovation and quality of locally produced goods is exemplary and we believe that this message needs to be conveyed to those people responsible for the procurement of goods within organisations. By partnering with Specialised Exhibitions Montgomery, we are providing a showcase for local manufacturers at an inaugural event.”

The Local Southern African Manufacturing Expo (LME), which is endorsed by the Premier of Gauteng, David Makhura, will be held at the Expo Centre, Nasrec from 21-23 May. The event, which will also include free-to-attend seminars hosted by SAIMechE, has attracted a wealth of local manufacturing intellectual property and expertise.

The expo will also play host to an AREI (Association of Representatives for the Electronics Industry) Pavilion and the Skills Development Zone hosted by the Artisan Training Institute (ATI). AREI represents the interests of the electronics industry in South Africa and aims to contribute to the creation of an environment which encourages dynamic growth of the electronic manufacturing industry, at both component and system level, in South Africa.

The Artisan Training Institute (ATI) will use the Skills Development Zone to display its technical skills in an interactive workshop setting. ATI is making a substantial difference in the technical training environment as it drives quality training throughout its operations.

The organisers have signed an agreement with the Mandela Mining Precinct wherein the Southern African Institute of Mining and Metallurgy (SAIMM) will host the SA Mining Supply Chain Conference and Workshop alongside the LME.

“We are excited about the potential of the Expo to ignite business ties between our local manufacturing sector and industry captains from Africa and abroad,” explains Charlene Hefer, portfolio director for Specialised Exhibitions Montgomery. “It is time for local manufacturers to share their offerings with the market. This event will present the exhibitors with a captive target audience and allow industry procurement specialists to source high-quality locally-manufactured products. Visitors will be spoilt for choice with a wide array of products from reputable well-known local manufacturers taking centre stage.”

For more information contact Natasha Heiberg, Specialised Exhibitions Montgomery, +27 76 135 6549, info@localmanufacturingexpo.co.za, www.localmanufacturingexpo.co.za

Iritron welcomes Oculus into the I³Group

Pretoria-based Iritron, a black economic empowered technology company and subsidiary of the I³ Group, providing quality solutions in the fields of electrical, instrumentation and control systems engineering, systems integration and simulation, recently announced that it has acquired Oculus, a leading control room solution provider in southern Africa.

The acquisition completes the visualisation and information solutions offering to the I³ Group subsidiary’s clients, from the field to control rooms/centres throughout their corporate boardrooms.

The I³ Group, starting with one company, has now grown to four companies. This growth is a direct result of its desire to keep up with market and customer demands, and be on the leading edge of the best global technologies and solutions. The Group is made up of the following companies Iritron, Oculus, KVMTech and Referro Systems.

Iritron, an ISO 9001:2015; ISO 14001:2015; OHSAS 18001:2009 accredited company, has extensive engineering expertise and a substantial local and international engineering industry track record in mining, metals, cement and aggregates, mineral processing and utilities, including power, energy, water and wastewater. The three divisions (Electrical and Instrumentation; Control System Engineering and Development, and Manufacturing and Construction) is renowned for quality solutions, services and products.

Oculus is a specialised design company for operational facilities, control rooms, control consoles and a distributor of leading-edge audio video solutions, with a solid track record in industrial and corporate sectors.

KVMTech, is a leading supplier of digital and analog keyboard, video and mouse equipment used in control rooms for high reliability solutions, as well as industrial automation and process control, measurement and data management solutions and services.

Referro Systems is a sales and distribution company for many top global electrical, automation and software brands, working across many industry sectors in many different areas and countries.

Together, the companies seamlessly integrate to provide clients with a complete solution to enable optimisation and visualisation in their processes.

The directors have taken this group of companies to market with an agreed set of standards, an integrity that is immovable and a policy to always do the best for each other, for customers, for employees and for suppliers.

For more information contact Alwyn Rautenbach, Iritron, +27 12 349 2919, alwyn.rautenbach@iritron.co.za, www.iritron.co.za
**SKF expands engineering services to address changing customer needs**

The last few months have seen SKF South Africa substantially expand its engineering team and services to keep in step with the company’s new technology and service developments, as well as to address changing customer demands.

According to SKF engineering manager, Chris Lubbe, customers are experiencing the negative impact of the country’s exacerbating skills shortage.

“With fewer skilled people to take care of equipment on site, customers are placing increasingly heavier demands on OEMs like SKF and are requesting more support from our engineers. The transformation of our engineering team, which has grown five times over the past eighteen months, enables us to address this market shift.”

SKF is also putting less focus on capex and more effort into its renowned contract services, after-market maintenance management and reliability service portfolio. “These have always been part and parcel of the SKF landscape, we are just taking it to the next level,” states Lubbe. SKF’s expansion strategy aligns perfectly with the company’s focus on taking full ownership of its equipment throughout its entire lifecycle which goes hand-in-hand with building solid, long-term customer partnerships. “Our engineering team now takes more responsibility for understanding and improving the machinery operating at a customer’s site. We are now perfectly positioned to offer support to all our customers, whether they are operating world-class maintenance programmes or older, less efficient plants; these require two very different skill sets,” he adds.

SKF’s current complement of fifteen engineers support the company’s various departments in four areas; applications, project engineering, custom design, and condition monitoring. “It all starts with our sales teams who have to find optimal solutions for a customer’s application,” explains Lubbe. “Here our application engineers step in to provide general support to the sales department.”

This is part of a broader long-term strategy to equip the sales teams with more technical skills to achieve improved overall efficiency to the ultimate benefit of the customer.

“The amplification of SKF’s engineering services will be an ongoing drive that reflects the significance we place on offering life-time services to our customers,” concludes Lubbe. “We are excited to partner more closely with our customers and assist them improve the profitability of their businesses.”

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

**HAW to showcase niche product lines at Nampo 2019**

Hydraulic and Automation Warehouse (HAW), a Bosch Rexroth South Africa Group Company, will showcase eight of its niche product lines at Nampo 2019. Formally known as Grain SA’s Nampo Harvest Day, the exhibition takes place annually at Nampo Park near Bothaville in the Free State.

The four-day exhibition runs from 15-18 May, with HAW’s focus this year on its Uniflex Grease Crimpers – specifically the Uniflex UG20; Salami brand gear pumps and valve banks; the M+S gerolor and gerotor motors and M+S steering orbitals; and tie-rod cylinders. Other products in the line-up include Intertraco hose and fittings, OMT filters and LuEn in-line components.

“Interacting with Free State-based resellers and distributors is the highlight of this annual event for us,” says HAW general manager, Werner Joubert. “It is the stage where we connect with existing customers to promote new products and technologies, and introduce our products, technologies and brands to potential new customers.”

Joubert says that HAW has the technologies, quality products and industry expertise to provide application-specific, cost-effective hydraulic solutions that can enhance agricultural equipment and machinery.

“We use the Nampo opportunity to demonstrate our commitment to agricultural equipment OEMs, and to get customer feedback and suggestions for exploring new technologies. We’re looking forward to seeing how HAW will be able to meet any new requirements identified by our target market,” he concludes.

For more information contact Werner Joubert, Hydraulic & Automation Warehouse, +27 11 281 3800, werner.joubert@haw.co.za, www.hytecgroup.co.za
Hytec appointed service partner to Zollern

Hytec South Africa has been appointed the southern African service partner to the Drive Technology Unit of Zollern. The partnership allows Hytec South Africa to sell, execute inspections, and conduct maintenance, repairs and other services on Zollern gearboxes and winches across the region. The appointment came into effect on 30 November 2018 and is valid for five years. Over the period, Zollern Drive Technology will provide full support in terms of technical manuals and drawings, as well as spare parts for the service, repair and maintenance of the equipment.

Initial training on Zollern equipment was conducted by the company’s service personnel in Hytec’s Cape Town branch. The company’s repairs manager in Cape Town has continuous communication with Zollern and receives information on repairs when necessary.

Hytec South Africa supplies Zollern gearboxes to end users for cranes, winches and drilling equipment as part of its gearbox range, and has been conducting any required repairs at its Cape Town and Johannesburg operations since 2007. “The difference now,” explains regional manager, Iaan Du Toit, “is that we can provide this service across the sub-continent and are not restricted to servicing only the Zollern equipment that we installed.”

Hytec South Africa’s history with Zollern dates back to 2007, when the company provided spares and assistance for projects undertaken by Zollern in South Africa. “In a little over a decade our customers’ installed base had reached a level that required us to enter into a service agreement with the OEM,” says Du Toit. “We are exceptionally pleased that this agreement has come to fruition as it benefits both our companies, as well as customers across southern Africa. The support we receive from Zollern is outstanding and we look forward to working with them for the next five years, at a minimum, as we are aiming for contract renewal once the current contractual period expires.”

For more information contact Iaan du Toit,
Hytec SA, +27 21 551 4747,
iaan.dutoit@boschrexroth.co.za,
www.hytecgroup.co.za

Parker Hannifin showcases its latest mobile solutions

Parker Hannifin presented its new, integrated electrified system solutions for sustainable mobile systems at bauma 2019. Visitors to Parker’s stand were able to see and experience a range of efficient and environmentally friendly innovations. The company’s Future Lab hosted the launch of Electrification Solutions with integrated electrified systems on display, including EcoReach, Steer-by-Wire and the new Global Vehicle Motor (GVM310).

EcoReach

EcoReach is a highly-engineered system combining a number of state-of-the-art core Parker technologies. These include a PMAC motor that improves load handling and reduces energy consumption, a reversible pump that converts shaft power into hydraulic power and runs as a motor driving the electric motor as a generator, and an optimised valve system featuring a combination of different elements designed specifically for forklift applications. EcoReach also features an integrated hydraulic unit with the motor, pump and hydraulic valves all incorporated into a single housing, which minimises the number of components, enhancing reliability and reducing installation size.

The result is an integrated hydraulic system that delivers improvements in performance and efficiency while simplifying build procedures and reducing costs for forklift OEMs. The system gives increased battery life, productivity, load handling capabilities and operational speed, plus a significant reduction in energy consumption.

Steer-by-wire

In the long term, self-driving machines are an industry goal, but in the near-term, steer-by-wire is the clear trend. Steer-by-wire removes the need for heavy, complex steering columns. Parker’s new SBW110 proportional, load sensing, pre-compensated mobile valve optimises steer-by-wire systems deployed on mobile machinery. This means easier installation and reduced noise levels for the driver, making the cab a safer, more ergonomic place to work. By simply using a pump oil supply, tank connection and electric signal, the flow from the SBW110 valve work ports is able to control the steering function. The valve is characterised by class-leading performance for robustness, control precision and energy efficiency.

Global vehicle motor

With the introduction of its new GVM310 size, Parker offers an optimised traction solution to meet the high-performance demands of on-road commercial and off-road electric vehicles and hybrid electric vehicles (HEVs). The GVM310 complements the electrification of hydraulic work functions already possible through the use of the GVM210 in combination with Parker’s hydraulic pumps. The outstanding power density and high efficiency of Parker permanent magnet AC motors, combined with a matched global vehicle inverter, reduces development risk, improves time to market and ensures compatibility and maximum efficiency. GVI mobile inverters are available in a wide range of low voltage variants as well as high voltage models.

For more productivity in diverse industrial applications, machines and processes, Parker offers valves, pumps, filters, gaskets, hoses, controllers, motors, drives and controls, and other related components and accessories. Parker’s technologies, products which can be combined into integrated systems, offer customers tailor-made solutions from a single source.

For more information contact Lisa de Beer,
Parker Hannifin SA, +27 11 961 0700,
lisa.debeer@parker.com, www.parker.com/za
Investing for the future, Rittal’s new plant in Haiger embraces the principles of Industry 4.0. The company has made its largest single investment, totalling €250 million, to establish the world’s most advanced facility for its new compact and small enclosures. The highly automated manufacturing processes, in conjunction with the neighbouring distribution centre, enable seamless order fulfilment, guaranteeing rapid availability of standard products and accessories.

This bold investment ensures that all subsidiaries, including Africa, benefit from these advancements. Managing director for South Africa Adrian Buddingh comments: “By putting Industry 4.0 into practice globally, the company looks to advance smart manufacturing locally as well. As a world leading provider of solutions for enclosures, power distribution, climate control and IT infrastructure, as well as corresponding software and services, we are creating one of the world’s most advanced production plants for compact and small enclosures.”

Owner and CEO of the Friedhelm Loh Group, Professor Friedhelm Loh says: “The plant is to be fully aligned with highly efficient Industry 4.0 principles. The new manufacturing site will also safeguard future competitiveness for our customers and our own business. The investment is a positive statement in terms of the regional economy and the 290 jobs at our new Haiger plant. We have quite consciously decided to shape the future with the local people who made us what we are today.”

The new factory halls, with 24 000 square metres of floor space, will soon house more than 100 high-tech machines. Together they will manufacture some 9 000 AX compact and KX small enclosures daily, processing approximately 35 000 metric tons of steel annually.

The new era of industrial manufacturing will also usher in changes for the human workers. There will be fewer strenuous manual tasks such as lifting and carrying. Instead, the focus will shift to controlling, monitoring and fine-tuning processes. The new technologies will bring improvements to the working environment as a whole. The Haiger facility will be quiet, clean and energy-efficient. For example, waste heat from the new paint shop will be recovered and reused for degreasing components or for heating the factory halls. Efficient use of water is also a high priority. Process water is managed within a closed-loop system, where it is cleaned and reused.

The Haiger facility is a pilot for the real-world implementation of Industry 4.0 and will act as a role model for Rittal’s international operations. It will also be a pioneer and reference for Rittal’s own products and services in terms of the IIoT.

For more information contact Rittal South Africa, +27 11 609 8294, info@rittal.co.za, www.rittal.co.za

analytica Lab Africa 2019
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and IFAT Africa and bring to the continent the full spectrum of the technology behind laboratory technology, analysis, biotechnology and diagnostics, food and beverage production, and water, sewage, refuse and recycling.

July 9-11, 2019
Gallagher Convention Centre, Johannesburg
Presented by Messe Muenchen South Africa
info@mm-sa.com
New mining sector supply chain requirements in the spotlight

The Southern African Institute of Mining and Metallurgy (SAIMM) will host the SA Mining Supply Chain Conference and Strategy Workshop alongside the inaugural Local Southern African Manufacturing Expo (LME) on 22 and 23 May. The conference's premium sponsor is the Mandela Mining Precinct (MMP) and partners include Mining Equipment Manufacturers of South Africa (MEMSA) and the South African Mineral Processing Cluster (SAMPEC).

The conference and workshop are aimed at creating awareness of new supply chain requirements as per the Mining Charter 3, and how capacity and capability in South Africa can be activated to meet these requirements. Further, strategies will be identified to develop local supply chains.

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.

“The conference and workshop will provide attendees with an insight into the roles and objectives of the MMP, MEMSA and SAMPEC, and the assistance they can provide,” says Charlene Hefer, portfolio director for Specialised Exhibitions Montgomery. “The conference and workshop are the perfect complement to the LME and we believe that the content will have great impact on the local sector.”

On 22 May, conference attendees can look forward to sessions on the SA mining supply chain in terms of strengths, weaknesses, opportunities and threats; the implications of the Mining Charter 3 for the SA supply chain; successful supplier development case studies; measuring and maximising local content; standardised codes; and export finance.

The programme for the workshop on 23 May addresses strategies to build the local mining supply chain, and the potential role of a South African mining services cluster.

The LME, endorsed by Gauteng premier David Makhura, along with the SAIMM conference and workshop, will be held at the Expo Centre, Nasrec from 21-23 May.

For more information contact Natasha Heiberg, Specialised Exhibitions Montgomery, +27 76 135 6549, info@localmanufacturingexpo.co.za, www.localmanufacturingexpo.co.za

Brand leaders welcome analytica’s arrival in SA

Over 120 leading brands and international exhibitors have welcomed the arrival of the international trade fair, analytica, in South Africa, with a strong exhibitor turnout and expanded presence at the upcoming analytica Lab Africa.

“The response has exceeded all expectations,” says Dain Richardson, senior exhibition manager at Messe Muenchen South Africa. “There is a great deal of excitement around the arrival of analytica, the recreation of the Lab Africa brand, and the event’s colocation with two other major events, giving participants a far broader scope and a combined audience of up to 6000 visitors.”

analytica Lab Africa, part of Messe Muenchen’s worldwide network of exhibitions, builds on the highly successful Lab Africa exhibition, which Messe Muenchen South Africa acquired in 2017. It will be collocated with food and drink technology Africa (fdt Africa) and IFAT Africa – the premier environmental technology show for water, sewage, refuse and recycling – at Gallagher Convention Centre in Midrand from 9-11 July. The event will include three days of industry-specific conferences, workshops and special features, with knowledge sharing by international leaders in their fields.

Cummins showcases its strength in North and West Africa

Cummins showcased its strong presence in North and West Africa by occupying three stands at the fifth edition of the Salon Halieutis exhibition held during February in Agadir, Morocco. The event attracted a broad spectrum of visitors and Cummins used it as a platform to display its comprehensive range of products, from the KTA19 marine engine to gensets and the Fleetguard range of filtration and coolant products.

Morocco is a leader in Africa in the fishing industry and this presented the opportunity for Cummins to diversify further into this market with its marine engine range, as well as to offer customer support and technical backup services throughout the wider region.

“While we have a long history in Morocco, we were not present in all markets,” said industrial sales and business development leader, Jaouad Ezzarhouni. “Now with the establishment of a Cummins entity we are targeting new opportunities and markets. Marine represents the second largest market for us in the region, second only to mining. Therefore our participation at Salon Halieutis not only generated brand awareness in the region, but reiterated that Cummins’ is one hundred percent behind its large customer base.”

For more information contact Deepa Rungasamy, Cummins, +27 11 589 8512, deepa.rungasamy@cummins.com, www.cummins.com
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**Appointments**

Bosch Rexroth has appointed Tillmann Olsen as regional president Africa. This is in addition to his role as CEO of the Bosch Rexroth South Africa Group.

Bosch Rexroth South Africa has appointed Mike Harrison to oversee the Group’s Hytec Services Africa (HSA), as well as the Group’s East Africa Hub.

Opto Africa has appointed Prashanth Gokaran as general manager.

Tectra Automation has appointed Malan Bosman as national sales manager.

**Energy efficiency incentives extended for three years**

South African businesses may be encouraged to be more energy efficient and reduce their electricity bills by Treasury’s recent announcement that the energy efficiency savings tax incentive (Section 12L) will be extended for three more years. The announcement made by Minister of Finance, Tito Mboweni comes at a time when there is an urgent need to reduce energy consumption nationally.

The SA National Energy Development Institute (SANEDI), which plays the role of implementing and overseeing the application process of the incentive, has welcomed the extension. Manager for energy efficiency Barry Bredenkamp says, "It gives businesses a larger window of opportunity to continue the drive towards energy saving. The incentive gives customers the triple benefit of reducing their bills, improving their carbon footprint, and helping to meet the country’s energy requirements, while at the same time being given a tax rebate."

The savings allow for a tax deduction of 95c per kWh saved on energy consumption. Bredenkamp says that in some instances customers have saved up to 30% on their energy bill, and then also get a rebate from their tax return to further sweeten the deal. The 12L tax incentive’s objective is two-fold: to encourage energy saving in a constrained capacity environment and to assist in meeting the country’s commitment to reduce carbon emissions over the next years.

National Treasury also announced that they will be reviewing the design and administration of the energy efficiency savings tax incentive this year, to make it even easier for smaller businesses to gain access.

For more information contact SANEDI, +27 11 038 4300, information@sanedi.org.za, www.sacccs.org.za

**Investing in technology is key to mining**

Investing in technology that drives efficiency and productivity is critical, " says Micromine Africa marketing coordinator, Craig Sternslow. "Mining companies no longer have the luxury of large budgets that can be allocated on the fly. Nowadays the allocation to innovation and business improvement is significantly reduced and this has exacerbated competition, not only between competitor industries, but also between different suppliers and vendors." He adds that there was a sense of optimism in the air at this year’s Mining Indaba: “There was a palpable excitement that everyone could feel. Engagement with government and communities has long been a standard, but in order for this to be successful, mining companies need to look at this collaboration positively, as an opportunity to do good, and also to increase the skill levels of workers at their mines.”

Another factor is investing in people. “The workforce is changing constantly. Mining houses need to understand the kind of employees they will have in the future, and what they will need in order to be productive and efficient. Investing in skills is vital, not only for the mining companies themselves, but also for corporate social responsibility,” concludes Sternslow.

For more information contact Kate Gibley, Micromine, +61 41 460 5160, kgibley@micromine.com, www.micromine.com
**BECKHOFF**

- Automation Engineers
  - TwinCAT 3 and TwinCAT 2
    - Port Elizabeth 11-13 Jun 2019
    - Cape Town 18-20 Jun 2019
    - Johannesburg 25-27 Jun 2019
  
  For more information contact
  Andrew Reinhold, Beckhoff Automation,
  +27 11 795 2898,
  training@beckhoff.co.za,
  http://www.beckhoff.co.za/za/support/training

**FESTO**

- Mechatronic Engineers
  - AUT961 – Introduction to Industry 4.0
    - Durban 4 Jun 2019
  - HY152 – Mobile Hydraulics
    - Johannesburg 11-14 Jun 2019
  - HY142 – Maintenance Hydraulics
    - Port Elizabeth 26-28 Jun 2019
  
  For more information contact
  Sammy Kanye, Festo,
  +27 11 971 5626,
  DidacticTaC.za@festo.com,

**SMC**

- Mechatronic Engineers
  - PNEU0021 – Basic Pneumatics
    - Cape Town 5-7 Jun 2019
  - TC-PNEU-B – Basic Pneumatics
    - Durban 19-21 Jun 2019
  - TC-MECH – Mechatronics
    - Johannesburg 25-28 Jun 2019
  
  For more information contact
  Riaan van Eck, SMC Corporation South Africa,
  +27 11 100 5866,
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From 17-19 March, I joined the throng of 430 delegates from 20 countries who descended on Sun City to attend the 27th annual IS³ User Conference. At the Valley of the Waves opening-night ceremony, a spectacular fireworks display set the tone which never let up until our departure three mornings later. Congratulations organising committee, once again you showed exactly why this event’s reputation as ‘Africa’s premier industrial software conference’ is so richly deserved.

Digital transformation in the spotlight
Doug Warren, AVEVA VP Strategic Partnerships, opened the conference proper with a keynote address the following morning. In line with the theme of The Revolution Evolution (aka digital transformation), Warren explained how AVEVA is focused on developing solutions that enable digitalisation from the edge to the enterprise through what he described as “an end-to-end digital twin.” The idea is to use the new data-intensive technologies of Industry 4.0 to break down the traditional operational silos of the past. The value is created when data-driven business intelligence is applied across all the enterprise value chains in ways that enhance operational visibility and improve customer experience.

Warren stressed that the benefit of these “converged value chains” is realised only if the process is driven through a deeper understanding of the organisations current operational practices, and their shortcomings. Put differently, a company’s digital transformation must be driven by a business case first, and by technology second. A quote by Bill Gates put this perfectly into context for delegates: “The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency.”

The message then is that with the correct implementation, digital transformation powers workers to higher levels of productivity through actionable insights into the current state of operations. In an asset performance context, this could involve sending all the relevant repair information to the mobile device of maintenance technicians on their way to a breakdown. In the case of contractors, who might be unfamiliar with the plant, it might also include GPS-based directions to guide them directly to the failed equipment. It could also facilitate a call to an expert based at the asset vendor’s HQ, in the event that a higher opinion is required.

Contrary to some opinions, Warren stressed that people are as much a part of the Fourth Industrial Revolution as the technologies they worry may replace them. The difference is the skills they will need. To this end, AVEVA is developing new products to speed up reorientation and skills development through augmented training and operational simulations. It is as much about instilling a new culture as it is about implementing new technology platforms, or in other words, buzzwords don’t solve asset performance management issues, people do.

US-based power utility Duke Energy served as an example of an international success story. Fitting, I thought, since at the time South Africa was enveloped in the gloomy chaos of Eskom-prescribed Stage 4 load shedding. During the post presentation interview I asked how AVEVA would address the problems at a hypothetical national power utility with asset availability down around 55%. Turns out it is not that difficult to fix, provided the organisation commits to a strategy of continuous improvement over time.

“The first thing we would do is a multi-disciplinary maturity assessment,” explains Warren.
The rationale here is to identify the areas of performance where the organisation believes it is weakest. The next step is to identify the most crucial areas where digitalisation could make a difference, as this is usually where the greatest ROIs will be found. “We favour a self-sustaining approach to digital transformation,” adds Warren, “which means that the savings from the first project must pay for the second one, and so on. This is a good way to make a business case for digitalisation, and keeps the focus off technology for technology’s sake.”

The next step is to prioritise the possible projects and identify the associated business processes. Only once projects have been ranked according to ease of implementation vs business benefit is it time to consider the most appropriate technology platforms. Warren stresses that it is vital for representatives of the customer organisation to be involved in every aspect of the project – from identification to implementation – if they truly wish to ‘own’ the solution.

This solution is invariably a mix of cloud and plant-based systems, depending on the type and criticality of the application. “What’s important to realise is that some projects may underperform in terms of ROI, while others outperform,” adds Warren. “Constant monitoring allows shrewd executives to maximise the returns they get from their digitalisation investments, and in fact sets the future direction as well.

“Getting back to your example of the power utility, the team may identify unplanned downtime as the most critical threat to the business. Next, the decision might be to implement condition-based monitoring on the most crucial assets. Once these have been identified, we would install the required sensors and hook them up to the appropriate analytics packages. Now the company is in a position to implement a predictive maintenance strategy on its most critical assets. As its level of digital maturity rises and it grows comfortable with the concepts, the solution can be expanded to include more and more equipment, until eventually, anything worth covering is covered. It is not necessary to take a ‘big bang’ approach. It’s an evolution, so the important thing is to get started in the right direction and empower your workforce for continuous improvement.”

**The AVEVA roadmap**

At the day-two opening address, Tim Sowell, head of digital portfolio strategy, used Warren’s presentation to springboard into where AVEVA is headed. The reality is that project lifecycles are getting shorter. So to compensate for this, workers from all of a plant’s engineering disciplines must be empowered to work smarter and more efficiently.

With this in mind, AVEVA is committed to utilising digital technologies to build business solutions that eliminate waste. “The aim is to create a unified platform that promotes teamwork across the organisation through a unified engineering experience,” Sowell explained to an attentive audience at the start of the presentation.

This vision is called AVEVA Connect, a digital services platform that extends the reach and availability of the physical plant through a living digital twin. Since the twin is a digital (virtual) replica of the plant, both physically and operationally, the same information can be made available to anyone who needs it wherever they are in the world. It is living in the sense that as changes are made to the physical plant, these can be replicated in the digital twin through the AVEVA Connect platform.

Sowell contextualised it during a subsequent interview as a move to role-based information. A reliability engineer, for instance, may want to keep an eye on the operational data coming from the machines, while a maintenance manager might want to pull the service history for a particular piece of equipment, along with the data to show its current performance level. A plant engineer, on the other hand, is empowered through a view of the current level of overall output and performance. The strength of the AVEVA platform is that in all three cases, the information is accessed from the same central repository.

But it doesn’t end there. Since the virtual plant is an exact replica of the physical world, it can be used to build realistic 3D training simulations. “We’re modernising the workforce through technologies like virtual and augmented reality,” explained Sowell. “This self-service learn-on-demand capability allows companies to on-board and train new employees in a fraction of the time previously required.”

What AVEVA is striving for is to empower people through access to asset performance information, visible across the entire enterprise. The AVEVA vision is to provide its customers with the ability to transform their businesses through optimisation and empowerment. The platform to accomplish this is AVEVA Connect which, through its living digital twin, addresses two spheres:

• Value chain processes: alignment of the plant and the products it manufactures.
• People: smart workers, always connected to the plant through mobile digital technologies.

“In the future, our cloud-based solutions will make it easy and affordable for any
organisation to implement a digital transformation strategy,” concluded Sowell during the presentation wrap-up. “Not only that, but it will be an evolution. They will be able to build piece by piece, and make the journey at their own pace.”

**Kim Custeau talks Asset Performance Management**

Asset Performance Management (APM) is one of the four defined AVEVA business units and it is led by VP Kim Custeau. I asked her how it all comes together in the real world.

“Asset Performance Management (APM) crosses over into many business areas, but mostly it’s about maintaining a plant in optimal operating condition over its entire lifecycle,” she begins. “The first level of APM is preventative maintenance, but, thanks to the affordability of modern digital technology, we are moving on from this because it is wasteful, and often responsible for introducing new problems shortly after repair.

“The next level is condition-based maintenance, which looks at the operating condition of the asset. Here we don’t initiate maintenance simply because a predetermined time period has elapsed. Rather, we monitor the condition of the asset and base maintenance triggers on criteria like vibration and temperature levels. Now, we’re repairing the asset only when it actually needs to be repaired.

“At the next level we have predictive maintenance, where we introduce algorithms and advanced pattern recognition. These techniques build a history of the asset condition over time. Once the history is established the algorithms are then able to compare the condition of the asset from one day to the next, and from that, predictions can be made about the probability of a failure and when it is likely to occur.”

The difference between the two is that condition based maintenance relies on a set of rules i.e. when the bearing temperature exceeds some predefined level it initiates a maintenance activity. While predictive maintenance is a supervised approach i.e. if a bearing temperature goes out of spec, the maintenance engineer is informed and is then in a position to evaluate other external factors (ambient air temperature for instance) before issuing a repair order.

AVEVA has gone one step further and added an even higher level called prescriptive maintenance. “This is the top level of the current maintenance pyramid,” explains Custeau. “Now, thanks to the concept of the living digital twin, we are able to recommend the appropriate remedial action in response to a specific anomaly.”

Maintenance is evolving thanks to digital technology, so how does one choose the best approach?

“A good APM strategy accounts for more than the performance of a single piece of equipment,” answers Custeau. “It is critical to first define what needs to be accomplished and then look at this within the limits of market, environmental and regulatory requirements. Once you have done this, then you pick the approach that will give maximum benefit to the company’s bottom line without violating the constraints.”

The message from the conference is clear. Digital transformation is not a quick fix that can be applied on an ad hoc basis to ‘patch up’ an ailing company. However, if applied correctly, the digital methods of the fourth industrial era can significantly improve the return on assets over the lifetime of an industrial facility. It is as much about people and culture as it is about technology, and, as it has always been, the first step is to define the business objectives. This is where many organisations get stuck, since very few have the resources to tackle digital transformation on their own. The value of business partners the calibre of IS³ and AVEVA is the expertise to get you started and then keep you moving in the right direction. Digital transformation is an evolution of technology and culture. The pot of gold at the end of the rainbow is asset performance and efficiency at levels simply not possible before.

**Awards**

As is customary on the final evening, the conference was topped off with a gala dinner. Wacky comedian Alan Committie entertained the crowd, and the following awards were made in recognition of excellence:

- Best presenter: Pleasure Mnisi, Exxaro
- Best Flow Software Innovation: Exxaro Grootegeluk
- Best Planning & Scheduling Implementation: Astron Energy
- Best Operations Implementation: Namibia Breweries
- Best Control & Information Implementation: Transnet
- Digital Transformation Strategy: Norilsk Nickel
- Best Business Value: Hidro-Tech
- Most Current Certifications: CSS – Total Engineering Solutions
- Top System Integrator, 2nd Runner-up: Business Connexions
- Top System Integrator, Runner-up: Advansys
- Top System Integrator, Winner: Control Systems Integration

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The SAIMC branches are doing very well this year. If you as a member have not been able to get to a technology evening to learn something new regarding technology and network with your peers, I urge you to make a plan to get to one of them.

It has been my absolute pleasure to join the different branches for their technology evenings, where I myself could learn new things and also had the opportunity to network with everyone. I want to thank all members who have come forward with new ideas and also issues that need to be resolved. It is an honour to interact with you and hear your thoughts on how we can improve the SAIMC to be an organisation that works for you, the member.

Also, if you have not registered with the SAIMC, registration is now automated on our website. I would like to thank Johan Maartens, our COO, for the steps that have been taken in this regard. I know that with time, you as a member will have a better user experience with more automation to ensure we make it as user friendly as possible.

If you have any suggestions or comments you are welcome to contact me. We value your insights.

Yours in automation,
Annemarie van Coller.
Tshwane branch

There have been some changes at the branch and Morne Maree has taken over from Petrus Klopper. Petrus will move to a new portfolio for which more information will be communicated later. Nico Marneweck is taking over as the secretary and will gradually take on more responsibility. Petrus will continue to assist Muhammad Babamia with the treasury role, while Mark Taylor will focus more on public relations.

At the April technology evening, Sagadevan Kanniappen of WIKA presented on the subject: ‘Primary flow elements’. In future it is hoped that we can publish presentations in the online forum. In the interim, please feel free to request these via email.

Finally, and as a thank you and recognition to IoT.nxt for allowing the branch to use their venue for technical evenings, the committee recently took a decision to award them with branch patron membership.

Durban branch

The April technology evening was held as usual at the Durban Country Club. The subject ‘Taking the next step in automation using collaborative robots’ elicited great attendance and interest, and presenter Frederik Langenhoven of Cobots did not disappoint with his interactive and interesting presentation.

Frederik pointed out that there is a new breed of robot in town. Collaborative robots, or cobots, have emerged as practical devices in the last decade. A cobot is a robot that is intended physically to interact with humans in a shared workspace, so the special pens and protective light curtains around the robot operating area are gone. The cobot is designed to work alongside a human operator, typically lifting the heavier items involved in electronic device assembly operations. It has smooth surfaces with no sharp edges, and protected joints, so a human working alongside cannot trap their fingers, plus it stops at the slightest external touch. Additionally, the cobot is flexible, it can be trained (taught) by the assembly operator by guiding its arms and grippers to show it what to do.

In summary, Frederik told the enthralled audience that:

- Collaborative robots are tools to support people, not take away their jobs.
- Collaborative robots can be used all over the industry, not only in big organisations, but also in small to medium size enterprises.

Suitable for use in many industries like automotive, metal, medical, plastics and food and beverage.

The branch thanks Cobots for the kind sponsorship and Frederik for the presentation.
Technology evening
On 7 February, Ian Janse van Rensburg, valve specialist from Mitech, gave a very informative presentation on control valve actuator selection.

Valve actuators are a differentiating element of a control valve, and there are many options available to meet industrial automation requirements. While simple in concept there are actually quite a few considerations when choosing the best option. Proper selection involves process knowledge, valve knowledge and actuator knowledge. A control valve can perform its function only as well as the actuator can handle the static and dynamic loads placed on it during operation. Therefore, proper selection and sizing are important because the actuator plays a significant role in a valve’s overall performance in the control loop.

The branch thanks Ian for his informative presentation.

Petrochemical Roadshow
The annual Petrochemical Roadshow was hosted at the Sasol Recreation on 28 March, where it showcased the various products, services and expertise available to the petrochemical, engineering, construction, mining and power industries. The branch manned the SAIMC stand on the day and we received visitors across the industry.

All instrumentation and control mechanicians, technicians and engineers are welcome to attend our monthly technology evenings the planned dates for the rest of the year are: 16 May, 6 June, 11 July, 1 August, 5 September, 3 October and 7 November. All presentations earn CPD points for ECSA registered persons. Enquiries can be directed to Johan Maritz on 082 856 3865.
At the last technology evening, SMC Pneumatics in partnership with Staro Process Control presented on the topic “Energise your efficiency: Transform energy into a boost for your competitiveness”.

Brian Abbott, product manager at SMC Pneumatics, gave a detailed presentation on how to use compressed air more efficiently in the plant environment, and on wireless valve manifold technology, which highlighted the following:

- Generate just what you need: analyse our energy bills with a critical view to determine whether what you are consuming is justified.
- Recover what you generate: different technologies to reuse the energy (heat, released air, etc.).
- Monitor your consumption: only when we know what is going on can we enact effective energy management policies.
- Use only the essential: how can we use energy more rationally in production processes? A necessary rethink on the way things have been done in the past.
- Think efficient: the concept that closes the loop in terms of day-to-day energy efficiency.

The branch thanks Brian for this well received and informative presentation.

What is flow measurement, why is it important and how do we measure it? Those were the questions asked of members at the March Technology evening, hosted at WIKA Instruments and presented by Sagadevan Kanniappen.

Flow is the movement of bulk fluid from point A to point B. The reasons for measuring it are quite simply to optimise profit and control accuracy. This can be done by various methods such as DP using primary elements, Vortex, Coriolus and electromagnetic flowmeters, to name just a few. Some of these methods overlap so, it is important to choose the correct instrument for the application.

Sagadevan went on to explain the measurement of flow by using primary elements.

These are not off the shelf items, making analysis of the specific application very important. The specific types of primary flow elements such as orifice plates, meter runs, flow nozzle, Annubar, and Pitot and venturi tubes were discussed and explained in detail, which led to some lively discussions and questions by members.

Cheryl Hird (left) thanks Sagadevan Kanniappen after the presentation.

Juaandré Heyneke (right) thanks Brian Abbott after the presentation.
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Imagine a production process where devices can diagnose themselves: they would realise when something is wrong or unusual and send an alarm. When, for example, excessive build-up occurs in silos and tanks the devices with this capability would just signal the need to clean a process.

It is as if the field measurement device has a heartbeat: it will react like an additional member of the workforce with specialist knowledge to steer the process in an effective way so as to avoid costly downtime. Users just run their plants and the processes and do not have to spend time checking how the instruments are working. The devices will tell them directly as soon as a problem occurs.

Thanks to Heartbeat Technology, processes that can take their own pulse are already a reality in many level, flow, temperature and analytical applications. Since 2012, self-diagnostics has been standard in several Endress+Hauser flow devices, and the portfolio has just been expanded to include level, temperature and analytical devices. Instruments with Heartbeat Technology excel through permanent process diagnostics and extensive in-situ diagnostic functions. Processes are no longer interrupted if verification is needed, it happens directly in the measuring point without any dismantling.

The benefits
The advantages of instruments with self-diagnostics are evident: plants run safer and more cost-effectively without any interruptions. Users are always in control of their measuring points, and verification efforts are significantly reduced with documented in-situ authentication. A simple, predefined procedure guides the person responsible for maintenance through the verification procedure and, at the end, the verification results are documented in an unambiguous manner. The SIL test according to the safety manual and documentation saves time and reduces costs, too.
verification protocol supports the evidence demanded by regulations, laws or plant standards.

The data acquired through self-diagnostics facilitates trend recognition for predictive maintenance. A combination of instrument and process parameters provides all the important information for the next steps in maintenance or targeted process optimisation. It is a prerequisite to finding the right strategy for predictive maintenance.

**The challenge at a copper mine**

An Endress+Hauser customer in the copper mining industry experienced the advantages of self-diagnostics.

The mine wanted to test a smart sensor. There were two clear objectives for the change in level measurement strategy: to increase production by higher ROM bin capacities; and to reduce maintenance costs. To do so, the mine wanted to use the maximum fill heights of a ROM bin used to store unprocessed copper ore. To accommodate this increase, the existing radar level sensor had to be relocated to a new position, where it would unavoidably get covered in dirt. The danger was that the strength of the measuring signals emitted and received by radar level transmitters – a critical factor for precise measurements – would diminish. Under these conditions conventional radar and ultrasonic level transmitters would need to be regularly cleaned, sometimes as often as every hour. It would be time-consuming for the maintenance personnel and the ROM bin would have to be stopped, leading to costly downtime.

The mine engineers wanted to avoid expensive mechanical changes and decided to use the Endress+Hauser Micropilot FMR67 radar level transmitter with Heartbeat Technology. This function monitors the extent of dirt build-up, and reports it back to the control room to alert the personnel of the need to clean the transmitter. The FMR67 also features a PTFE horn protector that reduces the rate of build-up. This means cleaning is required less frequently. The mine achieved its objectives through the use of Heartbeat Technology devices.

Heartbeat Technology’s intelligence tracks the performance of the device at the copper mine to ensure it is not adversely affected by abrasion, corrosion or sticky build-up. Standardised and clear diagnostic messages are sent regarding what needs to be done to maintain the plant economically and as a matter of priority. As the devices run their own diagnostics, proof tests are only necessary in maximum extended cycles. Furthermore, the automatically generated protocols provided by Heartbeat Technology without process interruption support the documentation according to international standards requested by institutions. For future-orientated predictive maintenance the instruments offer parameters to monitor the performance for process optimisation.

Heartbeat Technology is accompanied by two wizards for easy commissioning of foam or build-up detection.

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Dhiren Naidoo – Local Industry manager Primaries & Metal.
Cathay Industrial Biotech benefits from Siemens technology

Cathay Industrial Biotech (Cathay) is China’s leader in the field of bio-manufacturing. Its areas of expertise include producing polyamide from biomass, which takes place in a totally digital plant using laboratory, automation and control technology from Siemens. Extensive plant-wide digitalisation and automation have simplified research and maintenance, while also increasing the yield. This has enabled Cathay to produce polyamide and fibre using a method that is both sustainable and ecological.

Polyamide is required across a range of areas, including the manufacture of clothing, shoes and automotive components. Traditionally, polyamide is synthesised from fossil fuels in petrochemical plants. Cathay is taking a completely new approach using renewable biomass, or corn to be more precise. But the process required is a complex one, due largely to the organisms used. Digitalisation can open up wide-ranging opportunities in this field. “With big data, we can learn more about the laws guiding production,” says Liu Xiucai, chairman and CEO of Cathay. “The efficiency of bio-manufacturing can only be improved by integrating the whole production chain with hardware and software control, collecting, processing and analysing data automatically, and then feeding the results back to production.”

Integrated solution for integrated digitalisation

The digitalisation solution required to make this possible comes from Siemens. Using Simatic Sipat software with Process Analytical Technology (PAT), the researchers at Cathay investigate microorganisms best suited to industrial production. The plant engineering software Comos enables the construction of a digital twin. The Simit simulation software is then used to test and optimise the systems. The Simatic PCS 7 process control system secures stable production. The MES Simatic IT is responsible for ensuring stable production processes by sending out electronic work orders and evaluating and recording the quality. Using the XHQ operational intelligence software, Cathay can acquire information from all systems and create detailed reports and dashboards for further optimisation. Siemens also provides smart sensors, process instruments as well as LV and MV electrical equipment for the new plant, and supports Cathay with technical services and system integration.

Ideally placed for the future

This integrated solution provides Cathay with the benefits of real-time feedback from production, a minimised maintenance workload, simplified troubleshooting and fixing of faults, as well as automation of many of its production steps. With these advances, the factory is setting new standards on many levels. Not only is it an ultra-modern production facility, it is also a trailblazer for the future of biotechnology: “Biotechnology can be used to manufacture better materials and also for mass production,” concludes Liu.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za
Schubert & Salzer in control at PVS

Belgium-based PVS Chemicals produces extremely pure chemicals for use in the semiconductor industry. One of the company’s outstanding innovations is the production of ultra-pure sulphuric acid. As the only worldwide producer, PVS is able to supply diluted acid at a consistently high level of purity in which any impurities are measured down in the ppt (parts per trillion) range. The purity of acid enables semiconductors to be manufactured in a way that allows the individual circuit paths to be placed even closer together, allowing electronic devices to be made smaller and lighter. Schubert & Salzer Control Systems’ sliding gate valves have proved to be outstandingly successful in the processing plant producing the sulphuric acid. The valves’ excellent control precision over a very wide control range and their extremely high corrosion resistance are the key to the manufacture of these ultra-pure acids.

The demands on highly pure acids increase continually: nowadays, the end product has to be produced consistently for many applications in a precisely defined concentration with a tolerance band of less than ±0,05%. The dilution presents a special challenge in this process. One of PVS’s activities centres on the production of highly pure diluted sulphuric acid in which the addition of the sulphuric acid in the dilution process can vary between 0 and 100%.

“Producing such a high-quality product with minimal deviations in a continuous process presents a special challenge,” comments Kristof Spreutels, plant manager at PVS. “Across the world, we are the only one to have found the solution at such a high quality level. However, it has needed a control valve with exceptional characteristics to be able to compensate for the variation range of 100% in the basic medium with absolute accuracy. It is extremely important for us that the control valve can deal with any variations in concentration at the inlet with the minimal delay and the maximum precision for the end-product. Process parameters exist such that the control valve must compensate for variations on the intake side between 0 and 100%, followed by 0 to 80%.”

Outstanding rangeability and excellent control quality
The sliding gate valve handles this challenge with ease. At the heart of this valve are two slotted discs sliding against each other and forming a seal. One of the discs, a seal plate permanently secured in the body at right angles to the direction of flow, has a specific number of transverse slots of the same height. A second non-rotating disc with a similar slotted arrangement is moved vertically against the first, thus changing the flow cross-section. The pressure differential forces the moving disc against the fixed one. Thus the sliding disc valve seals itself without the need for a separate seat.

The sliding gate valves’ very fast response time to signal changes is a key factor in their accurate control quality. Short stroke, low moving masses and low actuation forces are the key parameters that enable fast response and a high resolution of the stroke position. The sliding gate valve offers all of these features in one package. The typical stroke between open and closed is only 6-9 mm.

Positioning of the pneumatically-controlled sliding gate valve is provided by the digital Schubert & Salzer 8049 positioner – twin-lead version with IP65 protection. Since the positioner rests centrally on the valve actuator, it takes up no additional lateral space, as well as saving weight. As a result of this integrated design system, no moving parts can be accessed thus maximising operational safety and security.

Surrounded by gold and PTFE
The sliding gate valve’s resistance to corrosion is another aspect in which PVS refuses to compromise. “In our process, we provide resistance to corrosion by making exclusive use of high alloyed or even exotic materials like PTFE, glass, platinum or gold,” says Spreutels. “That is why the control valve has to be made from Hastelloy C. Valves made from stainless steel or plastic would corrode away or dissolve in less than a week due to the wide variations in concentrations at the inlet in our process. As a result, the combination of control precision and high resistance to corrosive media is an absolute must for our process. Since we have been using Schubert & Salzers’ valves for over 10 years in steam generation and distribution, for example, it goes without saying that we should also use the same expertise for this special application.”

Since sliding gate valves in the twin flange version are very compact and light, they present no installation problems, even in PTFE pipelines. At the same time, the stress on the pipes is so small that additional valve supports are unnecessary.

“We use sliding gate valves wherever we want high availability, good control properties and low maintenance costs,” concludes Spreutels. “Even in the most challenging acid dilution, the sliding gate valves have required no maintenance or repairs whatsoever up to now. Also, despite the extraordinary stress placed on them by the media, they are showing no signs of degradation. So, thanks to the Schubert & Salzer sliding gate valves, we are the only company in the world able to produce these products to such a high quality and we’ve even been able to reduce the variation range in the concentration of the end product to ±0,02%.”

For more information contact Kamil Maharaj, Macsteel Fluid Control, +27 31 581 7800, kamil.maharaj@macfluid.co.za, www.macsteel.co.za

www.instrumentation.co.za  May 2019  27
One of the most important processes in the pulp and paper industry is the alkaline sulphate process, where lignin is separated from the fibrous material. Recycling of the chemicals used is vital for environmental and economic reasons. During the recycling process, black liquor will be concentrated and burnt to remove organic materials like lignin. This recovery process generates – in addition to energy – a smelt with high salt content, the base material for green liquor. Through causticising with lime, the sodium carbonate in green liquor is converted to sodium hydroxide and reused in white liquor for the next pulping process. LiquiSonic analysers ensure each process step is inline monitored and set in an optimal way. The analyser system provides optimised quality control and productivity, especially through fast process monitoring during liquor recycling.

LiquiSonic measuring technology in the sulphate process

**Black liquor**
The base materials in the kraft or sulphate process are wood chips and alkaline cooking liquor, which mainly consists of recycled white liquor, hot caustic soda (NaOH) and Na₂SO₄. The cooking at typically 170°C is also known as the delignification process, where lignin is separated from the fibrous material and pulp. The resulting black liquor contains NaOH, Na₂SO₄, lignin, carbohydrates and hemicellulose. In multiple black liquor recovery evaporators, the dry matter is increased from 10-15% up to 70%. LiquiSonic provides robust and accurate concentration monitoring and enhances operational safety due to high-water content that interrupts the burning process. PFA coated flange sensors work maintenance and drift free with no cleaning adaptor needed, even for alkaline hot liquids with high coating tendencies.

**Green and white liquor**
In the black liquor furnace process an inorganic salt-rich smelt is formed. The molten salts sediment on the ground of the recovery boiler and must be diluted by water or weak white liquor, resulting in green liquor, rich in Na₂S and Na₂CO₃. Green liquor is often collected in a separate stabilising tank before it is clarified. During clarification of green liquor, dregs must be removed. Clarified green liquor is used for causticising, a recycling step, where CaO lime is used to regenerate NaOH for white liquor. LiquiSonic provides quality improvement, like real-time green liquor concentration monitoring for optimally regulated lime dosage in causticising. This increases the recovery process efficiency, lime burning recycle numbers and white liquor quality.

**Advantages of LiquiSonic technology**
- Robust and maintenance free even for hot (up to 200°C) and high coating liquors.
- Layer-free, no steam wash system necessary.
- No frequent mounting and dismounting for maintenance and cleaning.
- Reduced laboratory costs.
- Highly accurate inline concentration measurement of green, black and white liquor (up to 0.1 wt%).
- Ideal lime dosage in causticising.
- Enhancement of operational safety.

For the high demands that are placed on sensor technology in the pulp and paper industry, LiquiSonic analysers have been built to withstand the harsh working environment and can be adapted to existing process conditions.

For more information contact Morton Controls, 086 100 0393, sales@mortoncontrols.co.za, www.mortoncontrols.co.za
Under Pressure?
Pressure Sensors for Industry 4.0

User-friendly: access to all sensor parameters via IO-Link 1.1, variable data mapping and NPN/PNP auto detection

Reliable: fully welded metal measuring cell*, integrated pressure peak aperture*, highest vibration and EMC resistance, protection classes IP6K6K/6K7/6K9K *optional

Simple: intuitive operating concept via touch display, 180° invertable multi-color display with all-round visible LEDs

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With the increase in emission regulatory norms worldwide, and the market moving from Euro 2 to 3, 4 and 5, the criticality of the refining process has increased and the risk of producing an out of specification product has increased. This risk has led the refiners to give more than the norms specify, resulting in a giveaway on quality and profit. The use of near infrared (NIR) technology has helped refiners get real-time data to ensure product quality and reduce the risk of producing an off-spec products.

Why is it important to use NIR?
Final product blending represents perhaps the most quality-critical aspect of refinery operation. Tight product quality characteristics are defined, and must be met for product release. If these criteria are to be met economically, then rapid and accurate online product property measurement is necessary. The measured product qualities are then available in real time for feeding to an online advanced blend control blend optimiser, thus ensuring the most economic blending operation to achieve blend targets.

Conventionally, this has been done with a large variety of analysers to monitor blend properties and octane. These analysers are extremely expensive, in terms of both capital and maintenance.

Typically, a conventional physical property analyser is slow to give results, however there are no online analysers for RON/MON or Cetane index measurement. A typical refiner’s practice will be to collect samples every eight hours from three different heights in the storage tank. These are sent to the laboratory for conventional analysis. This takes another six to seven hours for laboratory testing, which means the refiner is without data for about fifteen hours. What if a product is then reported off-spec? The refiner will have to re-blend the entire tank, resulting in lost productivity and profit.

How does NIR technology help?
NIR is typically designated to measure certain physical properties like RON, MON, RVP, distillation curves E70, E100, E150, E180, FBP, D10, D50 and D90, oxygenates, benzene, aromatics and olefins.

By accurately measuring final product qualities in real time, these analysers allow feeding any online advanced blend control blend optimiser with the required product qualities to minimise product re-blends and quality giveaway, and allows the use of lower cost feedstocks, while still meeting final product quality targets. Accurate measurement of blending component qualities as they arrive at the blend header also allows the optimiser to determine the best achievable blend order.

The result of a sample analysis takes at most two minutes, so if anything is off-spec the refiner can take immediate corrective action, reducing the risk of re-blend to zero.

How does it work?
NIR works on the principle of IR spectroscopy i.e. when an infrared light is made to pass through a hydrocarbon the sample absorbs some and the remaining light is passed to the detector, which creates a spectrum.

The importance of a localised database
Database models are available for several key refinery streams and properties. These are built from data collected from several refineries. They may not provide accurate predictions due to differences in crude sources, processing steps and blending targets, however, they give usable results in the preliminary stages. Now, since each refinery has its own crude supply and operational parameters, it is important to introduce data from the local refinery to increase the accuracy of the system.

To make a model, samples should be collected from the process, for each of the sample the spectra should be generated on a Lab FT-NIR and the corresponding properties of each of these samples should be measured using conventional lab analysers. Now each samples spectrum and its corresponding properties measured on lab FTNIR and conventional lab analysers respectively can be used as a data point. A large number of such data points are required to make a local database. The number of samples required to build a database depends on the variation for each of the properties. The model database should cover the entire range of variation expected in the process. These variations include the crude changes, seasonal variations, and also day and night variations.

However, in case of variations not being captured as it is difficult to change or alter the running process, it may be decided that the laboratory prepare synthetic samples by mixing various feed components in different ratios to create a database covering the entire range.
The ASTM accuracy: related to the number of samples taken to build the database, should be such that it has a 95% confidence level.

The quality giveaway: NIR technology is used to prevent the quality giveaway, which results in large savings on costly feed components. Thus for the example of RON, where the minimum limit may be 91 for regular gasoline, and the customer may decide on an accuracy of 0.5 RON, the samples in the database should be good enough to show 95% confidence level for the desired accuracy.

With all this in view, it is very difficult to determine the exact number of samples required to have a good enough database. The bigger and varied the database, the better, will be the prediction. However, with bigger datasets the work required by laboratory personnel on conventional analysers also increases.

What properties can be measured using NIR? What is the repeatability and accuracy?
This is an important aspect of maintaining the reliability and credibility of an installed process FTIR analyser, and is of particular significance for critical optimisation and quality giveaway applications. The discipline of monitoring the online analyser performance versus the site laboratory reference allows for rapid detection and adjustment in case of divergence. Medium-term drift and offset of the laboratory reference needs to be compensated, and calibration modelling effects caused by changes in the blend order or blending component availability need to addressed.

Yokogawa application engineering makes NR800 FT-NIR hardware come alive and work successfully.

Improving the refining margin with online analysis and optimisation
The table shows the results of cost of octane giveaway, per year 0.1 RON (pump octane) per 200 000 bbl/day CDU capacity.

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Octane Giveaway</td>
<td>0.1 RON</td>
</tr>
<tr>
<td>B</td>
<td>Multiplier for APC 99% Confidence Level</td>
<td>2.58</td>
</tr>
<tr>
<td>C</td>
<td>Refinery Margin, Rs/Octane-Gallon</td>
<td>0.1271</td>
</tr>
<tr>
<td>D</td>
<td>CDU to FPB Conversion Ratio</td>
<td>0.562</td>
</tr>
<tr>
<td>E</td>
<td>Average Throughput (CDU) bbl/day</td>
<td>200 000</td>
</tr>
<tr>
<td>F</td>
<td>Average Throughput (CDU) gals/day</td>
<td>8 400 000</td>
</tr>
</tbody>
</table>

Lost Profit, Octane Giveaway/day: R153 542.00
Lost Profit, Octane Giveaway/year: R56 027 739.00

The ROI for payback based only on RON is 2-3 months.

Final product blending – summary
Yokogawa’s NR800 FT-NIR is technology offers an excellent price-performance-value-risk trade-off for online final product blend optimisation. As an optically-based technology, it allows flexibility in terms of multi-stream, multi-property applications, since it is compatible with both local, fully extractive sampling, as well as remote, multi-cell extractive fibre-optic based analyser systems.

It offers multi-property analysis with rapid cycle times well-tuned to the requirements of an advanced blend control optimiser. It is also well established, with hundreds of installations globally providing examples of successful implementation.

Historically, the limitation to any spectroscopic measurement for online final blend product control has been the difficulty in developing, and more particularly maintaining, robust and stable calibration models. This has been mitigated by recent developments including well-controlled analyser to analyser variability, allowing easy maintenance and transferability of developed calibrations, and the use of globally applicable product databases to speed up calibration development.

Fuel blending optimisation is achieved through fuel analysis, which requires refiners to take control of the situation by continuously updating their inferential methods in an intelligent manner, based on experience, engineering expertise and judgment.

For more information contact
Yuvisti Ramgulam, Yokogawa South Africa, +27 11 831 6300, yuvisti.ramgulam@za.yokogawa.com, www.yokogawa.com/za
Pressure measurement device accuracies are commonly specified as percentage of full scale, or percentage of reading, and the difference is significant. If an accuracy statement simply names a percentage (0.1%), it is normally specifying a percentage of full scale.

Accuracy (or really inaccuracy) of pressure instruments is therefore specified in one of two ways:

- Accuracy as a percentage of full scale (% of FS).
- Accuracy as a percentage of reading (% of RD).

If an instrument has an accuracy specified as % of FS, the error will have a fixed value, no matter where the applied pressure is in the measuring sensor’s range. Take, for example, an instrument calibrated for a pressure range of 0-100 kPa, with a stated accuracy of 0.1% of FS. At an applied pressure of 100 kPa (full scale of the instrument) the error will be at most 0.1% of full scale, or ±0.1 kPa.

As the pressure moves down, the error will remain 0.1% of FS. Therefore, at half scale (50 kPa), that error becomes proportionally larger (0.2%). The further down from full scale, the further the accuracy decreases. At 10 kPa the error is 1% and at 1 kPa the error is 10%, which still relates to a ±0.1 kPa inaccuracy.

If an instrument has accuracy specified as 0.1% of RD, the error will always be the same percentage of the actual applied pressure. Using the same example as above of 0-100 kPa, but this time, with a stated accuracy of 0.1% RD at 10 kPa the error is ±0.01 kPa i.e. still 0.1% accuracy, and 10 times more accurate than an instrument specified as % of FS.

In summary, as per Table 1, 0.1% of FS accuracy is ±0.1 kPa across the scale. With a turndown of 10:1, the % error becomes 10 times as large at the lower end.

In comparison, for 0.1% of RD, the accuracy remains 0.1%, no matter the turndown ratio. However, it is important to note that this cannot continue all the way to zero, as there is a physical limit to how well the sensor can perform.

The latest Schneider Electric IGP50S gauge pressure transmitter range – also available as absolute or differential variants – with FoxCal technology (11 pre-calibrated ranges imbedded in the sensor), are leaders with their stated accuracy of 0.025% of RD and very high stability of < ±0.015% of URL (upper range limit) per year.

The 400:1 turndown ratio, coupled with the built-in calibration curves, allows for a single sensor to cover most ranges of pressure measurement with a single transmitter, resulting in drastically reduced inventory, engineering and configuration time. The robust design includes a standard 5 year warranty and SIL2 safety certification.

For more information contact Johan van Jaarsveldt, EOH, +27 87 803 9783, johan.vanjaarsveldt@eoh-pas.co.za, www.eoh-pas.co.za
Temperature is a key physical variable for ensuring quality in the production of plastic film. The application of non-contact temperature measurement technology poses the challenge that films with a thickness of less than 1 mm are transparent for standard IR thermometers, and consequently, are not able to be measured. Optris, leading German manufacturer of non-contact temperature measurement equipment, has developed the CT P3 infrared thermometer, which measures in a narrow spectral range of 3,43 µm, in order to enable a precise temperature measurement of thinner films made of, for example, PE or PP.

Rugged and heat-resistant with good process integration
The Optris CT P3 is a miniaturised and robust pyrometer in a solid casing, which is suited for retrofitted parts and OEMs. Without cooling, it can be used in environments of up to 75°C and has protection class IP65. The electronics are separate from the sensor head and have easily accessible programming buttons along with an illuminated LCD display. Selection options for the analog outputs are between 0/4-20 mA, 0-5 V, 0-10 V, thermic element version K or J. The digital outputs optionally available are USB, RS-485, RS-232, relay outputs, CAN bus, Profibus DP or Ethernet.

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

Pressure sensor with IO-Link

WIKI has a new, flexible pressure sensor with IO-Link in its portfolio. The model A-1200 is used for pressure monitoring or as a PNP/NPN switch, especially in intelligent machines.

The new pressure sensor can be integrated into series production without any great effort.

It is easy to configure and can be supplied with preset parameters on request. The IO-Link interface continuously transmits all measured values and information from the integrated diagnostic function, which monitors the measurement quality of the A-1200. In addition, a 360° LED display (green, yellow, red) gives visual information about the instrument status.

The pressure sensor also offers a blinking function that can be controlled via IO-Link, which enables its location to be clearly identified during maintenance. The A-1200 is available in a variety of versions, including an exceptionally robust one for measurement applications in harsh environments. This variant of the sensor is shock resistant up to a load of 1000 g and designed for medium temperatures from -40 to 125 °C.

For more information contact WIKA Instruments, +27 11 621 0000, sales.za@wika.com, www.wika.co.za
The dairy industry has been plagued for years with the challenge of accurate flow measurement in both processing and offloading applications. Often, the most common cause of inaccuracies in flow measurement is the degree of entrained gas, which adversely affects the fundamental measuring principles. Coriolis mass flowmeters are usually only used for single-phase fluids, i.e. either liquids or gases. Production facilities have been dealing with this challenge by implementing ‘correction factors’ in their control systems to compensate for these discrepancies. Whilst the flowmeters are accurately calibrated and certified, the complete loop integrity is compromised due to these ‘factors’ that are introduced.

**Milk delivery and receiving**

Accurate flow measurement of milk is required during the unloading from tanker trucks into processing plants. Milk’s protein and fat structure tends to trap air easily, causing errors in batch unloading. This air can be introduced in different ways:

- Agitation from within the trucks while travelling.
- Being drawn in through loose process connections or leaking seals.
- Pump unloading when gravity drainage is not possible.
- Insufficient settling time in tanks or improperly sized air eliminators.

An Endress+Hauser customer located in the Western Cape, needed to support its facility with fair and equitable measurement in order to maintain the proud relationship enjoyed with local farmers. Renowned for producing a wide range of cheese and dairy products with an excellent reputation for superior quality and flavour, this state-of-the-art manufacturing facility is strategically located to ensure milk is delivered to the factory with minimal delays. The high-quality milk is sourced from the nearby local farms, where free range cows graze in the lush green pastures of the Garden Route.

The producer embraces a culture of innovation in order to meet the changing requirements of today’s discerning consumers. Having realised that the key to success is reliant on the efficiency of its operations, the priority at the plant is a reduction of milk losses as part of an efficiency drive. As a socially responsible organisation, this manufacturer does not believe in passing unnecessary costs along to the consumer, but prefers to look internally for ways to eliminate waste. It was in this spirit of innovation and efficiency that Endress+Hauser was approached for a solution to reduce milk losses in the processing area. The existing flowmeters were proving to be inaccurate in this application, which has become notorious in the industry due to the varying degrees of entrained gas that can become trapped, causing measurement errors during batch offloading and downstream processing.

The trial was completed successfully and delivery on the set assessment criteria exceeded customer expectations. The success of the trial led to the purchase of additional flowmeters for use in another high loss application area – milk reception and offloading.

**For more information contact Anban Pillai, Endress+Hauser, +27 11 262 8000, anban.pillai@za.endress.com, www.za.endress.com**
The new Optisonic 7300 Biogas ultrasonic flowmeter from Krohne has been specially designed to measure dry and wet biogas with variable composition. The meter provides additional functions like calculation of standard volume, methane content measurement, and diagnostics features. It also features no moving parts and no pressure loss.

The new instrument overcomes the limitations of the ultrasonic principle in biogas applications due to high damping of the acoustic signals by carbon dioxide and high water content in the biogas. Its signal transducers provide a stronger ultrasonic signal into the gas, and specialised signal processing enables better detection of small, strongly dampened acoustic signals. These features, along with the mechanical design of transducers and transducer pockets, make the measurement insensitive to liquid and biological scaling.

It features a maintenance-free full bore flow sensor without any moving parts. Because the hydrogen sulphide (H₂S) in biogas is corrosive when dissolved in water, the measuring tube is made of stainless steel 1.4404/316L and the transducers are made of Nace-approved grade 29 titanium for maximum corrosion resistance. Equipped with lap joint flanges to lower its overall weight, the measurement accuracy is specified at 1 percent of actual measured flow rate, when calibrated with air. When 2 percent accuracy is sufficient, users can select a dry calibration alternative at a significantly lower price.

Optisonic 7300 Biogas features a built-in temperature sensor that facilitates direct measurement of methane content using calculation of the molar mass, in combination with the measured velocity of sound. This enables end users to determine the exact methane content of the biogas, necessary when it is used as fuel for gas engines in a combined heat and power (CHP) unit. It can also provide calculation of gas flow volume to standard conditions by using an additional pressure sensor. The electronics include diagnostics to validate the flowmeter functions and the process. For output of the measured values, 4-20 mA and pulse outputs are available, while HART and Modbus (optional) are included for field communication.

The instrument is certified for use in explosive areas (Zone 1). Since no pressure drop is generally allowed in biogas pipelines, the device is available in common line sizes of 2, 3, 4, 6 and 8 inches.

For more information contact Deon Rampathi, Krohne SA, +27 11 314 1391, d.rampathi@krohne.com, www.za.krohne.com
Data, light and the smart factory

By Kim Roberts, editor, Motion Control.

The role of lasers in the Fourth Industrial Revolution.

The factory of the future brings to mind abstract concepts like big data, artificial intelligence, digital twins and connected machines. It creates for us a vision of speed, communication and flexibility. What is not always addressed is how you turn all these ideas into products you can touch. What tools are equally fast, flexible and free of physical constraints, and can actually machine a workpiece in these connected and flexible processes?

This is where the world of photonics comes in – the science of harnessing photons through the cutting edge use of lasers and fibre optics – and it has become a key technology for smart factories. The connection between data and the physical world is a focused beam of light that is weightless and contactless – connected light.

And look at what that light can do. The capabilities of lasers alone range from ablation and material deposition to drilling, cutting, joining, perforating, welding and creating metallurgical changes, as well as roughening, smoothing, hardening and cleaning surfaces.

Machining at the speed of light

One of the biggest advantages of lasers is that they can process any material from metals and glass to plastics and even skin. They give you complete freedom. They don’t have tool changes, they don’t break down and they don’t wear out.

They also have a high degree of precision in processes monitored by sensors to produce micro and even nanosystems; and they are ideal for sensitive materials, as heat input can be controlled precisely. In combination with scanners and sensors, control loops are possible that adjust themselves in real-time. Smart lasers understand what material they are processing, how the process develops and when it is finished; and they can adapt to changes in the material such as thickness, reflectivity, shape and orientation.

Laser technologies also provide the accuracy and flexibility needed for the production of millions of electric motors, electronic power components and lightweight 3D printed metals and plastics. Laser-welded hairpins are replacing costly windings in electric motors. Laser-cut electrical sheets have advantages over mechanically machined sheets in the production of motors.

Changing the game

The vision of the IIoT is to create smart, efficient factories where autonomous machines can recognise their surroundings and communicate with other machines, as well as people. Intelligent production means the machine finds out for itself what to do. This is done by using photonic sensors to combine data connectivity, sensor technology, speed and artificial intelligence.

This is already happening. With reliable in-line quality monitoring, many machines in today’s production lines are now intelligent enough to interface and operate themselves without the need for manual input. They can deliver reports automatically as well as report or shut down any processes after analysing the data collected. For example, a machine can recommend a change in material flow if it identifies an interruption in the production line.
“One of the biggest advantages of lasers is that they can process any material from metals and glass to plastics and even skin.”

or a change in average completion times for a process. Sensor systems enable safe human-machine cooperation.

Small batch sizes need flexibility and easily controllable tools. This is a problem in factories that still depend heavily on mechanical processes such as milling, punching, sawing and drilling. But mechanical tools are gradually being phased out. They are being replaced by lasers, which offer a faster, simpler and more flexible way to produce things on demand. These are the trends:

- Manufacturing chains using lasers are on their way in, manufacturing chains using mechanical tools are on their way out.
- The actual workpieces are turning into data carriers with the power to communicate.
- Individual parts are being made from data sets.
- Part shapes can be changed with each different set of data.

Smart laser industries
These are some of the industries where lasers are paving the way for the IIoT with the processes provided by cutting edge companies such as Trumpf, Coherent|ROFIN, II-VI HIGHYAG, IPG-Laser and Manz.

Additive manufacturing
Also called 3D printing, this allows fully automated, digitally controlled serial production from one unit. Lasers build up highly complex components layer by layer from metallic or plastic powder – without tools and with previously unimaginable design freedom.

Photonics for a new era of mobility
The automotive industry is driving two future global projects: electromobility and autonomous driving. Based on a survey of more than 320 automotive manufacturers, digital transformation consultancy firm Capgemini reports that smart factories could add up to $160 billion annually to the auto industry alone, by 2023.

Lasers play a key role in high voltage battery manufacturing. One third of an electric vehicle’s added value is accounted for by the battery process chain – considered to be the nucleus of electromobility. Lasers are as indispensable here as in in-line process monitoring. The same is true of the complex manufacturing processes needed for the mass production of electric motors, power electronics and lightweight designs.

Imaging specialists such as Keyence, Stemmer and PCO contribute indispensable in-line inspection solutions for battery cell manufacturing. Cell service life and operating safety are often a question of nanometres and micrometres: Sensors measure electrode thickness, monitor the homogeneous distribution of active materials, and control all the rolling, drying, cutting and welding processes, enabling production defects and deviations in tolerances to be immediately rectified.

Photonics also forms the backbone of automated driving, for imaging, sensing, smart displays and media communication networks. Light detection and ranging (Lidar) for control and navigation in autonomous vehicles is replacing the sensory perception of human drivers. Optical sensors generate massive volumes of data (in the terabyte range every hour), so the trend is towards intelligent sensor systems that perform their own data analysis before deciding which data to forward to the on-board computers. This high level computing power in confined spaces together with efficient data transmission would not be possible without laser technology and optical inspection.

Printing
The printing process chain is another typical example of the IIoT in action. Small print runs and personalised prints mean more frequent order changes, so automated process chains prevail. Printing is done on packaging, glass, metal and ceramics, as well as on individualised print products. Inks are fixed on surfaces with UV or IR heaters or LED technology. Laser and camera systems control the quality.

Codes applied by laser to the products transport the control information to the respective machining centres and robots. These codes allow clear allocation of production parameters to individual products and also make the process transparent. The production status can be tracked and documented. The codes also contain shipping information.

Ultrasound-pulse laser technology
At the cutting edge, ultrashort-pulse laser (USPL) technology, awarded the 2018 Nobel prize for physics, is rapidly breaking into industrial production. This is set to transform the photonics landscape and revolutionise applications for the IIoT. Operating at extremely high peak intensity and ultrashort pulse widths in the femtosecond range (10-15 seconds), USPLs suppress heat diffusion to the surroundings and enable ultra-high precision nanofabrication of a wide range of materials that cannot be achieved with existing microfabrication technologies. Optical fibres will soon distribute the energy from USPL lasers instead of solid-state lasers, paving the way for completely new applications.

In the automotive and railway industries USPL technology meets the demand for miniaturisation, high precision, high quality, application to a diversity of materials, smaller lots and cost-effectiveness. For example, ultrafast lasers have been used to produce exhaust gas sensors made of special ceramic layer systems. In another example, Panasonic has used picosecond lasers in mass production to produce funnel-shaped ink-jet nozzles. A further example is irradiation by a femtosecond laser in halogen gas, which produces conical microstructures on a Silicon surface that can act as an antireflective coating. This technique was commercialised by SiOnyx for the production of photovoltaic Si solar cells and led to a 15% reduction in costs.

In addition, the development of killer apps for semiconductor chips such as printed board drilling by CO₂ lasers and photolithography by excimer lasers, will establish a firm position for USPL processing in manufacturing.

Adaptive beam shaping drives the future
A ground-breaking approach to smart laser manufacturing is being pursued by research fellow Dr Ben Mills at the Optical Research Centre of the University of Southampton. He is combining the precision of femtosecond lasers with high speed control of the beam shape, potentially enabling some extraordinary new applications. “We are ready to unlock a revolution in laser processing for applications ranging from sensing to healthcare,” he says of the highly customisable technology. “The latest closed loop system self-corrects in real-time, for example to work around a speck of dust – perfect for IIoT applications.”

Thanks to this, beam-shaping technology, the potential use of lasers in industrial applications is enormous as the approach enables processing in almost any material at extremely high precision. The current challenge is the move into 3D manufacturing. “We believe our technology will eventually enable the fabrication of 3D structures from almost any material at a resolution in the nanometre range,” concludes Mills.
Planning for digital transformation

By Paul Miller, ARC Advisory Group.

In recent years, much of the content at ARC Advisory Group’s annual Industry Forum in Orlando, Florida has revolved around IT/OT convergence and the digital transformation of industry, infrastructure, and cities.

As we’ve learned, digital transformation can be a challenging, if necessary, journey. At each year’s Forum, we learn more about how pioneering companies are overcoming these challenges and the associated operational and business benefits. This year, one of the key Forum takeaways was that culture, rather than technology, is often the barrier to digital transformation; other discussion threads centred on cybersecurity and data ownership.

For those of you who could not attend the 23rd annual ARC Industry Forum at the Renaissance Orlando at SeaWorld in Florida, videos of most sessions are available on ARC’s YouTube channel.

In his general session presentation, Mike Guilfoyle, research director at ARC Advisory Group, provided some perspectives on planning for digital transformation based on ARC’s research, consulting, and collaboration activities in this area. Not surprisingly, many of these thoughts resonated with those provided by the previous keynotes.

Mike made it a point to emphasise that “You can’t do anything digital without cybersecurity”. He also called attention to the many Forum workshops, sessions, and panel discussions that relate to cybersecurity, digital transformation, and digital technologies (IIoT, machine learning, virtual and augmented reality, digital twins, etc.) and encouraged end-users to participate in future meetings of the ARC-sponsored Digital Transformation Council.

The imperative

As Mike explained, “Whether it is disruptive technology, ongoing market innovation, billion dollar governmental pushes, or some combination of the three; all industries and populations are feeling pressure to transform.” This makes it clear that every industrial and infrastructure related organisation needs to understand how to embrace and execute digital transformation.

The scalability challenge

What makes careful planning so critical is that organisations expect to reap massive, game-changing benefits from digital transformation. Yet, as Mike explained, many continue to be confounded when it comes to ROI and scale. He referred to statistics that indicate that more than 80 percent of industrial companies are now undertaking digital transformation initiatives, but less than 11 percent are seeing sustainable success.

“Many industrial users suffer from ‘pilot paralysis’, while others are unable to scale up to maximise the benefits,” he explained. “I don’t need machine learning to know that something is wrong with this picture.”

Common missteps

Mike explained that common missteps include: numerous possibilities without direction; pursuit of technology; and managing cultural impediments. All are related.

“Digital transformation offers a plethora of possibilities, but much less direction. This leads to the pursuit of technology for technology’s sake. And, of course, as he emphasised, “The cultural barrier, the elephant in the room, underpins all others. No one wants to take on the cultural barriers to change.”

Possibilities without direction

Digital transformation presents many possibilities, which can be both challenges and opportunities. Some are understood, but still difficult. Many simply cannot be foreseen, yet the organisation must be prepared to deal with them. When examining all these possibilities, it becomes exceedingly difficult to answer the simple questions, what needs to be done, why, and when?

Pursuit of technology

Without a good compass to provide direction, many companies gravitate toward viewing digital transformation as a pursuit of technology. That is a pretty natural progression. However, it just adds to the problem. Given all the technologies and marketing behind them, it is very difficult to understand differences in solutions so that vendors can be compared in a meaningful way.
Adroit chooses Sigfox for smart water project

Adroit Technologies has chosen the Sigfox IoT network for a large municipal Smart Water IoT project. Managing director Dave Wibberley states that the company is excited about being involved in this proof of concept pilot project. “We chose the Sigfox network, run in South Africa by Sqwidnet, for its reliability, cost effectiveness and ease of use,” he adds, “believing that this network and partner ecosystem would allow us to fully test the viability of large scale IoT projects.

“We have done a number of proof concepts, but believe that having a real world project where we are integrating sensors onto our Adroit Enterprise IoT platform will allow us to fully test the viability of large scale IoT projects. “We have done a number of proof concepts, but believe that having a real world project where we are integrating sensors onto our Adroit Enterprise IoT platform will allow us to test the concept of large scale IoT solutions within a municipal water environment. The Sigfox technology is well proven; it is the value against cost that needs to be tested. This progressive water utility that delivers potable water to over 5 million people in South Africa really wants to understand the IoT, and separate the talk from the value. This is a good project in that we have identified real-world problems and used IoT technology to solve them.”

The project focuses on the following aspects of a smart utility, and, whilst it is by no means a comprehensive list of where the IoT can deliver value, it is varied enough as a starting point:

- Metering (energy and water).
- Security: partnered with Moduteq for security of sensors.
- Pressure monitoring: built a local sensor suitable for municipal use, partnered with UK-based Wavetrend for an additional sensor:
- Asset management: monitoring movable assets.
- Manhole monitoring: security and risk management.
- Vibration sensors: monitor fences.
- Temperature sensors (from Nerospec): server room temperature monitoring.

An example of where the IoT is set to assist this municipality is ensuring that physical samples are taken from water towers on a regular basis. For operational reliability purposes, a ‘tip’ sensor, which measures angular displacement, is installed under the access lids to ensure that a physical opening takes place within the prescribed timeframe.

The solution is being integrated into the Adroit Scada platform, incorporating a GIS interface. The complete system, which will test run for a calendar year, went live during March.

The Adroit Technologies Sigfox certified IoT Platform is extremely well suited to enterprise IoT solutions.

For more information contact Dave Wibberley, Adroit Technologies, +27 11 658 8100, info@adroit.co.za, www.adroit.co.za
Why should you plan to invest in an IIoT platform?

The more things change, the more they might appear to stay the same. Therefore, it should come as no surprise that Gartner predicts that within the next two years more than half of IIoT implementations will not be hosted in the public cloud, but rather be running on infrastructure located on the premises, closely integrated with existing operational technology (OT) systems. Perhaps not quite the ‘revolution’ we keep hearing about, but more an evolution of tried and tested principles developed over the years in the field of automation and control.

The evolution of OT
‘Operational Technology’ is used to describe the hardware and software systems in industrial environments that instrumentation and control engineers are already very familiar with. OT systems monitor and control physical processes using sensors connected to devices controlling valves, pumps, motors etc. Industrial control systems such as PLCs, scada and DCS are all important parts of an OT system.

OT systems have existed for some time now and are capable of reading high throughput data streams from plant and equipment, storing and analysing vast amounts of data and presenting information in ways that supports operational decisions. In order to guarantee reliability and performance, these systems are often proprietary in nature and isolated from the world-wide web.

Over the past few years Operational Technology systems have continued to evolve. The recent IIoT platforms are in many respects part of this evolution. But the sometimes-subtle differences are important to understand.

IIoT platforms are open to the web and promise to facilitate improvements in productivity and efficiency across the whole value chain as well as make possible completely new business models. In contrast to OT, IIoT platforms allow for a higher level of automation and insight by leveraging cloud connectivity to connect to many more diverse IoT devices across geographical boundaries. IIoT platforms are particularly effective when combined with new cloud-based analytics capabilities that can present information in an easy to understand format that can even be acted on by your suppliers and customers.

Which IIoT platform?
As a manufacturing CIO you will soon be (or perhaps already) faced with the decision on whether or not to invest in an IIoT platform. It is important to be well prepared for such a strategic technology decision. You will need to identify suitable technology suppliers that will meet future business requirements. To secure investment approval you will also need to build a compelling business case.

An IIoT platform is integrated software that is capable of providing connectivity between devices and systems in industrial environments. A suitable IIoT platform needs to have device management capabilities, as well as data retrieval, streaming and storage, advanced analysis and visualisation capabilities. There are over 30 IIoT platform vendors on the market today and finding the best one for your business will require some homework.

Several approaches to implementing an IIoT platform are possible. For example, a simple ‘upgrade’ of the existing OT systems in the plant might seem to be a simpler approach than implementing a brand new third-party IIoT platform. Several established PLC/DCS/scada vendors are building new capabilities that incorporate IIoT in their product roadmaps. This approach can simplify integration and help standardise systems around one supplier. On the other hand, you could perhaps look around for a third-party ‘universal’ IIoT platform that is more open and has a bigger reach. If you shop around, what are the most important criteria for selecting the right technology?

Should you look for an on-premise solution or a mixed model where part of the system is hosted in the cloud?

Some of the criteria to consider when evaluating IIoT platforms include:

• The ability to integrate with multiple disparate mission-critical systems, potentially in regulated environments (if applicable).

• Ability to connect to third-party cloud-based web services such as exchange rates, weather, logistics tracking etc.

• Self-diagnostic capabilities and remote management of devices.

• Supports low latency, high volume data streams.

• Robust and reliable edge processing of data that will be relied on for safety, supporting automated processes, equipment protection etc.

Developing a business case for investing in a new IIoT platform will also require some careful planning.

Your business case will naturally depend on the industry, specifics of the manufacturing process, the status of the existing OT systems and the potential value in adopting new business models. Here the manufacturing CIO

Gavin Halse

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

For more information contact Gavin Halse, Absolute Perspectives, +27 83 274 7180, gavin@gavinhalse.com, www.absoluteperspectives.com
needs to work closely together with the line of business owners (marketing, engineering, manufacturing etc.) to understand and define any potential IIoT-based projects.

There are likely to be other value adding benefits from an IIoT platform implementation:

• Eliminating ‘silos’ of information, particularly in established factories where disconnected islands of information have become entrenched over time.
• The ability to collect and process higher volumes of complex data from a range of new IoT devices in the field (and combine this with data from existing OT devices in the factory).
• The ability to federate multiple real-time data streams into a common centralised data store. Imagine the ultimate ‘scada’ system or ‘data warehouse’ that incorporates real-time plant and business system data, field instruments, computerised maintenance management data, field service data, condition monitoring etc.
• Providing universal access across the business to information previously held in proprietary systems that can assist in business decision making to enable enhanced automation of business processes across the whole value chain.
• Improved analysis and visualisation of this data using modern tools, even outside the factory boundary.

The benefits of a new IIoT platform will also allow advanced decision making around industrial equipment, processes and assets, as well as provide better overall visibility of the entire operation.

Where to now?
For the manufacturing CIO it is becoming important to develop a clear plan to align and integrate IT, OT and emerging IoT systems. This requires proactive planning to invest in the leading IIoT platforms of the future. Failure to do so could result in the business losing ground in fast changing markets. New market entrants who have no technology ‘baggage’ and who can rapidly implement digital business models can pose a real disruptive threat to established businesses that are slow to react.

Such a strategic plan to bring together IT, OT and IIoT will of course require the careful selection and implementation of an IIoT platform that will grow to serve the requirements of the business well into the future. The CIO has an important role to facilitate this process and help guide the business.

With the TIA Portal (Totally Integrated Automation Portal) in the cloud, Siemens is expanding the options of using the engineering framework even more flexibly in the various phases of planning, engineering and commissioning. The possibilities that this offers are based on all the main features of TIA Portal V15.1, with the additional available innovations of TIA Portal options – the simulation of the application in the cloud environment with the help of S7-PLCSIM Advanced, full use of the application possibilities, for example the complete controller portfolio including the new, redundant S7-1500R/H controller, the configuration of visualisations with HMI Panels, PC-based runtime systems, and the fully integrated Sinamics drives portfolio.

Using the TIA Portal in the cloud provides fast, flexible, and web-based access to pre-installed environments using any type of hardware, without any need for installation, and at any time and place. This substantially reduces the effort required for testing new TIA Portal innovations, and so enables the TIA Portal to adapt flexibly to the user’s hardware and way of working: integrating the widest range of PC and tablet hardware into the development process of machines and plants increases flexibility, while reducing the engineering hardware requirements to a minimum. Also, there is no need for local installation on the hardware as access is web-based.

The scalability of the cloud architecture enables customised adoptions to the user’s requirements. This includes not only the performance, but also the individual adaption for users who would like to access pre-installed TIA Portal environments. This enables users to adapt very quickly without any waiting time. It can also substantially reduce the costs of installation and software maintenance.

The central storage of project data in a cloud-based FileShare permits fast, easy access no matter where the user is located. It also makes it significantly easier to distribute project data throughout the team. This can completely eliminate the need to copy data from one device to another.

For more information contact Jennifer Naidoo, Siemens Digital Industries,
+27 11 652 2795,
jennifer.naidoo@siemens.com,
www.siemens.co.za
Do we need rogue IT units in the modern manufacturing plant?

My very first ‘misunderstanding’ while employed was with what are known as ‘cowboys’ or rogue IT units. Young, eager to please, and even more eager to perform, I was stopped dead in my tracks by people with different job titles, working in different departments, but working with and controlling IT decisions and inputs. After a few back and forth emails, it became clear to me that just because I worked for the official IT department, did not mean there were no other ‘IT departments’ in the company.

**What is a rogue IT unit?**

A rogue IT unit is the term given to a team that is running its own IT operations alongside, but separate from, the official IT department of the company. In all manner of work I have done, in a variety of industries, I have always found that there are one or two individuals who insist on running their own IT operations for their plant or department. They have their own contracts with external vendors, they have their own spares and they, more often than not, have their own licence management, completely separate and void of any standards, methodologies and procedures set out by the official IT department.

**Are they right or wrong… or left?**

This is difficult to answer. If they operate IT on the plant in such a way that it benefits their operations better than the service from the official IT department, then I guess it is hard to argue against their existence. I have worked with excellent rogue units where they follow the standards set by the official department, but they have their own developers, support teams and contract agreements with third-party vendors, who are given access privileges on their network. Then I’ve worked with rogue units that just go way out left-field and almost create an entire IT department just for their plant, ignoring standards, procedures, operating guidelines, etc. These have all manner of repercussions of which the most concerning are security, licence infringements and contracting irregularities. Sometimes the brightest guys work in these rogue units, I’ve found cases where they are better qualified than their counterparts in the official IT department. But, on the other hand, they are mostly what industry calls ‘super users’ – people who know the system well enough to form a rogue IT unit.

**If IT in the manufacturing plant is modern, why do we have rogue units?**

That is a good question, and one that has many probable answers. I think we find rogue units in many factories because the official IT department either cannot meet the demands of production, or have set a strategy that does not align with the objectives this department has set for the future. It could also be that implementation times by official departments are long, where the urgency of a plant-floor solution requires a more agile approach. Or it could be a financial decision, some plants or departments run legacy systems that cannot advance technologically unless large investments are made, and they simply fall by the wayside when new technology or processes are adopted by the enterprise. But perhaps the simplest reason is that the rogue unit has the appropriate skills and experience for the specific plant, which cannot be found within the official IT department. The rogue unit then springs up and grows from there.

So, now that we know what they are and why they exist, do we need rogue units operating their own vision of IT in manufacturing? It would be irresponsible to say yes, but narrow minded to say no – therefore I say yes and no.

No, we do not need rogue units in a Utopian world, where the official department has internal divisions, like MES and IIT/OT teams. Groups that are part of the official IT department, but somehow meet the needs of each and every manufacturing operation of the enterprise, a mean feat, but doable when focused on specific IT domains from level 0 upwards.

And yes, we might need rogue units when we do not have the luxury of a large established enterprise IT department with an appropriate budget. We might need rogue units when skills and money do not match up, or when legacy systems and specialist support for operational requirements cannot be met by the official department. It might also be good to encourage collaboration between the two, to share their exploits for the benefit of manufacturing excellence.

Whatever the reason, rogue IT is here to stay in manufacturing. So, it might be a good thing if it came about genuinely as a matter of technological circumstance. What we do not need are rogue units operating for nefarious reasons stemming from internal politics or strategic disagreements about IT for business vs IT for manufacturing.

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**Lance Turner**

Lance Turner is an MES specialist employed at Sasol’s Secunda plant. He has an honours degree in Information Systems with a focus on Enterprise Architecture design and solutions. A certified MESA MES/MOM student, his passion is amalgamating general IT across the manufacturing spectrum. Lance’s vision is for a converged IT and manufacturing discipline that will become the reality of Industry 4.0. His team motto is MES services that are always available, always stable, and always dependable.
New computing methods are helping to create autonomous edge nodes that are about to change the IIoT landscape. Edge nodes are data-aggregation points in an IIoT system, where the physical world of sensors and actuators interacts with computational resources such as IIoT gateway computers. This new computing model is based on edge nodes that are enhanced with local storage and computing power, in addition to machine-learning algorithms that enable them to process data locally and make quick decisions. An intelligent edge node enables faster decisions according to local identity management and access control policies, secures data close to its source, and reduces communication costs.

Edge intelligence is edge computing fortified with machine or self-learning algorithms, advanced networking capabilities, and end-to-end security. This article discusses four key elements of a good edge intelligence solution.

1. Localised data processing
The troves of data collected at the edge of a network can quickly lose their relevance. Hence, the data should be processed and useful insights derived from it at the earliest opportunity. Mission critical systems, such as healthcare and factory monitoring, require quality data measurements and instant decisions. In addition to being time consuming, sending data from the edge to the cloud can lead to data corruption and processed data without the required context.

For these reasons, the edge node should be equipped with the ability to process data locally and only key information should be sent to the cloud to develop data models. Edge nodes with local storage and processing capabilities keep the data closer to the source.

2. Real-time decision making at the edge
Edge intelligence enables real-time decision making at the edge nodes. Decision latency can be drastically reduced by enabling edge node analytics. Machine learning or self-learning algorithms can be developed locally or in the cloud and deployed at the edge to make the edge nodes autonomous, enabling quick decision making.

3. Robust edge-to-node communication
Data integrity is key in the edge-computing model because decisions are made at the edge node level. Data that is sensed and measured at these devices is of little use if the communication between the devices and the edge node is not consistent. No data loss or data corruption can be tolerated as the edge node is now responsible for making key process-related decisions. Other communication aspects to consider are range, bandwidth, device-to-device communication, the communication protocols to support, and how to power edge devices. A good edge network is one that is optimised for wireless sensor communication.

4. Security at the edge
The lifecycle of an IIoT system is often longer than a traditional computing system as many edge devices remain in operation even decades after they were deployed. While servers and PCs are complex enough to allow for security provisions, IIoT nodes are usually low in power consumption and processing power. Edge-intelligence solutions equip the edge node with local storage and processing power and a varied set of software and hardware options help secure the edge devices and nodes. Some of the methods used to secure the edge nodes include:

- Edge platform with end-to-end security.
- Intrusion prevention systems (IPS).
- External hardware security.
- Secure boot capability.

Since edge nodes are the gateways to the physical world, when an edge device or node is compromised it is not just data that is at risk. Cyber attackers can now potentially access unsecure edge nodes and devices to interfere with industrial processes or shut down equipment resulting in financial loss and even life-threatening situations.

For more information contact RJ Connect,
+27 11 781 0777, info@rjconnect.co.za,
www.rjconnect.co.za
Thinking industry further
Siemens leads manufacturing to the next level of digital transformation.

At Hannover Messe, Siemens has presented numerous additions to its Digital Enterprise portfolio for the next level of digital transformation in the discrete and process industries. “Through the integration of cutting-edge technologies into our portfolio, we can help industrial companies to benefit from rapidly growing data volumes in wide-ranging new ways,” explained Siemens board member, Klaus Helmrich. “With the use of technologies such as artificial intelligence, edge computing and additive manufacturing, we are paving the way for the future of industry.”

Under the slogan: ‘Digital Enterprise – Thinking industry further!’ Siemens demonstrated how companies of any size can use industry-specific solutions to increase their flexibility and productivity and to develop new business models.

The basis for these cutting-edge technologies is the availability of data. Through digital twins that map and link together all the steps of industrial manufacturing in a virtual world, comprehensive data pools can be created. One example is a new module with an integrated AI-capable chip for the Simatic S7-1500 controller: through the use of machine learning algorithms, robot-based handling processes can be optimised, for example. For the learning process, artificial intelligence (AI) requires large volumes of data. And this data is only available if processes have been digitalised and linked together seamlessly. With Industrial Edge, Siemens has extended its Digital Enterprise automation platforms – Simatic and Sinumerik – to include a data processing solution on the shop floor. With its scalable concept extending from the floor to the MindSphere open, cloud-based IoT operating system, Siemens is creating a manufacturing renaissance.

At the booth, Siemens used a showcase from automotive manufacturing to demonstrate how the use of cloud and edge-based data analysis, together with other cutting-edge technologies such as additive manufacturing and autonomous manufacturing systems, create new opportunities for the efficient and flexible production of electric cars and batteries. “Siemens is supporting the automotive industry with software and automation systems for the transformation to e-mobility,” explained Helmrich. “This helps to meet today’s challenges, such as the growing demand for customised products.”

Digitalisation cannot be implemented without protecting industrial plants from cyberattacks. In future, AI and edge computing will also improve security, since data analysis can be used to detect cyber threats quickly and reliably. For process automation, Siemens broke new ground at the Hannover Messe and introduced an innovative new process control system. With Simatic PCS neo, the company presented a brand new system software package, which offers the process industry new opportunities in the age of digitalisation. This includes global web-based cooperation in engineering and operations as well as unique usability with a seamless object-oriented data model and open system architecture. In addition, it offers the option of scalability from small process modules through to the largest process plants in the world.

Visitors to the ‘Future Area’ of the booth discovered where the integration of these cutting-edge technologies is leading – to a much stronger link between OT and IT. Through the convergence of these technology areas, increasing volumes of data from industrial development and manufacturing will in future be linked with other data from areas such as logistics or purchasing. As a result, a large amount of information will be transferred from the central to the control level.

In order to provide cross-sector data transfer and to increase flexibility and productivity, a wide-ranging, powerful communication infrastructure is required. The new 5G communication standard creates exciting prospects here. High data rates, reliable high-performance broadband transmission and ultra-short latency periods support considerable increases in efficiency and flexibility in industrial value creation – especially for Industry 4.0 applications.

Siemens has used this new communication standard from the outset and is supporting standardisation and industrial implementation through the development of an appropriate portfolio. It is also running its own research projects for Industrial 5G and establishing several 5G interoperability test centres running under actual OT conditions. This includes the evaluation and testing of available industrial standards, such as Profinet and Time Sensitive Networking (TSN).

“We support our customers on the path to digitalisation, from consulting on strategies for industrial digitalisation through to supporting in the implementation and optimisation of digital solutions,” concludes Helmrich. “Together we determine the existing level of digitalisation at the relevant company, and from there we develop a transformation strategy together with a roadmap.”

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za
Digitalisation: the cultural challenge

SKF pays attention to the human side of digital transformation.

In a digital transformation, people matter every bit as much as technology, says Victoria van Camp, CTO and president, innovation and business development, SKF.

Regardless of their sector, size or history companies, are recognising that the recent improvements in connectivity, control and analytical capabilities have the potential to unlock significant improvements in the cost, quality and productivity of their operations. More fundamentally, digital technology is enabling entirely new product and service offerings, and underpinning the creation of new business models.

Digital transformation involves cultural change

You do not have to look far to see this process in action. SKF has been designing and making bearings, seals and related products for more than a century. Today, however, SKF is a digital business too. It now offers a wide range of technologies – both hardware and software – that improve customers’ rotating equipment performance.

Digital technology is changing internal activities too. Engineers now create new products or solve customer problems through a portfolio of advanced design optimisation and simulation tools. The company has also made significant investments in flexible, automated manufacturing sites and connected logistics networks, which are helping to cut delivery lead times and tailor products more precisely to customer requirements.

Yet, despite all the progress made so far, few organisations can claim to have mastered the digitalisation challenge. The gap between the potential application of digital technologies and what most companies have integrated into their everyday operations remains wide.

If the rewards of the digital revolution are so significant, what is holding companies back? Technology is certainly part of the story. Some digital approaches have not yet reached the level of maturity required for large scale use. At SKF, work is ongoing into the use of new artificial intelligence technologies to predict asset performance and failures, but the approach is still in its infancy, even if it is developing quickly.

But there is also another force at work. There are plenty of technologies that are mature, robust and inexpensive enough to be applied far more widely than they are today. That suggests that barriers to adoption are not technical, but cultural. There is plenty of evidence to support this hypothesis. When consultancy Capgemini Invent surveyed more than 1700 business leaders, for example, 62 percent of them said that their own corporate culture was the biggest obstacle to digital transformation.

Perhaps that should not be surprising. Moving to a digital world can be an unsettling experience. There are the requirements to work in new ways, and with new tools, for example. In some cases, staff may fear a loss of autonomy. Increased transparency also means there is nowhere to hide if things are not going well.

The bad news, according to Capgemini’s research, is that companies in the mechanical and plant engineering sectors are late adopters when it comes to the creation of a true digital culture.

“The discipline of engineering strongly focuses on the technical side of its products and services,” notes Yvette Zzauer of Capgemini Invent. “This impacts the corporate culture, which tends to be more technology than human-centred. While this means engineering businesses tend to be more comfortable than other sectors about adopting technological advances, it can mean they pay insufficient attention to the human side of digitalisation.”

Digital transformation involves employees at all levels

Fortunately, there are things companies can do to promote cultural change. In the past, corporate culture was broadly and intangibly defined by shared values, attitudes, standards, and beliefs that characterise the members of an organisation and define its nature. However, digital culture is more tangible, concrete and explicit.

For SKF, building a digital culture is a long-term change management effort requiring sustained attention from the top of the organisation. Digital change cannot be achieved as a purely top-down effort as employees need to be involved throughout the process. Starting with smaller initiatives, it is worth testing and trialling these and then rolling them out to the organisation. Furthermore, digital transformation needs to go hand in hand with the organisation’s strategy and be enabled by organisational structures, allowing digitalisation to be driven throughout the organisation.

For more information contact
Samantha Joubert, SKF South Africa, +27 11 821 3500, samantha.joubert@skf.com, www.skf.com
Rotork has launched the latest generation of its monitoring and control system for valve actuators and plant equipment. Suitable for use in all industries, the Rotork Master Station is capable of operating up to 240 actuators across three separate field networks, allowing the optimum network to be used in different plant areas. It now supports Modbus RTU protocol with third-party device integration and Pakscan Classic, Rotork’s standard two-wire loop system which has more than 170 000 existing devices installed in networks around the world.

The Rotork Master Station has many features to enable the management of the assets connected to it. Whether the interest is in condition based monitoring or predictive maintenance, it is all possible from a large touch screen interface, while web pages share the same intuitive menu structure focused on providing quick device setup, interrogation and issue resolution. Multiple host connectivity is included and the presence of multiple databases enables maximum data transfer efficiency.

The system can be supplied with built-in redundancy support via a hot standby configuration, allowing a replica unit to assume network control in the event of an error in the primary unit. All network communications are secured with fault tolerance, allowing for plant operation to continue, even if a fault occurs.

Installation is low cost and simple through the use of a single twisted pair cable. The wired control loops can operate on lengths up to 20 km without external repeaters, further reducing labour, installation and commissioning costs. The Rotork Master Station is available with either 19 inch rack or panel mounting options and all wiring is easily accessible from the front panels.

All Rotork and third-party actuation products are supported while the new master station can replace existing Pakscan IIE and P3 systems without the need for additional changes to network or devices, allowing it to be easily integrated into installations.

Rotork provides service and commissioning support from all its global offices as well as online documentation that will assist commissioning, service and maintenance teams. Training is also available for customers, both in-house and onsite.

For more information contact Liam Jones, Rotork, +44 122 573 3606, liam.jones@rotork.com, www.rotork.com
RS Components has announced availability of the Fluke 710 mA Loop Valve Tester, which is an easy-to-use tool that greatly simplifies the testing of control valves, enabling the quick measurement of critical valve readings using a simple two-wire connection.

Traditionally, complex equipment has been used for control valve testing, but use of these complicated devices has meant extensive training for users, as well as removal of the control valve under test, and potentially one or two hours of bench testing. However, the Fluke 710 offers built-in test procedures and a highly intuitive interface including valve status indicators.

Importantly, the device provides quick checks of control valves while they are in place in a system. It sources the 4-20 mA current loop signal and causes the smart control valve to move, while simultaneously interrogating the HART communication protocol data to collect critical diagnostic information about the valve’s position and status. Therefore, the tester enables technicians to make fast and confident decisions on whether maintenance, and potentially system downtime, is required or not.

The built-in pre-configured valve-test routines offered by the Fluke 710 include: manually changing the mA signal and viewing the HART position and pressure variable information; full range ramping of the signal while recording the position or applied pressures, in terms of percentage, from 0 to 100%; evaluating the valve’s response to changes in the mA input; speed tests to determine how fast the valve can open or close; and bump and partial stroke tests to test valves over a portion of their range.

Measurements and other test results are recorded and stored in the Fluke 710’s memory, where they can be uploaded to the Fluke ValveTrack analysis software, which is included with the tester. This enables technicians to plot logged valve tests taken in the field, as well as the ability to compare previous uploaded tests to recent tests.

For more information contact
RS Components SA, +27 11 691 9300,
sales.za@rs-components.com,
www.rsonline.co.za
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Feel and understanding, or lack thereof.

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

I was present at a very interesting discussion the other day with people who are leaders in the automation and control industry. The subject was how jobs would disappear over the next decade or two as automation and robotics progress, and what type of work and professions would be relevant for the younger people coming into the field. The discussion shifted slightly to consider current training methods, particularly of young engineers and technicians.

A feel for the numbers is important
One of the persons present, a very senior manager in a company that produces specialised parts for aviation, expressed a deep concern that youngsters are far too reliant on computers and other devices, particularly where arithmetic calculation is concerned, and they do not have a 'feel' for numbers and values, which can lead to terrible errors. He said they just don't think about basic things that were 'instilled' in previous generations of engineers due to their education. He pointed out as an example how important it is for an engineer doing design calculations to have an innate feeling about the decimal point being in the correct position, to prevent errors of a magnitude or more from occurring.

Mostly, I agree with his thinking. When I present my courses the following two things always come up:
1. Delegates have to calculate the process gain of a certain integrating process, based on a step change in the controller output away from the balance point. In the calculations it becomes necessary to divide a certain value by 10. Invariably at least 95% or more of all the younger delegates use a calculator for this. This indicates to me that they do not have a feel for numbers and values.
2. On many loop optimisation calculations it is not necessary to use very accurate figures. For example, when looking at things like process gains of self-regulating processes, which gives one a rough but useful idea of the correctness of the valve sizing and span of the transmitter, and when measuring and calculating valve hysteresis, you really only need to work with one decimal point. However, the graphical measuring device on the recordings in the software I use in the course gives answers with an accuracy of four or five decimal places. I always tell delegates to round off the readings to one decimal place when they write the measured values down on their calculation sheet. However, they seldom seem capable of doing this and insist on using all the decimal places in the calculations. Once again this tells me that they do not really have a feel for numbers.

Another excellent example of this lack of feel and practical understanding of numbers is the number of decimal points that are often shown on digital displays on operators' screens, particularly on scada displays. My favourite example here is the mass of feed of ore to a mill on a conveyor belt on a gold mine. The belt weigher used was a mechanical one. Typically, it is accepted that such devices will give a reading with an accuracy of between 0.5-3% of full scale, which in this case was 600 tonnes. Basically this means that at best the reading would be accurate to ±3 tonnes. The person who had implemented the displays on the scada had used a standard digital display block in the software, which gave 8 digits. He had put a decimal point after the third most significant digit, so that at full scale the display read 600.00000! Some of the less should we say 'perspective' metallurgists and instrument practitioners, believe the figure displayed as true accuracy. “Hell, it’s a computer. It can’t be wrong.”

A practical consequence of this is that because the process signals from belt weighers are extremely noisy, with noise amplitudes typically 8-10%, it becomes impossible to read the display as the figure is jumping around the whole time. To overcome this problem, the instrument technicians on site had inserted an enormous lag filter with a time constant of close on two minutes. This of course allowed a lovely steady display, but gave erroneous readings, particularly when integrated to give total feed.

Basically these examples illustrate the lack of basic understanding that was referred to earlier.

The art of tuning PID controllers
Another point, raised by a senior manager of a company that writes control software, was that very few instrument and control practitioners working in plants these days have any real idea and feel on how to tune PID controllers, and this doesn't really matter too much as most modern controller software contains self-tuning algorithms. Therefore, is it only really necessary to call in an optimisation expert if they encounter a serious problem?

Unfortunately, this is most often the attitude of plant managers. I have been trying to change this thinking for the whole of my professional life in loop optimisation, and have written many articles on this in the past. This list summarises the most important points:
1. Feedback control is probably one of the least understood subjects in the engineering world.
2. At least 85% of control loops in industrial control systems worldwide are operating inefficiently in automatic.
3. Approximately 50% of all control loops have some problem in them, of which the plant people are generally unaware.
4. The biggest fallacy in plants is the popularly held idea that tuning will solve all problems.
In fact tuning is the very last thing that should be done after first analysing the control loop, finding all the problems, understanding the process dynamics, and then applying the best tuning to fit the control requirements.

5. Most control courses deal with the mathematical and theoretical aspects of control (which are very complex), and deal very little with practicalities, which few lecturers are really aware of themselves, as many of them have had little plant experience.

6. When it comes to the actual tuning, very few software packages work well. Most are based on imprecise models of the dynamics, and as a result, give tuning that is most often far from ideal.

In most cases, it is difficult to present financial evidence of what improved controls can do to the bottom line. Most plants have been running the same way for years, and senior managers have very little interest in trying to improve the controls. I have seen a few cases where plants having properly optimised the controls, and scientifically measured the benefits, have improved their return on assets significantly.

Can you see what’s wrong?

Further to my previous article, where I suggested you test your analytical capabilities, I have included a couple of figures showing an open and a closed loop test on a level loop working at pretty much normal load. The loop is actually working very well. (Figure 1 is the closed loop test and Figure 2 the open loop one.) However, there is something that is not really good in the loop, which could cause problems. This can be seen clearly seen in both the tests.

As I do not have much space left, I will give the answer in the next article, scheduled to be published in the July issue.
Turck has expanded its extensive IO-Link portfolio with new Class A and Class B I/O hubs with protection to IP67, and HF RFID read/write heads with threaded barrel design. Thanks to SIDI, the Simple IO-Link Device Integration, the new devices can be configured directly from the Profinet engineering system without the need for additional tools.

The slim-line 32 mm Class A I/O hubs of the TBIL-S series enable eight digital signals to be connected to an IO-Link master. The hubs thus reduce the wiring required for the final meters in machines and plants. Besides the TBIL-S3 with eight M8 sockets, Turck also offers the TBIL-S4 variant in the same ultra-compact design with eight universal I/Os on four M12 ports.

The I/O hubs of the TBIL-M series offer eight M12 sockets for sensors and actuators. They comply with the Class B IO-Link specification, which offers additional passive safety: Users can safely disconnect actuators connected to Class B devices by disconnecting the power supply, while communication with the I/O hub, as well as the function of the other sensors are retained, thus allowing the creation of cost-effective safety applications. All I/O hubs can operate in the extended temperature range from -40 to 70°C.

The cylindrical TN-M18 and TN-M30 HF RFID readers also come with an onboard IO-Link interface. The read/write heads with protection to IP67 are provided with a metal housing with an M18 or M30 male thread as well as an M12 connector. The RFID readers are optimally designed for use in the production controllers of assembly lines and can be assigned parameters easily thanks to IO-Link. When combined with Turck's TBEN-L IO-Link master, the SIO function of the read/write heads can be used in tasks, such as for reading tags or comparing defined data ranges as a switching signal.

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

Jumo has begun a new era of automation with the variTRON 500 central processing unit (CPU). In terms of technical possibilities, the system falls in the top class of embedded systems and proves itself with high speed performance and flexible operating philosophy.

Completely new hardware and software platforms have been used. During development, scalability was given the highest priority and the result is modular, flexible and above all, sustainable. The base of this CPU is a hardware platform with an 800 MHz processor that can be used as a single, dual or quad core variant, depending on the application.

The software has a modular structure based on a Linux platform, and enables excellent scalability for performance, memory and interfaces. Another notable feature is the customer-specific configuration and process data editor.

Several operator stations can be integrated into the system via Codesys TargetVisu or Codesys WebVisu, as well as up to 64 intelligent connection modules.

In the future, Jumo will provide visualisation libraries for individual customer-specific operation via CodesysS systems. Flexibility is also made possible by the integration of all important fieldbus systems such as Modbus RTU or TCP master and slave, Profinet IO controller, EtherCAT master, and OPC UA server. A Profinet IO device interface allows alternative connection to higher-level control systems via Modbus TCP.

For more information contact Anastas Schnippenkotter, ASSTech Process Electronics & Instrumentation, +27 11 708 9200, info@asstech.co.za, www.asstech.co.za
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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, for example, if 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 and at low per-channel costs.

**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 kps.
- 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 is increasingly 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.

**For more information contact**
Michelle Murphy, Beckhoff Automation, +27 11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za
Programmable HMI with PLC

The new generation of the TX700 HMI/PLC series can control and visualise even more complex processes and applications than before. Thanks to several interfaces and an integrated OPC UA server, this device generation is well set for the future of automation. Particularly, it enables customers looking for a versatile controller suitable for use in different applications to keep their stock at manageable levels. Users requiring simple display devices without a control function will also find a solution in the series.

TX207
A combination of the high-quality plastic housing of the TX100 series and the new powerful hardware platform of the premium HMI/PLC devices of the TX700 series, the resistive touch screen of the device is 7” diagonal. The TX207 has two RS-232 and two RS-485, as well as two CAN interfaces. In addition, two USB ports are available. Programming is done with Codesys3.5 SP12. Two options are available for creating the visualisation. On the one hand the Codesys TargetVisu can be used, and on the other, the visualisation editor TX VisuPro. It has sufficient memory and computing power and the operating system is real-time Linux, instead of Windows Embedded.

TX100
This product line includes three new devices with 4”, 7” and 10” screen diagonals and a resistive touch. The display has an Ethernet interface, a serial interface (RS-232, RS-422 or RS-485) and a USB port. The TX100 devices are pure HMIs without control function. The graphical user interface is therefore not created with Codesys, but exclusively with the visualisation editor, TX VisuPro is a modern software package for the development of user-friendly graphical user interfaces. It supports various drivers, which also allow communication with controllers such as Siemens, Beckhoff, Rockwell, Schneider and many other systems.

PC-based control optimises logistics applications

Open PC and EtherCAT-based control technology is ideally suited for optimising logistics processes and responding to changing market trends. With open interfaces, modularity and scalable performance, it is the perfect fit for intralogistics solutions that are custom-tailored to individual requirements, while delivering technological and economic competitive advantages at the same time. Components for system-integrated connection to the cloud make it easier to implement IoT and Industrie 4.0 concepts in smart warehouses.

Due to its openness, PC-based control technology from Beckhoff fulfills the requirements for end-to-end networking of intralogistics, production and distribution – all key challenges in the sector. PC-based control is based on a comprehensive portfolio of advanced industrial PCs, TwinCAT automation software, EtherCAT as a fast communication system, decentralised I/O components and highly dynamic drive solutions. Integrated, cost-effective and flexible system planning is assured by the performance-driven scalability of the control platform, the flexible support for different fieldbus systems and the same programming and configuration software across all performance classes.

The TwinCAT automation software suite bundles all necessary machine functionalities: from PLC to motion control, robotics, HMI, safety and measurement technology through to integration of vision systems and cloud solutions. Open interfaces allow effortless integration of control functions into existing system and database structures. With support for standardised protocols, such as OPC UA, Beckhoff provides the prerequisites for implementing secure cloud communication in the smart warehouse. Users also benefit from the openness of the control architecture through the unrestricted choice of a cloud solution. All systems concerned – I/O to warehouse management and eCommerce – can be fully connected.

For more information contact Michelle Murphy, Beckhoff Automation, +27 11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za
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Aveng Automation & Control Solutions has its Head Office in Johannesburg, and other offices throughout the country in Port Elizabeth, Durban, Cape Town, Secunda, Sasolburg and also in DRC, Zambia & Mozambique.

The company supplies and supports field devices and systems, helping businesses automate their production, processing and distribution in Oil & Gas, Refining, Mining, Minerals and Metals, Synfuels, Chemical Processing, as well as Pulp and Paper, Power Generation, Food and Beverage and other Industries. Engineers at Aveng Automation & Control Solutions are qualified, trained and have solid plant experience and understand the needs of the industry.

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Complete Process Control Solutions and Services Provider
SEW-Eurodrive is assisting the bakery industry to improve efficiency and reduce energy consumption by means of its Movigear mechatronic drive system. The company has enjoyed a longstanding relationship with Dale Spiral Systems & Bakery Automation of Johannesburg. The main advantage of Movigear is that the combination of servo motor, gear unit and electronics are combined in a single system that is highly reliable and hygienically designed. “Apart from reducing start-up costs, it also plays a vital role in cutting total operating expenses in an industry where pricing is the main factor,” comments Adam Sweeting, operations director, Dale Spiral Systems & Bakery Automation.

The company was established in 1998 by Chris and Jill Dale, who sought to transfer their considerable expertise in bread conditioning and cooling to South Africa. Twenty years later, the company is an acknowledged global leader in its field, holding a number of patents, and continually developing new equipment and systems in response to client requirements.

Extending the shelf life of bread
Conditioning or cooling extends the shelf life of bread significantly, as well as limiting the weight loss during the process, with much less handling required than traditional systems. The OEM has evolved from supplying conveyor systems only to a turnkey solutions approach that encompasses all ancillary equipment, from ovens to provers, spirals, conveyors, mixers and robotics.

“We have taken 20-year-old machines and reconditioned them to an ‘as new’ condition,” explains Sweeting. “Our extensive experience in this regard has allowed us to develop our own equipment that improves on existing systems, under trademarks such as Bakermation, Coolermation, and Mixermation.”

The company initially approached SEW-Eurodrive to supply drives for its conveyor products. Teething problems with suppliers eventually resulted in Dale standardising on the German drives due to their reliability, range of power options, and ability to maintain a constant torque rating.

The drive to promote Movigear in the bakery industry will allow Dale to increase its market penetration by focusing on refurbishing existing systems, many of which are outdated, and hence not equipped with the latest energy-saving and monitoring equipment. “While the initial capital outlay is perceived as the main stumbling block for such a conversion, we educate customers as to the long-term benefits and the impact on total cost of ownership and return on investment,” stresses SEW-Eurodrive sales representative, Nick McKey.

Energy intensive industries such as bakeries and food and beverage plants are increasingly looking to reduce their energy consumption, which is where the one-fit Movigear system has a role to play. Features include high overall efficiency, from the motor to the gear unit and electronics, an optimised interface between the motor and gear unit, highly efficient gearing, smart control methods, IE4 (super premium efficiency) compliance, and a compact design with optimised housing. Another major benefit is that any future automation that may be required can be integrated seamlessly, while additional options such as trouble shooting and problem solving can also be accommodated. Bakeries often have limited space, which means that the reduction in cabling and smaller cabinets required also add to the value proposition.

“There are proactive clients in the bakery industry who are keen to move forward through technology such as Movigear, which gives them an advantage in this highly competitive industry,” comments McKey. “Another advantage for customers is the aftermarket support and technical backup we offer.”

The strong relationship between the two companies is testament to how SEW-Eurodrive focuses on the specific requirements of a particular industry, concentrating on the best products for a turnkey solution that is modular and adaptable to future needs.

Commenting on the current state of the bread industry, Sweeting concludes that while there has been a lull in projects such as new production lines and facilities, there is a definite opportunity for sustained growth in the southern African region for upgrades to ageing mechatronics technology and automation systems.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
Cybersecurity certification for Emerson’s DeltaV

Emerson has received the industry’s first ISA Security Compliance Institute (ISCI) Secure System Security Assurance (SSA) Level 1 certification for cybersecurity. This certification, for the company’s newest DeltaV distributed control system, is the latest step in Emerson’s commitment to help provide secure digital transformation solutions for customers.

The certification, issued by industry consortium ISA Security Compliance Institute (ISCI), independently certifies that Emerson’s DeltaV distributed control and safety systems are robust against network and system attacks. DeltaV, an advanced automation system that simplifies operational complexity and lowers project risk, provides smart control capabilities for key industries in oil and gas operations, refineries, chemical plants, power and life science facilities.

“The world’s leading industrial manufacturers are leveraging transformative digital technologies and methods to improve production reliability, safety and overall performance, while focusing intensely on cybersecurity,” said Peter Zornio, chief technology officer for Emerson’s Automation Solutions business. “We are committed to helping our customers securely optimise their operations across the globe in an environment of increasing cyber threats.”

The ISA cybersecurity certification is designed to help the industry navigate the ever-changing digital landscape and recognise products with enhanced cybersecurity measures. ISA Secure SSA Level 1 certification covers the most critical standards of the automation industry’s leading family of standards, ANSI/ISA 62443 (IEC 62443). “ISA developed the ISA Secure cybersecurity certification to give asset owners confidence in their industrial control systems, and to promote supplier best practices which protect automation systems and the operations they control,” said Andre Ristaino, managing director of ISCI. “Emerson is taking a leading role that we hope other vendors will follow in further protecting personnel and processes alike from today’s increasing security threats.”

For more information contact Rob Smith, Emerson Automation Solutions, +27 11 451 3700, rob.smith@emerson.com, www.emerson.com

Zest WEG Group is able to offer a range of standard off-the-shelf products as well as end-to-end energy solutions by leveraging best practice engineering and manufacturing capabilities.

All products are engineered to facilitate a safe and reliable environment with operational stability and the highest possible production levels as an objective. Reduced maintenance and ease of serviceability assist in lowering the total cost of ownership.
Siemens extends drive system functionality

Siemens now offers new features in the firmware and hardware for the Sinamics S120 drive system. Operation is made easier in firmware V5.2 through the integration of the web server, which has a new, responsive design that reacts via standard web browsers regardless of the end device used (notebook, PC, tablet or smartphone).

For commissioning typical diagnostics and maintenance functions or servicing, no special tools are required. The web pages are available in six standard languages and feature error indicators and warning messages including meaningful help texts and suggestions for possible solutions. Users can intuitively create, manage and delete parameter lists – even across axes – and can perform firmware updates and system restores with the old firmware version. Backups of parameter settings can be stored on the web server and browser, and reloaded to the Sinamics converter using the Restore function. In order to test functions that are subject to license, it is possible to activate a temporary trial mode. In addition, a complete overview of all functions that are subject to license is clearly displayed in the web server.

In terms of hardware, active line modules (ALM) can now be connected in parallel for the Sinamics S120. The new firmware V5.2 provides the user with an extended performance range for book-size versions. The parallel connection also results in increased rated power without an additional chassis unit or an external power connection. The power can therefore be increased and voltage peaks are overcome. In addition, energy exchange is possible in the DC link. The new features are available for 55, 80 and 120 kW ALMs and can also be used in external smart mode.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za

SEW-Eurodrive helps French Spiderman

Specialist rigging company, Film Riggers, was recently called upon to ensure the safety of Alain Robert, aka the French Spiderman, while he scaled a skyscraper in central Johannesburg to create an advertisement for an international tyre manufacturer.

Film Riggers, a long-time user of automation and mechatronics technology from SEW-Eurodrive, was approached by a production company to execute logistics and safety during filming for the advertisement.

The idea was to have Robert climb the building while it was raining, as a metaphor for the extra grip provided by the tyres on display.

Partner Graham Terrell, who established Film Riggers with Alard Hüfner in 2012, explains that Robert had two ropes attached to a harness, controlled by SEW-Eurodrive drives using a custom program based on torque control to belay the climber.

The winches devised by Film Riggers use the Movidrive inverter, including the IPOSplus integrated positioning and sequence control system. The drive inverters have a wide power range, large overload capacity, and a modular design. In addition, they facilitate unrestricted application of AC drives, featuring the most modern digital inverter technology, according to Maxolution Engineer. Dylan Enslin.

For this particular project, Film Riggers used CM112 synchronous servomotors. Two 11 kW drives were used to secure the climber, and a 30 kW drive for the accompanying camera system.

Terrell was given access to the OEM’s electronics workshop to configure a miniature setup of the system, based on a 0,55 kW Movidrive drive inverter. This allowed for more controlled and refined testing, allowing Terrell to ultimately scale up the solution to the specific requirements of the project.

Commenting on the challenges, Hüfner says that Film Riggers had the dual responsibility of winching the camera platform up and down, in addition to securing Robert and ensuring his safety during filming.

“The idea was for the camera to be seen to be almost in pursuit of him, then tilting as it went past and tracking him,” elaborates Terrell. “Due to changes made at the last minute, we had to adjust the programming in order to cater for the new reference points needed for the rigging.”

“While this is a unique application of the Movidrive inverter technology, it is an excellent example of the flexibility and innovation of SEW-Eurodrive in responding to specific customer requirements and offering tailor-made solutions capable of adapting to the latest developments,” concludes Enslin.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
RS Components has announced the availability of two motor-drive analysers from test and measurement maker Fluke, which help to locate and troubleshoot typical problems on inverter type motor-drive systems.

The MDA-510 and MDA-550 help engineers save time by enabling the quick set-up of complex measurements, and the simplification of the troubleshooting process via guided tests and automated drive measurements. Users of these instruments can simply select a test, and then step-by-step guided measurements show users where to make voltage and current connections. Pre-set measurement profiles ensure the capture of data for each critical motor-drive section, including from input to output, on the DC bus, and the motor itself.

The MDA-510 guides users through this process of making measurements from the power inputs to the motor outputs of the drive, and offers specific information about different measurements and how to connect them, along with diagrams showing the connections. The MDA-550 adds to these capabilities by enabling the measurement of harmonics around the fundamental frequency as well as in the higher range from 9 kHz to 150 kHz. It also includes shaft voltage measurement, probes and probe holders.

Offering four input channels for voltage and current signals, features include measurement of key motor-drive parameters including voltage, current, DC bus voltage level, AC ripple, voltage and current unbalance, and voltage modulation; as well as measurement of additional electrical parameters via a full 500 MHz bandwidth oscilloscope. Other features include quick and easy report creation, and USB A and USB mini-B connectivity.

For more information contact RS Components SA, +27 11 691 9300, sales.za@rs-components.com, www.rsonline.co.za
The role of maintenance-free couplings in the sugar industry

BMG works closely with engineers in the sugar industry, providing engineering solutions and technical services to enhance production efficiencies at every mill and refinery.

“BMG’s specialist services to the sugar sector include bearing and gearbox inspection, bearing and chain refurbishment, large size bearing assembly, alignment and balancing, as well as customised product design,” says Carlo Beukes, business unit manager, Power Transmission. “Our team of mobile technicians conducts breakdown and routine maintenance on site. It carries out troubleshooting at sugar mills and advises on possible productivity improvements to ensure the highest level of plant output and reliability.

“We launch new products and advanced systems to meet industry requirements that are constantly evolving. Important power transmission components for sugar mills and refineries include maintenance-free, heavy-duty engineering couplings – Timken Quick-Flex (QF) and Vulkan GBN heavy industrial couplings – designed for efficient performance, low maintenance and extended service life in harsh operating conditions. These components extend from light-duty, high-speed/low torque drives, to heavy-duty, low-speed/high torque variants.

“The overall features and benefits of these two couplings are similar, with one major difference – the QF coupling is ideal for shaft sizes up to 232 mm, while the GBN series accommodates bigger shaft sizes up to 600 mm. Through BMG's assistance with accurate product selection, substantial savings can be made in reduced maintenance costs and minimal downtime.”

The primary purpose of a coupling is to transmit torque from a driving shaft to a driven shaft, and to accommodate shaft misalignment within the drive. Couplings also dampen vibration, torque fluctuations and torsional shock loads, even in arduous applications.

**Timken Quick-Flex**

Timken Quick-Flex couplings consist of two steel coupling hubs, which are attached to the drive and driven shaft. A urethane element wraps around the two hubs and provides a simple, yet effective, drive mechanism. The only spare part required, is a standby element that can be quickly changed when necessary.

Inserts, which are resistant to chemicals, are manufactured from different grades of urethane to suit various industries. The red insert is suitable for most high-speed applications with high levels of vibration, the stiffer blue insert is designed for higher torque applications and the black insert can withstand extremely high torque requirements, replacing grid and gear couplings.

An advantage of these flexible couplings over conventional units is direct replacement with virtually all comparable sized couplings. Quick-Flex couplings require no lubrication and are also easy to install and maintain. Due to the high torque capacity of this range, the selected QF solution is often smaller than the replaced coupling. This leads to a major weight-saving on the drive and also reduces stress on other components.

Once the two coupling hubs, insert and cover have been installed and aligned for the first time, the coupling hubs do not need to be moved again for the life of the equipment. Unlike standard jaw-type or gear couplings, there is no metal-to-metal contact between the hubs. This prevents any possible damage to the ironware during an element failure. The urethane insert can be easily changed, without moving the hubs or shafts and no re-alignment of components is necessary.

**Vulkan Flexomax**

The Vulkan Flexomax GBN maintenance-free couplings are suitable for applications that include low speed shafts of machinery driven by electric motors. For example, sugar mills, conveyor belts and tippers, as well as all machinery with high loads. These compact couplings allow for compensating axial, radial and angular misalignments and also protect the drivetrain from shock loads.

This range has a modular design that enables the integration of brake discs, pulleys, shear devices and spacer shafts within the coupling. Radial removability of the coupling elements is possible, without having to move the connected machinery. No lubrication is required during assembly or disassembly. Couplings are available in 16 sizes with nine designs and have customisable options to meet specific application requirements.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
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www.ghm-sa.co.za
Safety on the pistes

Inauen Schätti, a construction company whose areas of specialism include ropeways, is working to improve piste safety for skiers. As part of a pilot test project on the Parpaner Rothorn mountain, the company installed an avalanche mast for the selective remote-controlled detonation of charges above the snow pack. Triggering controlled avalanches protects winter sports enthusiasts and walkers from potentially hazardous snow build-up. Ensuring failsafe operation of the detonation mechanism is a controller from the Siemens portfolio. The controller is continuously self-monitoring, and operates without problems even under the most inhospitable mountain weather conditions at temperatures as low as -40°C.

Five kilograms of explosive are required for each charge. A standard hand grenade contains just 200 to 300 grams. As this enormous quantity of explosive triggers a detonation creating a pressure wave of up to 4000 metres per second, Inauen Schätti needs absolute assurance that a charge can only be detonated once the relevant command has reached the communication module on the avalanche mast via the cellphone network, as the consequences of any malfunction could be fatal, it was the absolute reliability of the Siemens solution that prompted the company to choose fail-safe components from the Sipplus portfolio for the project.

Failsafe even in sub-zero conditions

High up on the mountain side, a magazine loaded with 32 explosive charges rotates using the same principle as a revolver. The charge slips into the detonating mechanism, the flap opens and the descending explosive device detonates around two to three metres above ground level, triggering the avalanche. Operators working on the computer down in the valley are able to monitor the detonation. To ensure a reliable, trouble-free detonation without any chance of a misfire, the entire process is protected by safety mechanisms: to be precise, the failsafe Sipplus variant of the Simatic ET 200SP CPU controller from Siemens used in combination with the Logo! CMR2020 communication module.

“Obviously, this type of mechanism only guarantees absolute safety if the controller is reliable and fully functional at all times,” emphasises Deputy CEO of Masora, Thomas Tschudin. Masora was responsible for development of the control, communication and power supply systems for the pilot project. The entire technical system is designed to operate at very low temperatures and even works reliably at 100 percent humidity. Moreover, the controller can even be used at altitudes of over 5000 metres.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za

Safety technology to improve flexibility

The new Datalogic concept for robot evolution expects to overtake the competition. Following demanding safety regulations, outdated isolated robotic cells are now replaced with robot-like parts of industrial automation architecture. Datalogic’s safety product range has expanded towards safer more sophisticated devices. The new Laser Sentinel has been introduced, as a complete solution for safe area monitoring. The range includes industrial safety solutions based on light curtains, safety control units and photocells.

Increased safety with fewer components

The introduction of smart sensors, apart from providing additional information, also allows for cost reduction in terms of components and installation time. Datalogic has developed a new safety barrier SG4 fieldbus, using an open safety protocol for connection to the Powerlink network, which also includes a smart version of the muting function. This helps to block the safety barrier while the product is going through, allowing access by an operator. It is also possible to control the direction, speed and height of the products handled. These new barriers are therefore smart sensors which, apart from their basic accident prevention function, allow for connection within an industrial Ethernet network to send data about the product and process, eliminating components which are not integrated within the network and their associated cabling.

AGV contour navigation in shipping/receiving

In loading and unloading areas, Safety Laser Sentinels are used to ensure safe movement of goods. The sentinels are used for collision prevention at the front and back of the AGV. Thanks to the resident position and distance information, SLSs can also be used for vehicle guidance.

Robot cell access protection

Both access points of the robot cell can be protected by the SLS. Each access point controlled by a Laser Sentinel can be programmed with two different zone sets. Each zone can be separately activated by selection of inputs according to working station position or can be left entirely active. The possibility to have two safety areas active at the same time, or even separately, allows users to protect two independent areas with just one device.

For more information contact AC/DC Dynamics, +27 10 202 3300, info@acdc.co.za, www.acdc.co.za
Drone-based gas leak detection

Leaks in gas distribution and transmission pipelines present serious safety risks and result in lost revenue and profits to producers. The ABB Ability mobile gas leak detection system is a digital solution, which, for the first time, enables drone deployment in the identification of gas leakages. The new solution was recently launched at an ABB customer event in Houston to complement the existing range of ABB mobile gas leak detection systems suitable for all facilities.

The new leak detection system benefits from drone deployment to enable faster identification of leaks, requires less man hours to implement and costs less to operate as it covers wide, hard to reach areas. To avoid false readings, it can distinguish between biogenic methane – the source of which is ruminant animals, manure and shallow coal and oil deposits – and thermogenic methane from natural gas.

The solution uses patented cavity-enhanced absorption spectroscopy to detect methane and ethane with a sensitivity more than 1000 times higher than conventional leak detection tools. Particularly robust yet simple, the Off-Axis Integrated Cavity Output Spectroscopy (OA-ICOS) has extreme sensitivity that allows ABB to quickly identify potential methane emissions at a greater distance while flying, which is not possible with other sensors.

ABB’s analysis software automatically processes the collected methane, ethane, GPS and wind data to create a simple, easy to use report in either GIS compatible or PDF formats. These reports can be used to identify areas in the pipeline network that potentially have leaks.

Additionally, software features, such as the ABB Ability cloud storage tools, allow quick and efficient distribution of data and reports to all stakeholders anywhere in the world. Authorised users can view the progress of flights in real time as well as review and act on processed leak reports.

In March 2018, ABB was one of six companies invited by the Environmental Defence Fund (EDF) and Stanford University to represent the drone sector in the controlled testing phase of the Mobile Monitoring Challenge (MMC), a competition to advance mobile methane monitoring technologies at oil and natural gas facilities.

As well as being used for drones, the ABB Ability mobile gas leak detection system is used in urban distribution vehicles and hand-held inspection devices, meaning that all three methods of gas detection can be deployed in conjunction with one another to provide optimal safeguarding of both people and the environment.

For more information contact ABB South Africa, +27 10 202 5000, clayton.duckworth@za.abb.com, www.abb.com/za
The transport of materials is a key activity for most industries. For many of these tasks, conveyor belt systems offer a cost effective and efficient solution. However, with such a system comes a high risk of fire due to heat generated by belt friction and fire risks associated with the material conveyed.

Belt slipping can occur when rollers seize or when a belt gets worn and slack. Slipping causes friction that can quickly generate enough heat to cause the belt to catch fire. There are some materials, coal for example, which have the ability to self-ignite and start smouldering from the associated heat build-up. If the conveyor is not shut down immediately, or the hot spot cooled down before a fire starts, the entire system may be destroyed, or the fire conveyed from one area to the next, spreading throughout the plant. Once a fire has started on a conveyor belt, it is often very difficult to extinguish. This may be due to the flammability of the product conveyed or the properties of the belt itself.

IR protection systems
Over the past decade, there has been a shift towards a combined approach of fire detection and fire prevention: a heat detection system as early warning and a fire prevention system as a failsafe.

The conventional ways of measuring temperature with contact probes like thermocouples and RTDs/PT100s is not suitable to this type of application. The problems of drag, friction and static generation rule out contact measurement. Also, response time is critical on today’s fast moving conveyors as slow response allows hot spots to pass by the detector before an alarm condition can be registered.

The solution is non-contact infrared thermometers, also known as pyrometers, which have a very fast response (measured in milliseconds), and they do not make contact with the surface under measurement. This makes them ideal for conveyor belt monitoring. A pyrometer is installed for each roller bearing with an alarm triggered if the bearing temperature rises above a pre-determined threshold. Actual position and layout of belt sensors will be determined by the design of the conveyor and the type of material conveyed. In essence this would be an overlapping scan across the belt, where, if a hot spot is detected, it can trigger automatic spray of cooling agent or even stop the conveyor.

With many different models of infrared units available in the Raytek and Fluke Process Instruments ranges, it is easy to select the correct unit for an application. The product being transported will determine the temperature range considered safe, the distance from the sensor to the product will determine the optical resolution, and the conveyor speed will fix the response of the instrument required. Environmental conditions like smoke, dust and adverse weather conditions will determine what other accessories are required like IP rating, or air purge collars for the lenses.

On large coal and coke moving conveyors, the Raytek TX and MI3 systems have been used throughout South Africa and the world. These large conveyor systems have the detectors integrated into their trip systems and any spike of temperature from a hot spot in the product causes an alarm trigger. To design a system suitable for specific plant conditions, R&C Instrumentation is available to consult on its fixed automation systems or portable infrared temperature measuring products.

For more information contact
R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za
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- In-Built Data Logging of Process Values, Alarms and Critical Parameters.
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Load sensing by light

SKF’s new optical sensing technology takes monitoring to the next level, providing engineers with new insights into machine performance. SKF Fibre Optic Sensing uses optical fibres to measure forces, in real time, in difficult environments and without electronics.

The technology provides an instant overview of equipment performance, measuring parameters including load, speed and temperature. This opens up new opportunities for closed-loop control of processes. It also allows engineers to proactively prevent problems early, before they lead to costly shutdowns. These could be unfavourable running conditions, misalignment or wear.

The new SKF system offers many advantages that make it right for real industrial conditions. The technology uses light rather than electricity, which enables safe measurements in hazardous environments. The absence of electronics also means the sensors are safe from electromagnetic fields. The fibres transmit light without disturbances at long distance (kilometres), which enables remote monitoring where wireless technology cannot be used.

Victoria van Camp, SKF chief technical officer comments: “We combined our specialist industrial knowledge with digital expertise from leading partners and customers. The result is a solution that reveals parts of a machine’s performance that were previously in the shadows, using the power of light alone.”

Contact-free optical communication

Optical data transceivers are the appropriate choice for any application where data needs to be transmitted without cables and without interference. The Leuze DDLS 500 data transceiver makes contact-free and wear-free optical communication a simple task.

Especially suitable for applications where mechanical systems are pushed to their limits, this robust optical data transceiver has a patented single hand adjustment process, making it quick and easy to achieve precise alignment of the data light beam. Transmission over longer distances is just as easy, as the unit has an integrated laser alignment aid. Four laser spots on the floor assist in the accurate alignment of the device.

Equipped with Leuze’s availability control, the transceiver offers constant monitoring of the receiving level, which means that in the event of an impending failure the user will be alerted.

The Leuze DDLS 500 supports all common Ethernet protocols including Profinet, EtherNet IP, EtherCat, Ethernet TCP/IP and Ethernet UDP. The device offers real-time optical data transmission at 100 Mbit/s over a distance of up to 120 metres.

Access to technical support and information is via local Leuze distributor, Countapulse Controls. The company offers a comprehensive range of sensing, measurement, counting, switching, monitoring and positioning instrumentation, and supports customers through its technical advisory service hotline which is available 24/7.

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

For more information contact
Samantha Joubert,
SKF South Africa, +27 11 821 3500,
samantha.joubert@skf.com, www.skf.com
Responsive wireless I/O from Omniflex

Radio networks traditionally follow the Master (main station node) and Slave (out station node) methodology for data acquisition. A single master polls for data from one or more slaves, depending on the network size. Polling is inefficient and if the master fails, the network fails.

Omniflex Teleterm M3 Series implements Responsive Wireless with the following advantages:
- All out stations report automatically only when they need to, i.e. change of state or set limits reached.
- Faster more efficient reporting and better control.
- Reduced radio noise.
- Fail over options for redundancy.
- Bi-directional signals.
- Repeating capability for longer range.

Teleterm M3 Series uses licence-free radio bands and is suitable for up to 15 km range. Connect directly to scada or DCS via Ethernet. The system is ideal for short hop radio links such as:
- Reservoir monitoring.
- Tank gauge monitoring.
- Remote pump control.
- Dam levels.
- Plant utility reporting (water, air, gas, steam, electricity).
- Plant condition monitoring.

Each wireless node allows any mix of 12 configurable I/O: digital input; digital output; analog input; and analog output.

Benefits include:
- Low-cost implementation and cable saving.
- No master station required, so no polling each outstation.
- Peer to peer communication simplifies network design.
- Change of state(digital) trigger or cyclic(analog) for communications.
- The network traffic is kept low so only important data is transmitted.

For more information contact Ian Loudon, Omniflex, +27 31 207 7466, sales@omniflex.com, www.omniflex.com
Parker Hannifin introduces couplings for quick and easy installation

Parker Hannifin now offers quick connection couplings for its NSA series, notable for features including their low weight. NSA couplings are available in nickel-plated brass or stainless steel, while couplings manufactured from anodised aluminium are used in applications such as thermal management—a technology that plays a role in cooling mainframe computers or in aggregates used in mining and in railway and commercial vehicles. These applications require even cooling to prevent equipment from overheating, which can lead to malfunction or failure. In such applications, cooling with water or other liquids is more efficient than regulating temperatures via airflow, and is associated with significantly lower noise emissions, and requires much less installation space.

NSA couplings are designed to provide long service life and lines in thermal management applications and installation requires no additional or special tools. Thanks to the low pressure drop offered by NSA coupling systems, they save energy while also ensuring optimal equipment performance. Their greatly reduced size versus competing technologies allows them to be used in very small areas and restricted spaces, expanding design options for OEMs and installers.

The flat sealing valve design is a common feature across the complete series. This prevents cooling fluid from leaking during coupling and uncoupling before the start of maintenance work on the electronic components or batteries. In addition, quick coupling and uncoupling significantly reduces maintenance work. All NSA couplings are designed to provide long service life and also exhibit resistance to vibration and rotational movements—an important requirement for applications in the transportation and other sectors. A wide range of available sizes comprising 3, 6, 9, 12 and 19 mm couplings enables the selection for a specific cooling circuit application to be optimised.

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

Powerful electronic deadweight testers

Comtest now offers the latest Fluke E-DWT-H electronic deadweight tester, an electronic calibrator designed to deliver traditional hydraulic deadweight tester performance with digital measurement features and convenience. Improvements include:

- No weights to load and unload, transport, or send for calibration.
- Provides real-time pressure indication with no need to know and correct for local gravity or ambient temperature.
- No piston-cylinder changes.
- No significant sensitivity to level or vibration.
- Able to set and read any pressure value exactly, no minimum increment limited by smallest available masses; perfect for applications that require setting a nominal pressure precisely on the device under test and measuring it, such as analog gauge calibration.
- Operates in any unit of measure, switching easily from one unit to the next.

The E-DWT-H is at home in metrology and calibration labs, on the production floor or in the field. It can operate with a wide selection of test mediums, including Sebacate calibration fluid, mineral oil, water and other liquids. The 0.02% of reading total one-year measurement uncertainty rivals the best laboratory deadweight testers. High quality hardware allows easy system fill and prime, pressure generation and precise control up to 200 Mpa. The kits are compact, lightweight and transportable, and lines in thermal management applications and installation requires no additional or special tools. Thanks to the low pressure drop offered by NSA coupling systems, they save energy while also ensuring optimal equipment performance. Their greatly reduced size versus competing technologies allows them to be used in very small areas and restricted spaces, expanding design options for OEMs and installers.

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

Miniature multi-turn encoder

Modern industrial applications demand innovative designs featuring high performance, precise information and smaller component footprints. To this end, Instrotech now offers the Scancon miniature absolute multi-turn encoder with SSI interface. Based on new advanced electronics and mechanics, this high quality encoder represents the first step into a new world of automation possibilities.

Scancon designed this encoder to provide a compact, high-performance solution for motion control applications. It provides a 24 mm diameter size with multi-turn SSI capability. Other features include:

- Single or multi-turn versions.
- Hollow blind end or shaft diameter 3-6.35mm.
- Pre-set of zero position.
- Choice of counting direction.
- Enclosure rating IP64 to IP67.
- Cable or connector version.

Potential applications include automated machinery, pitch and yaw control, small AC motor feedback, wind turbines, packaging machines, robotics, ROVs and AGVs, solar trackers and automated doors.

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