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Control cabinets play a vital role in industrial applications. To ensure uptime, system integrators should consider several factors when choosing devices for the control cabinet. Drawing from its 30 years of experience, Moxa has identified four key considerations for choosing the best devices for mission-critical applications. See this month’s cover story on page 22 for more.
Emerson unveils its digital nexus at Nashville Exchange

Lal Karsanbhai, executive president Emerson Automation Solutions, launched this year’s American User Group Exchange with an announcement that positioned Industry 4.0 front and centre in the company’s formidable portfolio of industrial automation solutions. During his opening keynote, I, along with 2700 other delegates gathered at Nashville’s Opryland Resort and Conference Centre, heard the news of Emerson’s recently formed Digital Transformation business, spearheaded by the group’s Stuart Harris who led Emerson’s own internal digital transformation programme. The rationale behind the new $650 million division is to extend the reach of Operational Certainty, Emerson’s pragmatic approach to lead plant owners to maximum operational efficiency achieved over the lifespan of their facilities. As Karsanbhai explained, the new Digital Transformation business is focused on guiding customers towards a strategy that will elevate them to a top 25% performance ranking in their particular industry. Harris expanded on this during a subsequent media briefing where he outlined how automation alone is no longer enough to bring about a step change in operational efficiency. What’s required in addition is a refinement of organisational thinking and workflow, underpinned by the digital technologies of the fourth industrial age. Harris described it as the vision to provide customers with an opportunity to achieve top quartile operating performance that extends beyond pure process control to include reliability, safety and energy efficiency. The new offering is perfectly timed given that many companies are presently struggling to scale their digital pilot projects into enterprise-wide benefits. In essence, what Emerson has done is leverage its Plantweb Digital Ecosystem through an advanced portfolio of predictive diagnostics and analytical solutions, plus the addition of some state-of-the-art project management functionality. Combine this with expertise in Operational Certainty consulting and the new business unit is ideally placed to help customers establish a clear vision for digital transformation. The end-game is a performance-enhancement strategy executed and managed holistically across the enterprise through a user-friendly suite of integrated digital transformation solutions.

Operational analytics to the fore
Chief technology officer Peter Zornio set the tone for the technical part of the address by identifying operational analytics as a cornerstone of any digital transformation strategy. “Operational analytics focuses on the single greatest source of value that exists for any industrial manufacturer – the production itself,” he stressed. Emerson splits its portfolio of analytical tools into two categories: those that are principles driven and those that are data driven. The first are rules-based algorithms driven by the physics that make things work, for example, the performance of a heat exchanger. The second leverage the ideas of artificial intelligence (AI) and machine learning (ML) in more sophisticated applications like pattern recognition. When combined, these tools provide the potential to advance overall plant reliability and efficiency to levels that were simply unattainable before. While the ideas seem simple, Zornio pointed out that there is much confusion in industry about which type of model to apply where. Very few companies have the expertise and resources to scale their digital transformation beyond a pilot project, since scalable benefits accrue only when the right analytical methods are applied to the business problem under consideration. At the lower end of production, principles-driven solutions are often deployed to improve the reliability and performance of assets like valves and pumps, while the processing unit and plant levels are more the domain of data-driven algorithms like AI and ML. My takeaway from Nashville is that digital transformation has transcended the hype of the past to become a hero of the future. The smoke and mirrors have faded to reveal real companies – Celanese and 3M for instance – achieving measurable business benefits based on enterprise-wide decision support provided through the techniques of pervasive sensing and knowledge-driven analytical data processing. It doesn’t happen by accident though; it requires clearly defined business outcomes, a scalable implementation strategy, an investment in people, and perhaps most importantly, the insight of a trusted advisor. This then is the niche of Emerson’s new Digital Transformation division, and the reason Karsanbhai predicts it will grow into a $1 billion operation in the not too distant future.

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Yokogawa announces acquisition of RAP International

Yokogawa Electric Corporation has announced the signing of an agreement with UK-based RAP International for Yokogawa to acquire all shares of the company and make RAP a wholly-owned subsidiary. RAP specialises in providing digitised solutions that support risk assessment, management of the permit to work (PtW) process, and governance of control of work (CoW) for all plant maintenance activities.

Since 1994, RAP has been developing and implementing software solutions with integrated practices that let customers digitise their CoW processes. RAPnet, its flagship product, is an electronic CoW system for automating maintenance processes that is built around a knowledge base incorporating decades of accumulated first-hand knowledge and experience. The digitised off-the-shelf solution includes standard modules for safety risk assessments, PtW management, management of change, interlocks and overrides, and isolation management. With support for 25 languages, it has been implemented at over 150 locations in 30 countries in the oil, gas, chemical, utilities and steel sectors.

Kenya launches Africa’s largest wind farm

Kenya has launched Africa’s largest wind farm project in a bid to boost the country’s power generation capacity and reach its goal of 100 percent renewable energy generation by 2030. Set to contribute 310 MW to the national grid, the $680 million privately-funded Lake Turkana Wind Power project will increase the country’s power supply by approximately 13 percent.

With an energy mix that consists of 85 percent renewables, Kenya is considered one of the world’s leading countries in the development and implementation of clean energy. Installed capacity increased from 1768 MW in March 2013 to 2712 MW in 2019 through renewable energy projects including the Garissa solar power and Ngong wind power plants. Further, in the last eight months, the country has saved over KES 8 billion ($77 million) as a result of a decreased reliance on diesel-generated thermal power.

Emerson acquires Spence and Nicholson steam technology product lines

Emerson has announced the acquisition of the Spence and Nicholson product lines from Circor International. The acquisition complements Emerson’s broad portfolio of steam system solutions for process industries and commercial buildings.

The Spence and Nicholson lines are established industry-leading products that include steam regulators, control valves, safety relief valves, temperature regulators, steam traps and other steam accessories and solutions.

“This addition to our Final Control business demonstrates the continued value of bolt-on acquisitions that fill strategic gaps in our portfolio and diversify our product offerings in growth markets,” said Lal Karsanbhai, executive president of Emerson’s Automation Solutions business. “By adding Circor’s premium steam technologies and profitable product lines, we will strengthen our position to help customers optimise their operations and enhance energy efficiencies.”

The acquisition closed on August 30, 2019.
Beckhoff Automation recently partnered with VEGA to present another highly successful series of breakfast seminars at venues across the country, with the theme Process 4.0. Beckhoff managing director, Kenneth McPherson set the tone by telling the story of Beckhoff – a family-owned garage success story that has grown into a leading automation company. He highlighted the four core values that underpin the company’s philosophy: people, focus on new talent, loyal relationships and a culture of innovation.

“Beckhoff is very focused,” he said. “We are the industrial PC (controller) company, the I/O company, the motion company and the automation (software) company.”

Frikkie Streicher, managing director of VEGA, added that VEGA, also a family-owned company, has similar ideals and morals, in particular with respect to the safety of its people and the environment. “The synergy between us works so well, Beckhoff has the control systems and we have the field instrumentation. Together we can create a complete automation system,” he said.

This was followed by Beckhoff product and business manager Benjamin Bruns, who talked about Beckhoff’s open PC-based control technology for the process industry. He covered major trends in the world of automation and Beckhoff’s contribution; the critical issue of safety and explosion protection; artificial intelligence (AI) and machine learning; predictive maintenance; and a range of interesting applications. He said that modular automation is the most important upcoming trend for the factory of the future as applications become more specialised and more targeted.

Beckhoff’s functional safety solutions combined with explosion protection include intrinsically safe I/Os and Ethercat terminals, all with fieldbus integration, as well as robust and intuitive explosion-proof control panel solutions. These embrace the concept of Smart Safety, where all angles of process safety are digitalised and fully integrated.

VEGA business and product manager, Mustapha Tayebi then described VEGAs IIoT solution. He explained the technology behind VEGA’s latest range of measurement solutions and the various options for different applications. “With IIoT you have a new infrastructure where every single layer can share the information needed to make decisions,” he said. “VEGA’s IIoT solution is the PLICSCOM display and adjustment module with Bluetooth. This new technology allows connectivity to the cloud with digital communication as the basis.”

He showed how customers can enhance their experience by connecting to the myVEGA portal for device selection and configuration.

Left to right: Mustapha Tayebi, Frikkie Streicher, VEGA, Kenneth McPherson and Benjamin Bruns, Beckhoff.

“What differentiates VEGA is the support and service we can offer via myVEGA, it takes our service to another level,” he added. “It integrates with all our VEGA products through any device. We can merge information technology and operational technology to create added value for our customers.”

This was followed by a live demonstration by Andrew Reinhold, technical engineering manager at Beckhoff, and Clint Viviers, technical product manager at VEGA, who together showed how data can be collected from the field, processed and pulled through from the cloud to an HMI in order to create actions.

The morning was rounded off with a Q&A session where the experts were able to answer a variety of questions. “Beckhoff with its software platform is positioned for all eventualities. Our two companies can combine our expertise and come up with innovative solutions,” concluded McPherson.

For more information contact Michelle Murphy, Beckhoff Automation, +27 11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za or Leandi Hendrikse, VEGA Controls SA, +27 11 795 3249, leandi.hendrikse@vega.com, www.vega.com
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Emerson deepens commitment to manufacturers’ top quartile performance

As leaders across industries work to realise measurable business improvement in today’s complex technology environment, global engineering and technology company, Emerson, announced it has established a dedicated organisation focused on digital transformation technologies and programs.

The new Digital Transformation business – announced at the annual Emerson Global Users Exchange – brings together critical resources to help manufacturers develop and implement pragmatic digital transformation strategies that deliver industry-leading, or Top Quartile, performance. The $650+ million business combines existing expertise in consulting, project execution, smart sensor technologies, data management and analytics – all part of Emerson’s Plantweb digital ecosystem. The organisation will help customers not only establish a clear vision for digital transformation, but also execute with confidence and realise measurable results at each step of their journey.

“In a space inundated by confusing promises, Emerson helps customers define and execute a practical and successful path to digital transformation,” said Lal Karsanbhai, executive president of Emerson’s Automation Solutions business.

“We are looking for a partner for their digital transformation programmes, and this move positions Emerson to be that credible partner,” Harris said.

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Hydrogenics strengthens Cummins’ fuel cell capabilities

Cummins has announced that it closed on the previously announced acquisition of fuel cell and hydrogen production technologies provider Hydrogenics Corporation.

“We are thrilled to welcome the Hydrogenics employees to the Cummins family,” said Tom Linebarger, chairman and CEO, Cummins. “Hydrogenics is one the world’s premier fuel cell and hydrogen production technologies providers, and their expertise and innovative approach will strengthen Cummins’ fuel cell capabilities. This is another step forward as we continue to invest in a broad range of clean, fuel-efficient, and high-performing products and technologies that deliver value to our customers.”

Cummins began developing its fuel-cell capabilities more than 20 years ago. The acquisition of Hydrogenics accelerates Cummins’ ability to further innovate and scale hydrogen fuel cell technologies across a range of commercial markets. Owning both fuel cell and hydrogen generation from electrolysis capabilities will enable the company to offer a full, differentiated hydrogen solution, from start to finish, integrated seamlessly for customers.

Hydrogenics will report under Cummins’ Electrified Power Business Segment, led by Thad Ewald, VP – Corporate Strategy, and its operations will continue to be headquartered in Mississauga, Canada. Founded in 2018, the Electrified Power business designs and manufactures fully electric and hybrid powertrain systems along with innovative components and subsystems to serve commercial markets as they adopt electrification. To date, the business has introduced complete electrified powertrain solutions in six markets across seven applications and continues to launch market leading products with customers across the world.

For more information contact Deepa Rungasamy, Cummins, +27 11 589 8512, deepa.rungasamy@cummins.com, www.cummins.com
**SEW-Eurodrive passes international audit with flying colours**

The Durban branch of SEW-Eurodrive has passed an internal audit by its German parent with flying colours. This means that not only does it comply with the latest standards such as ISO 9001:2015, but it is also on par with other group companies globally in terms of quality and internal policies and procedures.

The fact that KwaZulu-Natal is home to some of the harshest operating environments in the country, from sawmills and sugar mills to ports and pulp and paper, assures clients that all products supplied adhere to stringent international standards, according to Clive O’Reilly, branch manager for KwaZulu-Natal, who is based in Prospecton, Durban. Not only is it a high-humidity climate, but there is also a lot of salt and dust to contend with, which has a corrosive impact on equipment, especially in the sugar industry. “Therefore we assemble our gearboxes and motors in accordance with a strict specification and assembly process verified by our German parent,” O’Reilly notes.

As a result, the staff are highly motivated due to the fact that the Durban branch passed the audit successfully. It underlines the fact that SEW-Eurodrive is able to offer the best solutions available locally, based on the highest quality products. “It gives our customers peace of mind that they will not incur any downtime due to unplanned breakdowns,” he affirms.

This is supported with a 24/7 service offering, with technicians on standby to attend to any emergencies throughout the province. “We can handle any breakdown situation. We also stock aggressively in-house, which reduces lead times considerably. All of this affirms our high capability, which has now been underscored by the international audit.”

SEW-Eurodrive’s strong standing in the sugar industry in KwaZulu-Natal was recently underscored when it clinched an award for the best exhibit at the 91st congress of the South African Sugar Technologists’ Association (SASTA) from 14 to 16 August at the International Convention Centre in Durban. “It was a very successful event for us, capped off by our award. We found that a lot of engineers in this and other industries are unaware of our turnkey solutions, which poses a huge scope for growth,” O’Reilly notes.

Commenting on the growth opportunities in the sugar industry, O’Reilly reveals that SEW-Eurodrive is already providing detailed assistance with planning for next year’s off-crop season in the sugar industry, a period during which general maintenance and refurbishment traditionally take place.

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

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**Aury Africa establishes technical hub in Mpumalanga coalfields**

Screening and vibrating equipment solutions and services provider, Aury Africa, has established a technical hub in eMalahleni to service the Mpumalanga coalfields. The hub comprises its regional office and showroom at the Smokey Mountain Office Village, in addition to a 720 square metre workshop, storage, and fabrication facility.

Since the establishment of its hub, the company has seen increased interest from coal-mining clients. Managing director, Sydney Parkhouse, elaborates: “Our presence here has proven to be extremely beneficial, as the actual products our customers need in their daily operations are now available on their doorstep. Not only are delivery times reduced significantly, but we are also able to provide 24/7 technical back-up and aftermarket support.”

In addition, Aury Africa is also able to offer a dedicated design and draughting service to generate fabrication, engineering, and assembly drawings for customer sign-off prior to manufacture and on-site installation. Project management assistance can also be provided if need be.

“All the people employed in our installation and technical support teams have been employed from local communities, and gone through an extensive skills upliftment programme, adds Parkhouse. “This included the latest safety training, regulatory requirements, artisan training, and actual experience at our overseas facilities. Thus, our clients can rest assured that all of our work is carried out to international quality standards.”

Aury Africa is also engaged in skills transfer to Nkomose Consulting, its B-BBEE partner. It has entered into an association with Tony Weatherby from WMP Consultants, a former metallurgical manager at Anglo Coal South Africa, with over 35 years’ experience in the industry, whose significant track record adds invaluable experience to the company.

Aury Africa’s extensive product range includes high-quality vibrating screens for the coal, gold, and minerals-processing sectors, comprising banana, horizontal, circular, high-frequency, and flip-flop vibrating screens. It also supplies a range of exciters to fit most OEM screen types. Consumable products available include centrifuge baskets, polyurethane (PU) wedge wire panels, intertank/interstage cylinder screens for classification, sieve bends, and static panels for separation.

**For more information contact Sydney Parkhouse, Aury Africa, +27 11 026 6642, syd@auryafrica.co.za, www.auryafrica.co.za**
Ultra high pressure (UHP) washing is a highly-effective and environmentally-friendly cleaning method using water jets to remove old coating systems and industrial grime, without the use of potential contaminants such as detergents or grit.

Leading rope-access specialist, Skyriders, recently deployed UHP to clean the top part of a large tank, exposed to the elements and therefore subject to weathering, for a major petrochemical producer in Mpumalanga. The scope of work was to deploy UHP at 2800 bar in order to wash the tank and prepare the surface, and then to apply a protective coating system. "The client had a documented specification for the application that we had to adhere to rigorously at all times," comments Skyriders marketing manager, Mike Zinn. "This was necessary to guarantee the integrity of the entire protective system."

Major industrial customers such as chemical plants and refineries often have separate budgets for maintenance and access. "On this specific project, for example, we were able to prove to our client that a Skyriders deploys UHP cleaning at large petchem tank per-square-metre rate, is inclusive of both access and maintenance, represented significant cost and time saving," adds Zinn.

Skyriders’ holistic approach to access and maintenance generally translates into a 20-25% budget saving for its clients, in addition to benefits such as enhanced health and safety, and guaranteed quality of work. The traditional means of cleaning such large tanks is grit blasting, which leaves behind a residue that itself needs to be cleaned. This sand can also pose a safety risk during the cleaning process, as the tank remains operational during maintenance so as not to impact on productivity. The high-pressure water used in UHP, on the other hand, simply evaporates.

Skyriders intends to expand the scope of its UHP service offering, as this cleaning method is ideal for major industrial structures as diverse as smokestacks, silos and storage tanks. "It is not only an important value-added service, but is an integral part of the turnkey access and maintenance solutions we can offer," concludes Zinn.

For more information contact Mike Zinn, Skyriders, +27 11 312 1418, mike@ropeaccess.co.za, www.ropeaccess.co.za
New format for 2020 Sasol Solar Challenge

The 2020 Sasol Solar Challenge is officially open for entries and boasts exciting changes. Participants can look forward to a new route, changes in format, and a renewed title sponsor. It will be held in September next year, once again challenging top young engineers from across the world to drive their fuel-free, cutting edge cars across 2300 km of South Africa’s public roads.

Competitors in 2020 will have to think on their feet on ‘blind’ days, when information regarding the route is withheld until the night before, forcing teams to strategise on the go. Experienced teams usually travel the route several times in advance to prepare for all challenges, but will now need to plan for the element of surprise. The loops en route, which allow teams to rack up distance and get a lead on competitors, will also be much shorter in 2020. Spectators will also have better opportunities to see the carefully co-ordinated, Formula 1-style pit stops in action.

The Sasol Solar Challenge is a popular testing ground for the world’s leading teams to push new equipment to the limit. Widely regarded as the most difficult of a dozen such events globally, the baking sun, violent storms, high winds, changing road surfaces and a record drop in altitude of nearly 2000 m along the route allow teams to gather invaluable data.

“The 2020 Sasol Solar Challenge is once again an opportunity for our team to test and understand new technology we’ve developed,” says Tshwane University of Technology’s (TUT) team leader, Johannes de Vries. The University’s car, Sun Chaser 3, topped the South African leader board with 2397 km in 2018. Sun Chaser 4, which will compete in 2020, is 25% more aerodynamic, and the team hopes to make it 20 kg lighter too.

Sasol is the title sponsor for the fourth year running, demonstrating its commitment to furthering STEM education and inspiring learners to pursue technical careers. “The Sasol Solar Challenge brings maths and engineering to life in the eyes of the thousands of school children it reaches on its route, inspiring them in ways that textbooks simply cannot,” said Sasol’s group brand marketing manager, Nozipho Mbatha.

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www.solarchallenge.org.za

ABB’s Alrode-based motor and generator factory now fully compliant

Following a recent investment and transfer of knowledge and skills, ABB South Africa’s motor and generator factory in Alrode, near Johannesburg, is now fully compliant with the Department of Trade and Industry’s ‘greater than 70% local sourcing’ regulations. This development demonstrates the company’s full commitment to skills development and localisation.

ABB’s commitment also includes the modernisation of local manufacturing facilities, comparable to the best in the world. This has been demonstrated in the Alrode factory’s upgrade. Combining the best available materials with superior technology, the electric motors and generators produced in the Alrode factory will operate reliably in every industry and application, despite challenging process or application environments, and with the lowest lifecycle cost.

Customer benefits

Local manufacture offers many benefits to customers, from ABB’s improved broad-based black economic employment (B-BBEE) rating to reduced costs, improved efficiencies and shortened turnaround times which result in better after sales service and access to spare parts.

The upgrade means that the Alrode factory can now manufacture, and test in-house, large induction and synchronous motors, and generators capable of producing between 550 kW and 20 MW of electricity, for power utilities, heavy industries and mines within South Africa, and further field.

The factory can also support specific customer requirements by designing and manufacturing to order, unique motors and generators tailored to local conditions.

Product lifecycle management and repair services

ABB’s product lifecycle management model is designed to provide proactive service offerings for increased availability and performance. The company offers a dedicated field service programme that supports installation, supervision, commissioning and a full range of field-bound maintenance services designed to increase the reliability of the motors and generators already in use.

The new Alrode factory is also able to offer a full range of genuine OEM spare parts, including commissioning parts, operational parts, preventative maintenance kits and capital parts. Being fully compliant with the DTI’s requirements bodes well for the company since as it can now offer its products and services to a greater number of customers. Building an agile and customer-focused organisation is part of ABB’s focus on customer centricity as it will increase competitiveness and create new opportunities for export into neighbouring countries.

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Barrier-free from zone 0 into the cloud
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www.beckhoff.co.za/process

Beckhoff offers an integrated automation concept for different markets and applications in the process industry. Automation and process technology are combined on a single hardware and software platform. Also integrated: barrier-free communication from zone 0/20 into the cloud via intrinsically safe EtherCAT Terminals as well as all modules for the IoT connection and data analysis. Beckhoff thus offers the control alternative for numerous industries: from oil and gas production through petrochemistry and water management to pulp and paper manufacturing.

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info@beckhoff.co.za
Marthinusen & Coutts recently provided a solution to an irregularity that occurred in the stator of a large 36 MW compressor motor deployed at Sasol’s Secunda plant.

Initially, a Sasol maintenance team discovered during a routine inspection that the flux shield mountings on the stator were faulty, whereupon Sasol awarded M&C a contract to identify the cause of the irregularity and offer a solution.

“We tested the stator winding, which we found to be fine, but confirmed that there was a defect in the flux shield and recommended that it be repaired, as there was a risk of it damaging the winding if left to continue operating in its existing condition,” said Rob Melaia, M&C’s engineering and technical executive. “To repair the flux shield meant also having to remove the winding and perform a rewind on the stator.”

Sasol accepted M&C’s recommendation and assigned it to perform the required repairs. “In addition to replacing the old bars with new ones, we did a very specific modification to repair the flux shield to prevent a recurrence of the defect in the future,” explained Melaia.

“On investigating the defect we found that the electrical current, instead of flowing only in the flux shield as it ought to have done to prevent the core from overheating, had started flowing in the mounting bolts, so causing wear by electrical arcing in the mounting holes and the mounting studs,” he added.

The solution M&C’s repair team provided was to fit copper braid straps from several points on the flux shield to the stator body to reroute the current in such a way as to prevent a repeat of the damage as witnessed. To confirm the effectiveness of the solution M&C arranged to have the refurbished stator tested by local independent test authority H.V. Test Field Services.

The results of the final tests were found to be the best among many conducted on similar equipment over a period of several decades. “We have every reason to be proud of this outcome as it says volumes about M&C’s expertise in this field, both in terms of correctly diagnosing and repairing faults in a wide range of large rotating equipment, as well as providing the appropriate and most effective solutions for them,” concluded Melaia.

For more information contact Marthinusen & Coutts, +27 11 607 1700, support@mandc.co.za, www.mandc.co.za

Appointments

Magnet has appointed Lynton Julie as electrical technician, Durban.
Magnet has appointed Audrey Gopalan as projects administrator, Durban.
Magnet has appointed David Douglas as commercial sales manager, Durban.
Magnet has appointed Floris Erasmus as external sales representative, Johannesburg.
Magnet has appointed Sulusha Moodley as lighting designer, Durban.
TRAINING

BECKHOFF

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TwinCAT 3 and TwinCAT 2
Cape Town 5-7 Nov 2019
Durban 12-14 Nov 2019
Johannesburg 19-21 Nov 2019
Port Elizabeth 26-28 Nov 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

MECOSA

• Radiation Protection Officers

Radiation Protection Officers – Training Course on the use of Radioactive Isotopes in Industry
Johannesburg 12-13 Nov 2019

For more information contact
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+27 11 257 6100,
michelle@mecosa.co.za,
www.mecosa.co.za

SMC

• Mechatronic Engineers

TC-PNEU-B – Basic Pneumatics
Cape Town 20-22 Nov 2019
Johannesburg 4-6 Dec 2019

TC-MECH – Mechatronics
Johannesburg 26-29 Nov 2019

FESTO

• Mechatronic Engineers
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PN111 – Modern Industrial Pneumatics
Johannesburg 2-6 Dec 2019

PN100 – Introduction to Industrial Pneumatics
Johannesburg 9-10 Dec 2019

HY511 – Basic Hydraulics
Johannesburg 11-13 Dec 2019

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Festo, +27 11 971 5586,
DidacticTAC.za@festo.com,

SIEMENS

• Automation Engineers

DR-DRV-FUN – Fundamentals – Inclusive of Micro Master MM440
Midrand 2-6 Dec 2019

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Midrand 2-6 Dec 2019

For more information contact Vanessa Bonhomme, Siemens Southern Africa,
+27 11 652 3206,
vanessa.bonhomme@siemens.com,
http://www.sitrain-learning.siemens.com/za

TCOTC

• Automation Engineers

IFS – Instrumentation Finishing School
Johannesburg 2-13 Dec 2019

For more information contact Eric Carter,
turboTRAIN, +27 83 300 3321,
eric@turbotrain.co.za,
turbotrain.co.za/instrument-workshops/ifs/

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The end of the year is almost upon us. Have you taken the opportunity to ask yourself what has really changed for you this year? In some areas we have seen significant and exponential change. Automation and Industry 4.0 have shown significant and exponential development. But has this changed anything for you as an individual? Or, maybe the best question to ask is if you understand the impact it has on your future? Are things changing and you are not realising that you are adapting? Or maybe resisting the change?

We are part of a great time in history where innovation is happening at such a rapid pace that we can almost not predict what will happen two years from now. We now have technologies that enable us to use tremendous amounts of data to solve our daily problems. But, I think we have to ask ourselves if we are using this era optimally? Are we collaborating and using every opportunity to be part of multi-disciplinary collaborations to solve problems efficiently? Perhaps a difficult question to answer, especially in the business world, where you might not be the decision maker choosing the way forward.

Within education we are seeing a big drive for change and collaboration between industries to ensure that our educational institutions provide for the future skills needed. We still have a long way to go, but there is hope. People are indeed challenging the old ways of doing things. We are all on a journey of change and each needs to take it a pace that they can handle. The SAIMC has multiple individuals working towards a common goal to be the ‘voice of automation’, which guides the country to prepare and adapt. If you ever want to be part of this, I urge you to get into contact with us and tell us where you want to contribute.

Sometimes however, it can all be overwhelming. Just dealing with normal life can be a challenge. But, as South Africans, we are very adaptable and have shown the ability to innovate, even in conditions where others would lose hope. So, don’t be too hard on yourself. Take it one day at a time.

Yours in automation,
Annemarie van Coller.

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Students, lecturers, SAIMC regional members (formerly branch patron members) and SAIMC committee members braved the cold recently to meet at the UZKN School of Engineering for an SAIMC Industry Expo. The brain-child of Durban Chairman Hennie Prinsloo, the concept and execution was great and all exhibitors agreed that it was a wonderful way to give back to our industry via the students who, after all, are the future of the industry.

Prof. Saha (UKZN) and Hennie Prinsloo opened the proceedings and welcomed everybody present and students were encouraged to network and interact with industry vendors, look and examine the vast array of products at close quarters and generally experience the industry first-hand. There was lots of interest at the exhibition tables especially as all the regional members had gone to a lot of trouble with their products on display and everybody freely gave of their time and expertise.

At midday when many of the students were on a break from lectures, Paul Sikhakhane expertly took them through what the SAIMC is and what it does, and this was followed by a brief presentation by John Owen-Ellis on the transition to employment and what kind of options are open after graduation.

The Durban branch of the SAIMC would like to thank the following regional members for their presence and contribution to the day’s success: Technews Publishing, ICA, Krohne, Swagelok, Metso, Loadtech, PSA, Pulse, ifm, Elonics and Mzukulu.
It is with deep sadness that the SAIMC heard of the death of dear friend and esteemed colleague Eugene Sithole, who passed away suddenly on 7 September.

Thanduxolo Eugene Sithole was born on 13 September 1970 to parents Raphael and Nomathemba Sithole. He proceeded through his school years finishing at St. Francis College, where he completed matric after which, due to his technical abilities, he enrolled at Mangosuthu Technikon to earn a National Diploma in Electrical Engineering.

Eugene started his professional career in 1993 as an instrument technician at Nestlé (Pietermaritzburg) after an intense training programme with Sapref (Shell and BP petroleum refineries) and Huletts Aluminium (Pietermaritzburg). Over the years he built his credentials and skills working at Umgeni Water, and then with Fluor/Igoda as a design/instrumentation engineer until 2012.

In 2012, he joined Sowa Projects (a consulting company specialising in electrical and instrumentation related projects) as the managing director, where he remained until his recent death.

Eugene was a firm supporter and active member of the SAIMC and a regular visitor to the technology evenings and social functions. He served on the Durban branch committee in 2010 and will be sorely missed by all.

Obituary: Eugene Sithole

Industry expert talks about importance of continuous learning

Learning from industry experts is a vital component of any student’s training. Such an expert is Thabo Lekgowane, a robotics engineer from Ford, and a member of the SAIMC. Recently, he addressed students from the TUT Faculty of Engineering and the Built Environment on the current advances in the industry.

In addition to sharing a wealth of information, Lekgowane encouraged final year diploma students to take their studies seriously and make the most of every opportunity to learn. He emphasised the automation industry’s need for skilled workers from all engineering fields, and advised students to equip themselves with the relevant skills and knowledge to become the preferred engineers to fill this gap. Providing typical examples of industry-related projects, while also discussing the complex challenges posed by the fourth industrial revolution, he called on students to, “find their place in industry”.

Together with the Automation Federation, the SAIMC is driving the recognition of automation as a separate engineering discipline. This will assist to make opportunities available for the youth to use the technologies and designs of Industry 4.0 to prepare for the future world of work. In 2019 alone, the SAIMC spent 21% of its membership fees on developing the youth via the FIRST Tech Challenge and the MyFuture 4.0 exhibition.
Why use wires?
At the technology evening on 11 September, Rudi Erasmus of Phoenix Contact walked us through when and why wireless communication is preferred to cabled communication.

Communicating with moving machinery is obviously one, but it is also preferable where long distances are involved, such as wastewater treatment plants, and pipelines, for example.

Apart from these obvious examples, Rudi also covered many of the technical aspects of wireless communication, including the bands they typically occupy, including protocols such as BlueTooth, and comparing them with Phoenix’s Trusted Wireless protocol, and where each has its niche.

Moving on, he also covered aspects of wireless propagation, antenna types, Fresnel zones, antenna polarisation and co-existence with other wireless channels.

The branch thanks Rudi and Phoenix for hosting the evening, and for making it memorable.

Johannesburg branch

Vaal branch

This month’s presentation at the Vaal branch covered the basic principles and fundamentals of SIL. It included the common misconceptions about SIL, risks, accidents, processes, random and systemic failures amongst others. Risk is an integral part of our daily lives. Hazards are also present in our working environment. Thus it is important to identify anything that could pose a risk of death or injury and to eliminate any hazards at work emanating from production processes.

Standards applied to overcome these risks are based on proven principles:
• Statutory architectures.
• Exclusion of faults.
• Stipulation of single and multiple fault safety measures to implement a protective function.

An increasing number of programmable devices are now used when designing a plant, from a PLC to intelligent sensors. It is not possible to assess multiple fault safety measures in this form. Specific standards have therefore been devised so that the risk can be quantified, based on probability statements, and reliably reduced. This involves new concepts that require a more detailed explanation.

The abbreviation SIL refers to the safety integrity level and is a measurement of performance required for a safety-instrumented function.

Works cited

Jannie Claasens (l) from the Vaal Branch presents Jurie Weidemann from Pepperl+Fuchs with the SAIMC presenter’s certificate.
**Consulting engineers, system integrators & project houses**

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Abacus Automation supplies innovative, custom-developed technical solutions using standard PLCs, drives, scada and motion control equipment and is Siemens approved for crane automation. With 22 years in the industry, this award-winning and internationally acclaimed company has highly qualified, experienced and professional staff. It operates out of offices in KwaZulu-Natal.

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Autotronix is a recognised leader in industrial automation design and implementation having attained its ISO 9001 certification. Autotronix offers its clients turnkey control system integration services for energy management, PLC/HMI/scada/VSD, manufacture of control panels, applications for water distribution and manufacturing. The company operates out of offices in Gauteng and KwaZulu-Natal.

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Hybrid Automation is an approved Siemens system integrator and partner for automation and drives, process instrumentation as well as motion control. This enables it to provide its clients with the latest technology and solutions. Its client base includes major blue chip companies and has gained a strong foothold in virtually all the engineering verticals.

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**Moore Process Controls**

Moore Process Controls provides process automation and optimisation solutions to realise the maximum potential of your plant and assets. Our offerings include DCS, PLC, scada, compressor control solutions, MES, production management and predictive maintenance systems, control loop optimisation, alarm and energy management systems, plant security and access management systems, Matrikon OPC, OSI Soft, dashboards and historians, wireless and data solutions including digital twin, process simulators and training simulators and cloud-based IIoT solutions.

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Process Dynamics
Process Dynamics specialises in industrial automation and process control. The company is one of Africa’s leaders in turnkey automation projects and specialises in the integration of SCADA (WinCC, PCS7, Wonderware, Citect) and PLC (Siemens, Schneider, Rockwell) as well as MCC and control panel manufacturing and installation. Process Dynamics is ISO 9001:2015 accredited as well as a registered CIDB company.

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SAM – Systems Automation and Management
Systems Automation and Management is a supplier of data acquisition systems and innovative automation solutions and is one of the leading integrators of PLC, SCADA and fieldbus systems in South Africa. The company’s comprehensive range of capabilities includes industrial networks, automation and control, scada, custom solutions, information delivery, data warehousing, hardware and software, BMS, MIS and MES.

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Contact: jane@technews.co.za
Saryx helps Transnet achieve ROI through scada modernisation

Saryx Engineering has set the bar high in terms of scada modernisation and standardisation. So much so that the company won ‘Best Control & Information Implementation’ in recognition of a project with client Transnet Freight Rail in Saldanha, earlier this year at the IS3 X-Change Conference.

The task: to replace Transnet’s GE iFix system in parallel with System Platform without introducing downtime or interfering with operational performance.

To put things into perspective, the Saldanha-Sishen Railway is 861 km in length, seeing approximately 38 trains per week. The length of each train is 3.9 km, with 342 wagons, and five to eight locomotives, making them among the longest freight trains in the world.

With the enormity of such a loading operation, one of the main requirements for this project was to achieve zero downtime while the upgrade project took place. In addition, the learning curve from the old system to the new needed to be minimal in terms of operator training.

Key aspects of the project included:
- Move from RS-232 serial technology to Modbus TCP.
- Replace current desktop PC with industrial server technology.
- Move all scada views to terminal server technology.
- Achieve high system availability.

How did System Platform assist?
- Moved to object-based design for standardisation of graphics and tags.
- ISA 95 was implemented to the system which manages the object configuration and alarming resolution.
- Wonderware Insight implementation improved data analysis for engineering staff.
- System Platform is virtual server compliant.

The most significant advantage established from the object-oriented design was that it exposed inconsistent or irregular field values, which varied from site to site. This was very difficult to pick up in the old tag-based system design.

The old system had reached end of life

The old system shared the same computer as the CS90 system. The issue was that the CS90 had the capability to upgrade to a newer Windows version, but the iFix did not. The iFix had operational interference on the CS90 system, and vice versa, because they shared the same client computers with multiple screen cards. In-house support and system knowledge had been lost due to staff retiring.

Saryx installed a temporary Motorola interface to mirror the data to both old and new system. With this, Saryx could compare the old and new status to ensure all signals were correct. The iFix system could now be decommissioned without causing downtime. A rollback option was available if required to minimise operational impact and the operational staff had a sneak preview of the system before it went live. To their surprise, not much had changed in terms of screen navigation. Because of this, the engineering staff developed confidence in the new system while it is working in parallel with the old.

Network design was simple as follows:
- Control network with redundant terminal and data acquisition servers.
- Scada network linked to the terminal client.
- Motorola network separate from the scada network to ensure the least amount of collision domains.

- Insight installed.
- Skelta BPM for automation of data to CASOM system for Transnet.
- Alarm Advisor which assists the maintenance staff with the alarms.

Prior to the upgrade, the systems had a generator overview, loop status, generator status, and an operator overview. Post upgrade, in addition to the above, a template was used to get standards across all screens in the HMI. The object graphics are embedded instead of redrawn, and grid snapping ensures that all graphics align correctly.

Operators and managers can now interrogate the alarms and events from the scada, while managers have an overview into the system performance. Wonderware Insight gives managers the ability to ‘google’ for the tags they need analytics on, instead of using the filter and navigating options in the query and trend tools. After adding the historians, easy clicks transform how the data is viewed. In addition, the scada now offers ‘Flight of Sight’ graphics, which is important for operational staff.

For more information contact
Saryx Engineering Group, 086 099 5105, saryx@saryx.co.za, www.saryx.com
Process Dynamics has a long history within the brewing industry. The company has completed a number of projects for SABMiller and when the company was bought by Anheuser-Busch InBev (ABInBev) in 2015, the relationship continued to flourish.

Active in southern, eastern and some parts of western Africa, Process Dynamics has extensive experience in the challenges faced with African food and beverage plant automation projects. According to the company’s managing director, Kobus van Niekerk, one of the major problems in African countries is the ‘islands’ of automation found in most factories. This, he says, is caused mainly by budgetary constraints, tender award processes and the lack of future planning.

“Price is the main factor and tenders are awarded to the lowest bidder. Furthermore, there is no continuity and the end goal is not always kept in mind. All of this is exacerbated by an unstable or absent plant network infrastructure. There is also little, or no, integration of the various systems supplied by different contractors or suppliers, a practice that is mainly instituted to protect IP. Finally, it is extremely difficult to access data,” says Van Niekerk.

The food and beverage industry in Tanzania is very segregated, with automation in only certain sectors and a lack of a common standards hindering productivity. At the ABInBev plants in Tanzania there was no connectivity between the diverse systems and accessing spares was difficult, which made maintenance a major problem. Since there had been no upgrades and therefore no expansion, operations were negatively affected. “The motivation behind the proposed brewery upgrades was to standardise the business on one platform. This meant moving from legacy PLCs and scada systems to Siemens WinCC and then, once installed, upgrading to the Siemens TIA portal,” says Van Niekerk.

Process Dynamics was responsible for the phased upgrade of three ABInBev breweries in Tanzania. These upgrades were conducted at the syrup plant, racking skid, pre- and post-filter, BBT valve automation, ration blending and carbonation plants at Dar es Salaam between 2010 and 2015; the Unitank automation, glycol cooling/Redds/yeast plant; the Filler Line 2 at Arusha between 2012 and 2018; and the cellar automation, pre-filter, CIP station, and cellar automation phase 2 at Mwanza between 2012 and 2018.

Part of the upgrade project entailed installing a SIMATIC TIA V12 portal, installing a network infrastructure, migrating all PLCs and HMIs to TIA, as well as cellar automation on a new scada system at Mwanza and Dar es Salaam. In 2016 the Dar es Salaam plant was upgraded from SIMATIC TIA V12 to V13.

Van Niekerk says that when ABInBev took over SABMiller’s plants there was an order to standardise all global operations using the ABInBev Global Technical Standards, commonly referred to as GTS. The three Tanzanian plants were already aligned with these standards, thereby allowing operations to continue without further upgrades being required at the time. Standardisation provides ABInBev with a number of benefits, including faster deployment, shared benefit, improved support and consistent data.

“One of our biggest challenges was finding software to manage the expectation of outcomes and benefits. We had to convince the previous SABMiller brewery management in Tanzania of the benefits of the upgrade. Any upgrades in the future will be approved under the GTS standard and allow us to implement a common protocol driven by enhanced data gathering and a resultant increase in productivity. We have remote login capabilities to all three plants from South Africa, allowing us to assist with any process problems,” says Van Niekerk.

For more information contact Kobus van Niekerk, Process Dynamics, +27 11 394 5412, kobusvanniekerk@process-dynamics.co.za, www.process-dynamics.co.za
Control cabinets play a vital role in monitoring and controlling industrial applications. To ensure system uptime, system integrators should consider several key factors when choosing devices for control cabinets that need to perform optimally and reliably for the next 10-15 years.

Drawing from over 30 years of experience in providing reliable products for industrial control cabinets, Moxa has identified the following four key considerations for choosing the best control cabinet devices for mission-critical applications:

1. **Withstand harsh environments**
   Control cabinets can be placed in a variety of environments, both indoors and outdoors. Depending on the specific project requirements, the devices used in the cabinet should feature a wide operating temperature range and specific certifications for use in hazardous locations, such as C1D2 (US) or ATEX (EU) certifications for oil and gas applications, or DNV GL certification for marine applications.

2. **Efficient use of space**
   Control cabinets are often added to an existing infrastructure or placed alongside machine tools used to enable remote monitoring and control. Consequently, the devices inside should be as compact as possible. In addition, thermal management of electronic equipment also requires additional space and an adequate ‘keep-out-zone’ to ensure safe and reliable operation. A good way to save space is to choose integrated (all-in-one) devices, such as a computer with a rich interface set and wireless capabilities, or a device server with integrated I/Os or switches.

3. **Easy hardware installation and maintenance**
   Control cabinets have a limited amount of physical space to accommodate a high volume of industrial control units, switching blocks, wiring, and other equipment. Devices with DIN-rail mounting capabilities save installation time, reduce wiring connection costs and effort, provide easy component adjustments, arrangements and maintenance, as well as supporting high-density deployment.

4. **Power consumption and redundancy**
   Due to different use cases, the control cabinet may be situated in places with limited power supply, or even only rely on batteries. Consequently, it is important to choose devices with relatively low power consumption. At the same time, these devices must still have the operational reliability to ensure the efficiency of a functioning cabinet. Depending on the project specifications the cabinet may even require a redundant power supply to guarantee power stability, uptime reliability and a wide range to overcome power fluctuation demands.

Recommendations from Moxa include the NPort IA5000A serial device servers; MGate MB3170/MB3270 Modbus TCP gateways; ioLogik E1200 remote I/O; and IMC-21A Ethernet-to-fibre media converters.

**NPort IA5000A**
The NPort IA5000A device servers are designed for connecting industrial automation serial devices, such as PLCs, sensors, meters, motors, drives, barcode readers and operator displays. The devices are solidly built, come in a metal housing with screw connectors, and provide full surge protection. The NPort IA5000A servers are extremely user-friendly, making simple and reliable serial-to-Ethernet solutions possible.

**MGate MB3170/MB3270**
The MGate MB3170 and MB3270 are 1 and 2-port Modbus gateways, respectively, which convert between Modbus TCP, ASCII, and RTU communications protocols. The gateways provide both serial-to-Ethernet communication and serial (master) to serial (slave) communications. In addition, the gateways support simultaneously connecting serial and
Ethernet masters with serial Modbus devices. The gateways can be accessed by up to 32 TCP master/clients or connect to up to 32 TCP slave/servers. Routing through the serial ports can be controlled by IP address, TCP port number, or ID mapping. A featured priority control function allows urgent commands to obtain an immediate response. All models are rugged, DIN-rail mountable, and offer optional built-in optical isolation for serial signals.

IoLogik E1200
The IoLogik E1200 Series supports the most often-used protocols for retrieving I/O data, making it capable of handling a wide variety of applications. Most IT engineers use SNMP or RESTful API protocols, but OT engineers are more familiar with OT-based protocols, such as Modbus and EtherNet/IP. Moxa’s Smart I/O makes it possible for both IT and OT engineers to conveniently retrieve data from the same I/O device. The IoLogik E1200 Series speaks six different protocols, including Modbus TCP, EtherNet/IP, and Moxa AOPC for OT engineers, as well as SNMP, RESTful API, and Moxa MXIO library for IT engineers. The IoLogik E1200 retrieves I/O data and converts the data to any of these protocols at the same time, allowing users to get your applications connected easily and effortlessly.

The UC-8100 computing platform is designed for embedded data-acquisition applications. The computer comes with one or two RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports, as well as a mini PCIe slot to support cellular modules. These versatile communication capabilities let users efficiently adapt it to a variety of complex communications solutions.

Each unit is built around a Cortex-A8 RISC processor that has been optimised for use in energy monitoring systems, but is widely applicable to a variety of industrial solutions. With flexible interfacing options, this tiny embedded computer is a reliable and secure gateway for data acquisition and processing at field sites as well as a useful communication platform for many other large-scale deployments.

Imc-21A
The IMC-21A industrial media converters are entry-level 10/100Base{T(X)}-to-100BaseFX media converters designed to provide reliable and stable operation in harsh industrial environments. The converters can operate reliably in temperatures ranging from -40 to 75°C. The rugged hardware design ensures that all Ethernet equipment can withstand demanding industrial conditions. The IMC-21A converters are easy to mount on a DIN rail or in distribution boxes.

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za
A good combination for the primaries and metals industry

Endress+Hauser’s measurement devices for flow, level, pressure, temperature and liquid analysis.

Whether it be in a cement plant, in steel production or in mining, Endress+Hauser helps the primaries and metals industry to bring out the best of its processes – making a real difference in many areas with a custom-fit portfolio.

Solutions for every purpose
The company has known the primaries and metals industry and its processes for over 65 years. Industry experts from sales centres across the globe have a great deal of expertise when it comes to applications, and provide a broad instrumentation portfolio specifically tailored to the industry’s high demands. Custom-made services and solutions complete the offering.

Their spectrum ranges from fieldbus engineering to entire automation solutions for core processes and utilities (e.g. full water monitoring or the detection of leaks in pipes). This portfolio helps businesses to increase plant availability, adhere to environmental regulations and operate processes in a more efficient and safer manner.

Safe under any circumstance
Dust, high temperatures, chemicals, abrasion – the often-extreme conditions in the primaries and metals industry are not a problem for Endress+Hauser’s measurement devices for flow, level, pressure, temperature and liquid analysis. They continue to work just as precisely and reliably under the highest stress, are suitable for safety instrumented systems up to SIL3 and, most importantly, are easy to use. Pressure transmitters of the Cerabar M series provide a high level of process safety due to their robust ceramic measuring cells and integrated detection of a broken sensor membrane, for example. The high-temperature Omnigrad TAF range was developed for measuring points with extremely high temperatures. Ceramic thermowells shield the sensors from mechanical and chemical influences, thereby increasing the thermometer’s life span, compared to stainless steel.

Easy operation
Water and chemicals are common in many mining applications, for example during industrial water treatment, or to extract metals and minerals. To ensure that these processes achieve optimum performance, the pH, dissolved oxygen and turbidity values must constantly be monitored. Sensors with Memosens technology are ideal for tasks such as these: they digitise the measured value in the sensor before transferring it contactlessly to the transmitter, thereby eliminating external influences. The sensors can also be pre-calibrated in the laboratory and exchanged quickly and easily during operation, saving costs while increasing the availability and safety of the plant and staff.

Unobstructed measurements
Continuous measurement in silos and bunkers represents a challenge to level measurement devices: dust, temperature layers and gas blankets can influence the measurement signal. The new non-contact radar level measurement device Micropilot FMR67 is unaffected by factors of this kind: the first 80 GHz instrument developed according to the international functional safety directive IEC 61508 always provides an unobstructed view – even in narrow silos, with a large number of fittings and under adverse circumstances. This is made possible by the small beam angle of just three degrees and the drip-off antenna, which simply repels any dirt. Endress+Hauser offers a total of 13 measuring principles for level measurement and point level detection, providing the right solution for every task.

Maintenance on demand
Measurement devices can provide more than just measuring values, which is why Endress+Hauser has equipped its latest flow, level, temperature and analysis measurement instruments with Heartbeat Technology. It enables the instrument to constantly monitor itself and many process conditions; verification for SIL repeat tests during the running process is also possible at the touch of a button or the click of a mouse. Due to device specific parameters, the instruments detect critical trends early on. Level measurement devices can detect whether any build-up has formed on the sensor antenna, or whether there is a build-up of foam on a liquid surface, for example. Flowmeters, meanwhile, detect corrosion, entrained gas and abrasion within the measurement tube, among other things. Maintenance services can therefore be better planned while processes can be controlled in a more efficient manner. Coriolis flowmeters in flotation processes, for example,
can detect chemical changes to the flocking agents and are able to indicate when a new preparation is required.

**Going digital**

Barely any application in the primaries and metals industry can cope without precise flow measurement. Blast furnace cooling circuits in the steel industry are monitored for leaks through ultrasonic or electromagnetic flowmeters, for instance. In cement manufacturing, Coriolis instruments assist with clinker production and help control the burner by recording the mass flow, density and temperature at the same time as the viscosity of liquid fuels such as heavy fuel oil. The latest addition to the Endress+Hauser flowmeter family is also multitalented: the Picomag, an electromagnetic flowmeter for monitoring smaller pipe sizes used in water distribution around the plant. The smart pocket-sized newcomer simultaneously measures temperature and can be operated easily via Bluetooth in areas that are hard to access. The device is ready for the Industrial Internet of Things through its IO-Link technology, which enables its flexible integration into all fieldbus systems as well as access to many additional device and process data.

**Everything well controlled**

Water is indispensable to mining operations. Employees require potable water while numerous applications need process water which, once used, is treated before being recycled or returned to the environment. Water and wastewater treatment automation solutions allow the measurement and control of these processes. Field instrumentation packages help to increase filtration cycles in seawater desalination applications. Smart aeration control solutions in wastewater plants result in energy savings of up to 30 percent. Analytical measurements that can be accessed wirelessly and over long distances provide support during water body monitoring and therefore assist with environmental regulation compliance.

**An eye on material streams**

Saving fuel, natural gas and electricity is one of the main objectives for companies in the primaries and metals industry: energy costs account for up to 40 percent of total costs in steel production and as much as 75 percent in cement manufacturing. Mining operations meanwhile use approximately eight percent of their production costs for lubricants and fuels for trucks, drills, haulers and other vehicles. Endress+Hauser supports efficient operations of these high-cost processes. Energy monitoring solutions help to capture and monitor energy use to take targeted measures to reduce energy consumption. Loading solutions with Coriolis flowmeters provide a decisive advantage during the delivery of fuel to mining operations: they determine how much fuel is being purchased with exact precision. Inventory management solutions also render inventories and expenditure transparent, enabling an efficient logistics chain.

**WEG’s variable speed drives on Ghana mine**

Two units of the newly-developed WEG 11 kV VSD have been commissioned in West Africa by WEG Automation Africa, a member of the Zest WEG Group.

According to Kirk Moss, senior manager: projects and engineering at WEG Automation Africa, the new WEG MVW3000 VSD is a valuable addition to its medium voltage (MV) VSD portfolio. The first two 11 kV units produced are for 850 kW ventilation fan motors in an underground gold mine in Ghana.

“In line with WEG’s ongoing innovation, the addition of the WEG MVW3000 system brings a range of benefits to customers,” says Moss. “It gives WEG Automation Africa even greater flexibility in our market offering, further enhancing our capability to provide customised solutions.”

The design is based on the well-known cascaded H-bridge (CHB) topology, using multiple low voltage power cells in combination to achieve the desired voltage output. The input switch, phase-shifting transformer and VSD are fully integrated in a single MV panel.

“The WEG MVW3000 is particularly suited to applications where there are standard motors with no special insulation,” adds Moss, “or where existing motors are being modified for VSD control.”

This VSD delivers high quality input power using low harmonic multi-pulse transformers. Users benefit from an efficiency of over 96,5% throughout the entire load range, and a power factor of more than 0,95 throughout the entire speed range.

“The design includes power cells with long-life plastic capacitors, which are more reliable and last longer than dry type capacitors,” explains Moss. “They also have the advantage of not needing to be reformed after long periods of storage.”

In standard configuration, the 11 kV VSD is available from 40-400 A or 640-6500 kW, although larger sizes are also available if required.

Among the options on the WEG MVW3000 is an automatic cell bypass solution. This ensures minimal reduction in the output-rated torque so that normal operations can continue. Redundant power cells can also be added to the design to ensure that 100% torque can be maintained. Prior to delivery, all VSDs are fully load-tested in WEG’s state-of-the-art facility in Brazil.

**For more information contact**

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Real-time data increases metal recovery at Peñasquito mine

By Janice Abel, principal consultant, ARC Advisory Group.

Newmont Goldcorp, the world’s largest gold producer, has embarked on a digital transformation journey to optimise its portfolio of high-quality mining assets, reinvest in its people and technology, and drive increasing margins and returns on investment. To this end, the company is exploring a wide variety of digital technologies, including autonomous drilling, drones, mixed and augmented reality, machine learning, and data analytics and visualisation.

At a recent OSIsoft User Conference in California, ARC Advisory Group had an opportunity to learn about a related project at Newmont Goldcorp’s flagship Peñasquito gold, silver, zinc, and lead mine in Mexico. According to Derek Shuen, superintendent, electrical, instrumentation, process control & energy management at Newmont Goldcorp, the company had been using the PI System at its flagship Peñasquito mine since 2012 to integrate and historise data sources across the mine site, but was not getting the most value from the data.

In 2017, as part of Newmont Goldcorp’s larger “20/20/20” five-year initiative to improve business performance, the corporate IT group hosted a joint workshop in conjunction with OSIsoft. The workshop participants wanted to focus on an area that would be relatively easy to achieve, did not require a capital investment, and had the potential for good results. While several other options were discussed, the team decided that enhanced metal recovery stood out as the best opportunity for quantifiable improvement that could be achieved in a relatively short time frame.

Feed variations require prompt operator response to maximise metal recovery

The flotation circuits at open pit mining operations such as Peñasquito are highly susceptible to feed variations. To optimise metals recovery, operators have to manually adjust up to eight different reagents. The operator’s ability to react to feed variations will often largely determine recovery performance.

Previously, the mine had seen its metal recoveries dip for no apparent reason. These types of losses can extend for several hours if the operator is not vigilant or does not have the right data.

Prior to this pilot project, to establish baseline performance targets for the operators, Newmont Goldcorp’s Technical Services had used regression analysis on daily, weekly and monthly historical data to correlate and establish baseline targets for economic recovery of the various precious (gold and silver) and base (zinc and lead) from the feed grades. Since Technical Services only updated these equations every two years or so, the targets rarely varied, regardless of the nature of the ore feeds.

For the flotation cell operators, the recovery target was typically pegged at 70 percent and rarely adjusted. Since the established targets were based on past historical data, rather than current operations, they were not really meaningful for the operators who thus tended to operate the cell in a largely ‘open loop’ manner. This resulted in inconsistent operating practices between shifts and individual operators and the unexplainable dips in extraction performance, resulting in recovery losses.

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Local PDS at the cutting edge of technology

With mine safety legislation getting progressively tighter, Booyco Electronics continues to ensure compliance with its locally developed proximity detection system (PDS). According to Pieter Janse van Rensburg, the company’s area manager for Mpumalanga, legislation coming into force in 2020 will mean the extended application of Level 9 safety standards, which require full intervention from a PDS on trackless mining machines (TMMs) to avoid man and machine related incidents. Booyco Electronics’ PDS can facilitate such collision avoidance, with automatic slow-down and even safe-stop of mining machines. The system uses VLF antennas on a vehicle to create fields within a danger zone around the vehicle. The size of each field can be determined by the customer, to suit their specific operating environment and addressing identified risk.

An RFID tag installed on the pedestrian’s cap lamp alerts them — through a light and sound alarm — when they enter this zone. The light changes colour from green to orange and then red, the closer the pedestrian is to the vehicle. The vehicle itself also receives a warning from the PDS, with the operator being alerted that a pedestrian is in the proximity. If equipped and configured appropriately, the vehicle can also be automatically slowed down at a certain distance from the pedestrian, and similarly brought to a safe stop.

One of the most significant advantages of the Booyco Electronics PDS is that it can effectively detect as many as seven TMMs and 20 pedestrians within one field, in the underground environment.

“Our combined technology includes a very low frequency (VLF) signal that penetrates rock walls underground,” he says. “This ensures that the pedestrian will still be warned of an approaching vehicle even if it is out of sight around a corner.”

The PDS can be applied to older ‘non-intelligent’ machines on a mine as well as the newer, controller area network (CAN) bus enabled models.

With 13 years of experience in PDS, Booyco Electronics has supplied in excess of 5000 sets of mining vehicle equipment around southern Africa, as well as 50 000 pedestrian sets of equipment.

For more information contact Booyco Electronics, 086 126 6926, info@booyco-electronics.co.za, www.booyco-electronics.co.za
Three-phase power quality analysis

Comtest has announced the availability of Fluke’s range of three-phase power quality loggers – 1742, 1746 and 1748 – giving users fast, easy access to the data they need to make critical power quality and energy decisions in realtime.

Compact and rugged, these instruments are designed specifically for technicians and engineers who need the flexibility to troubleshoot and quantify energy usage, and analyse power distribution systems. Fully compliant with international power quality standards such as IEC 61000-4-30 and capable of simultaneously logging up to 500 parameters while also capturing events, the Fluke 1740 Series helps uncover intermittent and hard to find power quality issues easily. The included Energy Analyze plus software quickly assesses the quality of power at the service entrance, substation, or at the load, according to national and international standards like EN 50160 and IEEE 519.

An optimised user interface, flexible current probes, and an intelligent measurement verification function allows digital verification and correct connections make setup easier, considerably reducing measurement uncertainty. The devices also allow users to minimise time spent in potentially hazardous environments, while reducing the need to suit-up in PPE by using a wireless connection (WiFi) to view data directly in the field.

Measures all power quality and power parameters
The Fluke 1748 logs over 500 different parameters for each averaging period. This allows for the analysis of power quality in detail and the correlation of intermittent events with detailed waveform data, helping to identify the root cause of disturbances. For basic power quality logging, the Fluke 1746 captures all relevant power parameters for performing energy-saving studies and electrical network planning with a full upgrade option to 1748 available. For simple load and energy studies the Fluke 1742 offers optimal performance in a rugged package and can be upgraded to 1746 or complete 1748 functionality.

Calculates current harmonics limits
When downloading data from the Fluke 1748 loggers, Energy Analyze Plus can calculate the limits of current harmonics based on installation parameters to predict overload of the grid according to a wide range of international standards. This powerful predictive maintenance feature enables current harmonics to be observed before distortion appears in the voltage allowing users to prevent unexpected failures or non-compliance situations and increase system uptime.

Easy to use
Fluke power quality loggers are designed with the technician in mind. The four current probes are each connected separately allowing flexibility and simplicity, the instrument automatically detects, scales and powers the probes so users do not have to worry about ensuring the measurements are correct.

Capturing logged data is just one part of the task, users then need to create useful information and reports that can be easily shared and understood by their organisation. Fluke Energy Analyze plus software makes that task as simple as possible. With powerful analysis tools and the ability to create customised reports in minutes users can communicate findings and solve problems to optimise system reliability and show savings. A range of built in report templates for industry standards such as EN 50160, IEEE 519 and GOST enable one-click reporting to create high quality reports at the touch of a button. Reports can be modified as standards evolve, or new versions become available.

The 1740 series products are built to withstand tough working environments. The flexible current probes are IP65 rated and suitable for most installation situations; the optional IP65 voltage adaptor ensures safe, reliable operation even in harsh conditions. Standard 2 m leads simplify connection on difficult to access conductors, and optional 5 m leads are useful when installing in difficult locations. With the capability of powering the instruments from the power line up to 500 V, installation is simple.

For more information contact Comtest,
+27 10 595 1821, sales@comtest.co.za,
www.comtest.co.za
Stop the Enemies of Turbines
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- Reliable trace level monitoring
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- Low maintenance

www.microsep.co.za
Eliminate power outages caused by steam leaks

Locally developed acoustic steam leak detection system launched.

Instrotech is the SA developer of a leading acoustic steam leak detection (ASLD) measurement system called Inspecta, currently in use in the boilers of power generating facilities around the world.

The current system Inspecta FFT, first released some 20 years ago, is reaching its end-of-life, and Instrotech’s design engineers felt the time was right to upgrade to newer technology, by combining their 30 years’ experience with the latest industry-standard technology.

“There hasn’t been a major upgrade in quite some time and there has been so much advancement in technology that we could really throw everything at it – do it differently and build Inspecta III with the latest technology and a suite of impressive new add-ons,” says the company’s MD, Pieter Deysel.

The pressure is on

As technology advances, so has boiler technology. Power generators are pushing materials technology by increasing boiler operating pressures to get greater efficiency, which in turn makes the early detection of steam leaks even more critical to the performance of a facility or power station. There has always been a requirement for the early detection of steam leaks but with the modern boiler technology, if steam at these levels escapes out of the system, it can understandably, cause further secondary damage.

This is why the positive identification of a leak is critically important to a power station/facility. If good data is captured and analysed to provide the relevant information, it can be determined if the leak is serious or not and what the rate of progression is, slow or catastrophic. This information is vital as if the location and progression of the leak can be ascertained, an effective decision can be made as to whether to continue or shut down boiler operation. For certain leaks, delaying the shut-down decision for a period of 2 hours can result in the down time of a boiler changing from 2 days to in excess of 14 days. Thus a few hours can sometimes be crucial in making a correct remedial decision.

Typically, for a 600 MW boiler at a large power generating facility, an hour of down time will lose approximately R600 000 of billable electricity sales, charged out to consumers at R1 per kilowatt hour. Inspecta III goes an appreciable way to mitigating these punitive income losses, and pays for itself in early leak detection within a short period of time.

Inspecta FFT was an unconnected, stand-alone system, giving an alarm to the operator who would attend to the problem. Later it was connected to the power station’s DCS, taking the data collected and incorporating it into the facility’s scada system. This required interpretation by the operators of the captured data to diagnose the presence of a leak. The system was thus limited by the level of technology and skills available at the time. Today’s technology provides low-cost computing power, mobile communications and the Internet, which Instrotech has taken full advantage of, allowing the delivery of a vastly enhanced Inspecta III.

“With current technology, we now have access to unlimited computing power that means infinite possibilities. Our clients can do so much more with the features we have added to Inspecta III,” concludes du Plessis. “Providing reliable early steam leak detection is, in its essence, a time-critical operation. Shutting down a large boiler unnecessarily will cause loss of production and incur significant start-up costs. Delaying the shutdown of a boiler with damaging steam leaks will incur even more production losses and expense. Thus the decision as to whether to continue operation or shut down the boiler had better be an informed one. We believe that our new system provides exactly that – precise, information that an operator can act on with confidence.”

For more information contact Instrotech, +27 10 595 1831, sales@instrotech.co.za, www.instrotech.co.za
Automated analysers for sulphate and chloride measurements

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

Mettler Toledo's 3000CS sulphate and chloride analyser can provide online ppb level detection of chlorides and sulphates in power plant water to control corrosion and minimise damage.

Online, ppb-level chloride and sulphate monitoring

The innovative 3000CS analyser uses microfluidic capillary electrophoresis, an ionic separation technology, to directly measure trace levels of harmful sulphate and chloride ions. With online measurements every 45 minutes, the analyser automatically performs direct chloride and sulphate measurements in pure water and power cycle chemistry samples, for immediate detection of any contamination. The most important point in the cycle is at the turbine inlet, to ensure that only acceptable levels of chlorides and sulphates enter with the steam into the turbine.

Low cost of ownership compared to offline methods

Typically, chloride and sulphate measurements are done with offline technologies, such as ion chromatography and inductively coupled plasma. The 3000CS provides accurate chloride and sulphate measurements continuously, delivering a rapid return on investment by eliminating the need for costly internal or external laboratory tests.

Easy to maintain with ISM predictive diagnostics

The unit features semi-automatic calibration and an intuitive touchscreen interface. ISM (intelligent sensor management) technology provides diagnostics that predict when maintenance or replacement of consumables will be required.

For more information contact Darren Prinsloo, Microsep, +27 11 553 2300, darren.prinsloo@microsep.co.za, www.microsep.co.za

RELIABLE ENERGY SOLUTIONS

for the entire mining sector.

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 mine and plant 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 for the mine.

Zest WEG Group

Tel: 0861 009 378

www.zestweg.com
As a global bearing and rotating technology specialist, SKF South Africa is committed to assisting companies to achieve their productivity goals whilst remaining environmentally friendly. The Multilog On-line System IMx-M was the perfect solution for condition monitoring at a biomass electricity plant in Nelspruit, Mpumalanga.

The plant produces electricity using the waste generated by the neighbouring paper plant, which is used to fire the boilers to generate steam to drive a turbine capable of generating 25 MW.

SKF received a proposal request for a condition monitoring system with 4-20 mA outputs and proposed the sophisticated IMx-8 condition monitoring device. Lourens Zeelie, online condition monitoring specialist at SKF South Africa, explains that this device however does not feature the requested 4-20 mA outputs: “So we revisited our extensive IMx product range and determined that the IMx-M protection system, which features 4-20 mA output capabilities would be the ideal fit for the biomass electricity plant.”

The Multilog On-line System IMx-M is a protection system designed to react to any deviations to protect the equipment it is monitoring. Utilised in conjunction with SKF’s @ptitude Observer software, the Multilog IMx-M offers a comprehensive system for machinery shutdown initiation, early fault detection and diagnosis on machines and bearings.

Lourens points out that of the two IMx-M condition monitoring and protection modules, supplied as a pair, the biomass plant project only requires condition monitoring. The protection module will therefore initially not be utilised, but SKF will work with the customer post commissioning to look into the possibilities of incorporating protection capabilities.

The IMx-M will be used in the biomass plant to monitor the general condition of the equipment, for example, machine balance and alignment, as well as detailed bearing condition. Additionally, the IMx-M system will provide automated advice for correcting existing or impending conditions that can affect machine reliability, availability, efficiency and performance. This proactive approach offers users adequate planning time to arrange the necessary maintenance equipment, parts and labour.

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

SKF condition monitoring system to boost reliability at biomass electricity plant

A new panel-mounted power monitoring device (PMD) from Socomec has been launched locally by ElectroMechanica (EM). The Socomec DIRIS A-40 has been designed for measuring, monitoring, and reporting electrical energy. The latest PMD offers a range of functions for measuring voltage, current, power, energy, and power quality. Compliant with IEC 61557-12, implementation is quick and efficient. The three current technologies – namely solid-core, split-core, and flexible (TE, TF and TR/ITR) – allow for a monitoring solution to be implemented on new and existing installations.

IEC 61557-12 is a specific standard for all PMDs designed to measure and monitor electrical parameters in distribution networks. Compliance with the standard ensures a high level of equipment performance, metrology, and also the mechanical and environmental aspects.

A configuration wizard provides step-by-step instructions for the end user, in addition to detecting and correcting configuration errors, thereby slashing commissioning time by half in order to guarantee a reliable monitoring system. The Socomec DIRIS range consists of IIoT-ready connected products that can export data automatically for remote processing, without any restrictions on time and storage. The embedded WEBVIEW-S solution optimises metering, alarming, and monitoring functions, with no need for additional software.

Metering consists of the measurement of active, reactive and apparent energies; a historic record of measurements; a graphical display on a monthly, weekly, daily, or hourly basis; and automatic data export via FTPS in CSV format. Monitoring includes real-time measurement of electrical values; viewing data as graphs or tables; and power quality analysis of the utility supply and loads.

The Socomec DIRIS A-40 has panel-mounted measurement units, ensuring that the end user has access to all the measurements required for carrying out successful energy efficiency projects, as well as monitoring electrical distribution. All of this information can be analysed remotely using an energy management software solution. Thanks to its large backlit LCD display and its multiple viewing screens with direct pushbutton access, the Socomec DIRIS A-4x provides clear readings and is easy to use. It directly displays a number of multi-measurement and metering values.

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

Latest power monitoring device
A diverse range of process to instrument valves and connections aimed at eliminating potential leak paths for the oil and gas industry was highlighted at ADIPEC by the Instrumentation Products division of Parker Hannifin. The company showed the latest additions to its extensive monoflange and Pro-Bloc ranges of block and bleed valves, including versions that comply with the Class A ultra-low-emission requirements of the international ISO 15848 standard, together with a new range of flushing ring integrated into existing double block and bleed technology – that eliminate the need for individual components such as standalone flushing rings and ball valves.

Parker’s monoflange and Pro-Bloc valves are designed to couple instrumentation to the process lines as closely as possible, and to eliminate any use of threaded components. By combining all necessary primary and secondary valves on a single one-piece body, which mounts directly onto a process flange without use of additional fittings, both series of products reduce the number of potential leak paths substantially. They also help cut installation time and cost. A wide choice of standard flow and valve configurations – including single block and bleed, and double block and bleed – provides a flexible interconnection scheme, enabling plant engineers to match requirements easily.

Installation of remote instruments usually involves use of conventional tubes and fittings, implying that NPT taper threads, together with PTFE tape or anaerobic sealant, will feature at some point along the path. Since these types of connections can compromise system integrity and cause contamination problems, Parker offers solutions for eliminating them whenever possible. This design goal can be achieved on both Parker monoflange and Pro-Bloc valves, where instrument outlet connections can incorporate single or two-ferrule compression type tube fittings.

Parker goes to considerable lengths to ensure the material used for its process to instrument valves is of the highest quality. Raw material is sourced from mills with fully traceable records for quality audit purposes. Furthermore, each flange is forged from a single piece of grain flow-controlled steel. As standard, they can be fabricated from A105 carbon steel, AF350 LF2 low temperature carbon steel, A182-F316 stainless steel and A182-F51 duplex stainless steel. Optional corrosion resistant materials include super duplex, Monel, Hastelloy, 6Mo and Incoloy 625, subject to the physical layout constraints of the installation.

New actuator design
The new series of solenoid valves for actuator control was also on display. These allow device operation down to -40°C ambient temperature. The X Series unique design advantage is based on coil modularity: coils can in fact be removed from the pressure vessels. Such option offers a strong advantage when replacing a valve or a coil is required. In case of failures, it minimises cost of parts to be replaced (only pressure vessel or coils requiring service would be replaced). For maintenance purposes, since different pressure vessels could share the same coil, entire operation sites could be maintained with just a few spares.

Such advantages also provide improvement in reactivity and service to customers. By achieving the low temperature and material traceability features, in addition to the ease of configuration given by modularity (coils can be dismounted for any purpose including installation, maintenance, cabling), the X Series provides a flexible, reliable and easy to use product solution for valve actuation in the oil and gas industry.

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

Gasification reactors, due to their harsh process conditions, place high demands on the instruments used there. Many manufacturers have reacted to this and adapted their products accordingly, but what are the optimisation possibilities for thermocouples used at higher process pressures?

The challenge: gasification reactors
In a gasification reactor, there is an extremely aggressive process atmosphere and, with that, the risk of poisoning of the noble metal thermocouple. The process conditions often lead to shutdowns and interruptions in operation. Profitability and safety aspects are thus two important themes in connection with the instruments used in them.

The solution: Sapphire thermocouples
WIKA has developed the TC84 sapphire-design, high-temperature thermocouple specifically for use in gasification reactors. Through the use of a sapphire protection tube, the high-temperature thermocouple is protected from poisoning by the aggressive process atmosphere during operation. The reason for this is its monocrystalline structure. The sapphire-design thermocouple has, as a result of its construction, a significantly higher service life than other high-pressure thermocouples and, therefore, contributes to a clear reduction in process downtime.

Radiometric solutions in refineries

Berthold Technologies’ radiometric instruments for non-contacting level and density measurement are widely used in the oil refining industry, where customers include Exxon Mobil, Sinopec, Shell, BP, Conoco Phillips, Lukoil and Total.

The measuring solutions based on gamma absorption help customers to control their processes for safe operation and maximum efficiency. Berthold is renowned for cutting-edge technology and high-class products and provides a wide range of standard solutions to industry. In addition it develops, in close cooperation with customers, tailored systems for new processes and measuring tasks.

To make critical applications more reliable the company provides interface, level and density measurements for oil/emulsions/water in desalters; distillation bottoms; delayed coking units; solvent de-asphalting units; alkylation units; fluidised catalytic cracking units; and continuous catalytic reforming processes.

Committed to technology leadership
The high-sensitivity detectors achieve a better measuring effect and can work with remarkably low source activities. Depending on the application the source activity can be reduced by up to 80%.

Unique features such as X-ray interference protection during weld inspections (XIP and RID), the patented temperature and ageing compensation and SIL2/SIL3 certification leads to superior measurement performance and high reliability, which remain stable over time. These non-intrusive measurement systems offer a number of advantages including:
- Outside mounting of components.
- Not exposed to the harsh process conditions.
- Free of wear and maintenance.
- Smooth handling and operation.
- Lowest cost of ownership.
- Easy to install on existing pipes or tanks.
- Perfect for high temperature and pressure applications.

For more information contact Mecosa, +27 11 257 6100, measure@mecosa.co.za, www.mecosa.co.za
Self-cleaning flow indicator for liquids

To check the flow processes in pipeline systems and for insight into the interior of process pipes, many flow indicators are used in which the flowing medium sets a rotor turning and thus to a large extent visibly signals a flow. Instrotech is offering Kobold’s DAA self-cleaning flow indicator, with the unique characteristic of the rotor being housed in a rotatable glass cylinder. This version ensures a functional flow check from two points of view. On one hand, its construction as a visible cylinder gives a relatively large and thus easily observed field of observation; in addition, the rotary movement of Teflon rotor permits reliable monitoring of cloudy or dark media due to its noticeably bright colour. This type of device is already widely used and has proved itself in industrial use thanks to its functional reliability.

The unique design and construction of the DAA flow indicator, specifically the incorporation of two wiper elements has resulted in a product first – combining a flow indicator with a device which allows the equipment to be cleaned during operation. The sight tube is rotated so that the wiper elements concentrate the dirt into two narrow strips on the interior of the glass. From there it is taken away effortlessly by the flow.

The borosilicate glass tube is fitted with O-rings which slide easily, so that the cleaning of the unit can be carried out by hand even under full operating pressure. The flow indicator with integral cleaning device can be used in any position for checking the flow of gases and liquids. A choice of sizes is offered and flow rates of 0.4 l/min up to 100 l/min H2O can be reliably checked. Along with the standard housing version in brass, the units are also offered in a resistant stainless-steel version for aggressive media. If the rotor is unwanted for particular applications, for example increases in flow rate, the unit is also available with just a sight glass with cleaning device.

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

Thermal profiling can prevent business disasters

Thermal profiling is the term used to describe the process of recording and interpreting the temperatures of products and air as they move through a heat treatment process.

In the food, beverage and pharmaceutical industries, it is essential to know the temperature at which a process is being run. This is critical to ensure that product quality is maintained to the standards required by consumers.

Not all processes are equal. Each process has its own challenges in terms of space, duration and environment (steam and submersion in water or oil).

The risk to public health places the processing industry firmly under the public spotlight.

Therefore, the effects of getting cooking or freezing processes wrong can be disastrous for a business, as well as its customers.

The Datapaq range of Thermal Profiling units and Thermal Barriers allow temperature logging equipment to pass through the treatment ovens connected directly to the process. This type of system is unique as it maintains the operability of sophisticated recording and storage electronics at temperatures in excess of 1000°C.

The units also come with a sophisticated software package that allows users to set parameters like actual ramp and soak times required to meet the desired specifications, and on completion, print out actual versus desired values to showing any deviations from the required profile, along with the durations.

There are many different packages available for different applications, but as an example the Food Tracker System, comprises of Insight software, a data logger and a selection of protective thermal barriers and thermocouples. It offers an accurate and reliable means of measuring product and environmental temperatures, an essential requirement for HACCP data analysis and process validation.

All systems offer enhancements such as humidity measurement, food tray and thermocouple jig, as well as the TM21 Radio Telemetry System for real-time temperature monitoring.

Another use of the Datapaq system is to use the information to optimise process temperatures. The most frequent food processing applications in the profiling systems include: food processing, baking, pasteurisation and sterilisation.

For more information contact R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za
Emerson has introduced the Daniel 3418 eight-path gas ultrasonic flowmeter, which delivers highly accurate flow measurement in natural gas custody transfer applications with reduced upstream piping requirements and without flow conditioning. The meter compensates for flow distortions that result from pipe bends, shorter straight runs or smaller design footprints, allowing it to operate in more design configurations without sacrificing accuracy and long-term performance.

The 3418 is Emerson’s first ultrasonic flowmeter to pass all perturbation tests for OIML R-137 Accuracy Class 0.5 with only five pipe diameters in front of the meter and without a flow conditioner. It features eight interlocked direct chordal paths, positioned as two British Gas path layouts where the second is the mirror image of the first, allowing the meter to cancel out asymmetrical velocity effects. This design enables it to measure flow with greater resolution and accurately calculate swirl, reducing the need for flow conditioning and long upstream piping configurations.

As a part of the Daniel Gas Ultrasonic product line, the 3418 features the ability to calculate standard flow and directly integrate with temperature and pressure transmitters, gas chromatographs and flow computers while providing real-time meter and process diagnostics. The instrument uses Emerson’s proprietary MeterLink diagnostic software with specific enhancements designed to mimic the look and feel of the original Daniel four-path gas ultrasonic meter interface.

“The addition of this new model further supports our customers with the most technologically advanced fiscal measurement ultrasonic portfolio in the marketplace, yielding the highest level of measurement confidence available,” said Lonna Dickenson, director of product marketing for Daniel ultrasonic flowmeter products at Emerson.

Available in sizes DN250 to DN1050 (10-in to 42-in), the 3418 offers bidirectional flow capabilities, increased flow capacity and no incremental pressure drop, therefore reducing measurement risk and minimizing operating cost.

For more information contact Devesh Roopnarain, Emerson Automation Solutions, +27 11 451 3700, devesh.roopnarain@emerson.com, www.emerson.com
Interface measurements in desalters are often regarded as non-critical, even though every drop of oil to be refined passes through the desalter. As refineries try to maximise their margins, so-called opportunity crudes are often used. These generally contain increased levels of sulphur, oil sands, bitumen, heavy oils and oils with high TAN. This can lead to problems with the proper operation of the desalter. In addition, refineries are increasingly confronted with stricter environmental regulations. The efficient level control of water/emulsions/oil layers in the desalter ensures that salts and minerals are effectively removed and that environmental requirements are met. Therefore, more and more operators are turning to radiometry as a highly reliable and accurate measurement solution for this application.

If a clearly defined interface is formed, different technologies can be used for interface measurement. If a larger emulsion layer is formed, for example, when using opportunity crudes with a significant density gradient change from oil to water, the measurement with alternative technologies can lead to errors. These cannot determine the height of the emulsion layer and always assume only one separation layer (or interface). This can lead to misinterpretations with the level read as either too high or too low.

EmulsionSENS from Berthold – optimum control of the desalting process

In addition to controlling water and brine levels, the EmulsionSENS interface measuring system from Berthold Technologies allows users to monitor the gradient change in density to ensure that the water content in the area of the electrostatic grids stays within defined limits, preventing short circuits. In addition, the emulsion layer can be kept continuously at the desired level with the help of an EmulsionSENS, which leads to a significant reduction of the ‘emulsion breaker chemicals’.

Thus the probability of upsets is reduced and throughput in the desalter is maximised, which saves energy and money in the long term through highest degrees of accuracy and process stability.

For more information contact Mecosa, +27 11 257 6100, measure@mecosa.co.za, www.mecosa.co.za
The measurement of CO₂ emissions throughout industry is a critical activity. Across many industries, leaks in equipment resulting from non-maintenance, mechanical damage or wear and tear can impact on the wellbeing and safety of not only employees, but also on the manufacturing processes involved, for example, in the food, beverage and refrigeration industries.

Adding to its already extensive range of instrumentation, Greisinger, part of the GHM Group of Companies, has launched its brand new G 1910-2 and G 1910-20 CO₂ mobile, handheld measuring devices. These offer benefits to the user such as a compact CO₂ monitor with an integrated sensor and an optical and acoustic alarm function with a large rechargeable battery life, easy charging and a wide measuring range.

Jan Grobler, managing director of GHM Messtechnik South Africa, elaborates: “From breweries, wine presses and dispensaries to heating, ventilation and air-conditioning to energy management in buildings and use in research and education, this newly launched, compact handheld measuring device fits perfectly into the hand and can be taken anywhere.

“Every mining or pulp and paper plant, for example, has to monitor the environment and this device offers a wider measuring range than usual, which can reach up to 2000 ppm in the G 1910-02 version, and as much as 19 999 ppm with the G 1910-20 model. Additionally, having a calibration connection means the customer can recalibrate the device themselves, or we can do it for them. This eliminates the need to for devices to leave the place of operation for recalibration purposes.”

The devices are equipped with benefits such as a long-lasting rechargeable battery with low power consumption that enables measurements over a period of 24 hours. Standard AA NiMH batteries can be used and recharged via the Micro USB connection with a standard Micro USB charging cable without the need for a special mains adaptor.

The instruments also have alarms for applications in air quality monitoring, green houses and energy management. CO₂ is measured with a high-class non-dispersive infrared (NDIR) sensor. The display of the time-weighted average over eight hours (TWA) or 15 minutes (STEL) can be read simultaneously.

For more information contact Jan Grobler, GHM Messtechnik South Africa, +27 11 902 0158, info@ghm-sa.co.za, www.ghm-sa.co.za
Siemens has extended its Industrial Edge offerings for the machine-oriented Sinumerik Edge to include more new applications. With the new software, the company is helping machine tool users to improve workpiece and process quality, increase machine availability, and further optimise machine processes. With edge computing, large volumes of data can be processed locally on the machine tool. This also reduces storage and transmission costs for users, as large data volumes can be pre-processed and only the relevant data then transferred to a cloud or IT infrastructure.

Using Analyze MyWorkpiece/Vision to reduce downtimes based on artificial intelligence

At EMO 2019, Siemens presented the Analyze MyWorkpiece/Vision application for the first time. The software works with image recognition and is based on artificial intelligence. It detects whether the right workpiece is in the correct position in the machine room – and it works better than the human eye. If the workpiece is positioned correctly, processing can be started. The application can also detect wear on the tool. In addition, the application transmits the work process live via camera from the machine room and documents all image data. Analyze MyWorkpiece/Vision ensures preparation and process quality for users. By detecting tool wear, resources can be used efficiently.

The application configuration is tailored to the machine operator, meaning that users can benefit from artificial intelligence without a great deal of expert knowledge. Job setup using the application is also easy, so simple integration into the manufacturing process is possible. Analyze MyWorkpiece/Vision joins the portfolio of existing applications such as Analyze MyWorkpiece/Toolpath, Analyze MyWorkpiece/Capture and Analyze MyWorkpiece/Monitor, all of which contribute to better workpiece and process quality, helping to increase the productivity of machine tools and to reduce costs.

Increased machine productivity using artificial intelligence with Optimize MyMachining/Magazine

In the field of performance enhancement, Siemens is also presenting a new edge application. Part of the performance increase results from an optimal arrangement of tools in the magazine. The optimisation algorithm is based on artificial intelligence and runs on Sinumerik Edge. It calculates the tool arrangement in order to minimise manufacturing time. In the field of improved machine productivity, the new application adds to the Optimize MyMachining/Trochoidal application.

Protect MyMachine /3D Twin for Sinumerik One

The Sinumerik Collision Avoidance application presented at this year’s EMO is an edge-based application especially for Sinumerik One. Protect MyMachine /3D Twin includes comprehensive protection of the machine and tools in terms of the current setup situation, including dynamic observation of workpiece protection. By using Sinumerik Edge the performance and productivity of the NCU is not adversely affected by additional computing performance. With Create MyVirtual Machine and Run MyVirtual Machine – both software applications for Sinumerik One for creating digital twins – computational models created in this context can be used to include in Protect MyMachine/3D Twin, which joins the existing Analyze MyMachine/Condition application in the field of digitalisation solutions for machine tool condition monitoring.

Edge management as a control centre

With Manage MySinumerik Edge, Siemens presents its Industrial Edge Management solution to manage edge applications for machine tools. With Manage MySinumerik Edge, all connected devices can be administered, monitored and updated centrally. In addition, applications are always distributed in the latest version efficiently and securely to Sinumerik Edge devices. Applications can be installed on Sinumerik Edge devices without adverse effects, regardless of the machine tool operating state. Edge applications can be provided both by Siemens and by third-party suppliers. Users and machine builders can also develop their own applications, tailored to the individual requirements of their machines.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za
Beyond Capex and Opex
How best to finance cloud services and edge computing?

How do we finance IT? We identify a need, we test the waters with a PoC (proof of concept), then we get the green light after we prove the value. We know roughly how much it will cost by looking at the proposal; now let’s go ask for money. Simple, right? Not so. At the next IT conference you attend, ask anyone you strike up a conversation with how they capitalise their IT projects, I’m willing to bet you will either get a momentary silence followed by passionate debate, or a sigh accompanied by angelic-like shaking of the head.

Let’s add even more confusion
Capex is funding for assets. Simple, no debate required here. Opex is operational expenditure throughout the given period of time – a quarter or a year depending on how a company defines it. These are fairly simple definitions attributed to IT expenses, whether in project or operational mode. However, as time has passed, the introduction of digital process technologies has blurred the lines of conventional IT financing, and applying these conventional funding methods to technologies such as IaaS, SaaS, edge computing etc.

So how is cloud computing financed?
The mainstay of cloud computing is its effort to guarantee Quality of Service (QoS), and a sometimes smoke and mirrors financial benefit, I mean, you’re renting vs buying expensive infrastructure, the Achilles heel of all capital IT projects.

However, there are literally hundreds of white papers on cloud pricing, which is no surprise. Confusion around costing schemes that exist today includes offline, online and edge pricing, together with usage-based, location-based, time-based and volume driven options. I urge readers to study a paper titled ‘Pricing Schemes in Cloud Computing: An Overview’, published in the International Journal of Advanced Computer Science and Applications (IJACSA), Vol. 7, No. 2, 2016. The lengths to which these brave people went to produce this fascinating document speaks volumes of their character, but also to the sheer magnitude of pricing options designed to meet the needs of companies adamant that cloud computing is a must have component of their IT strategy.

We have defined the types of pricing methods available, but have yet to address the issue of Capex vs Opex.

Up to now, Opex has been the preferred choice when paying for cloud services, be it to a cloud provider or the purchase of on premise or asset, whichever you choose. Of course the argument will have to be convincing when you do apply for the Capex at your internal financial department, as they will probably be as baffled by this ‘guidance’ as you might be. It means one can now, based on certain principles, capitalise a period-based cloud service contract. Hmmm, licence fees, rented software applications, utilisation, yes, all can be capitalised under this guidance.

You can find this guidance by doing a Google search for 350-40 Internal Use Accounting Standards Board approved a ‘guidance’ to allow a company that has a service contract with a cloud provider to capitalise that month-to-month expenditure, or asset, whichever you choose. Of course the argument will have to be convincing when you do apply for the Capex at your internal financial department, as they will probably be as baffled by this ‘guidance’ as you might be. It means one can now, based on certain principles, capitalise a period-based cloud service contract. Hmmm, licence fees, rented software applications, utilisation, yes, all can be capitalised under this guidance.

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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.

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Navigate the fourth industrial revolution with PricewaterhouseCoopers

By Steven Meyer.

Using the building blocks of 4IR to transform business processes into manufacturing advantages requires a holistic approach.

Today, most manufacturing companies recognise the potential of 4IR technologies to improve their overall production efficiency. For many, however, moving past proof of concept remains a challenge. According to PwC Smart Manufacturing Lead, Vinesh Maharaj, this is because the first step in the digital transformation journey often gets skipped. "Effective scaling across an enterprise hinges on an integrated transformation strategy," he adds, "which must be developed during a concept phase that precedes any investment in a pilot project."

The implication is that the heavy-hitter organisations that go on to become ‘digital champions’ embrace digital transformation as the future of business, rather than some quick-fix patch applied to staunch a bleeding bottom line. With its track record in audit and management consulting, PwC already understands the business of many of these digital champions. No surprises then that it has expanded its advisory offering to include manufacturing technology, and more specifically, digital transformation in the smart factory context.

"In the past, our technology offering consisted of advisory services relevant to business-related technologies, anything from ERP systems down," opines Maharaj. "Now, as the ideas of Industry 4.0 start to go mainstream, we have added an industrial technology component to include automation systems from level 3 down to the factory floor."

The foundation for the Smart Factory advisory offering in South Africa is built on a mature practice in Germany: The Digital Operations Impact Centre. "They have been on the digital manufacturing journey for the last six years," elaborates Maharaj. "In that time, they have built a portfolio of over two thousand clients, which gives us a critical mass of references to expand the service into South Africa, and other areas as well. What we bring in an advisory capacity covers all aspects of smart manufacturing and smart supply chain transformation."

His ratification is that in most areas of manufacturing, South Africa is falling behind in terms of global competitiveness, not to mention creating new job opportunities for the burgeoning majority of unemployed youth. For us to recover, we need to
reindustrialise so that we can produce goods at prices that allow us to create new export opportunities. PwC’s purpose then is to contribute towards finding solutions to this important problem. So what does it have to offer?

Achieving outcomes that were not possible before
Maharaj explains that in general, PwC’s client base searches for guidance in one or more of the following five areas: sorting through the noise; funding and executive support; thinking through the journey; new ways to work; and cybersecurity.

As it happens, this is a very good fit with the uncertainties associated with a shift into digitised manufacturing, which means PwC brings many lifetimes worth of accumulated experience to the new offering.

“We believe in a holistic approach,” continues Maharaj. “Our Smart Factory service is delivered ‘strategy through execution’ through a combination of market, business and technology expertise.”

The approach he refers to is underpinned by the digital maturity assessment. This first step towards smart factory transformation is not purely about technology though, but includes the all-important issues of people, redeployment and new skills development.

“The only way to transform the manufacturing sector in South Africa is through trust,” stresses Maharaj. “With senior managers, we need to build trust in the ideas and technologies of the fourth industrial revolution. We can do this through practical case study examples, but on their own, these are not enough. Smart manufacturing is about breaking down traditional barriers to information across the organisation in ways that empower people at all levels to contribute through better informed operational decision making. As such, any strategy we develop must lead to better performance at all levels in the organisation. For the C-suite, we outline the business case for digital transformation within the unique environment of that particular organisation. At other levels, the strategy addresses change management and plans to reskill the company’s workers so that they can be redeployed to perform new tasks.”

Typical plant assessment process
Maharaj highlights that smart factory transformation in itself is not a project with predetermined start and finish dates. Rather, it is an endless quest to ensure the company’s competitive advantage in an ever changing marketplace. Digital technology is the enabler and better informed business decision making to a level that was not possible before is the prize. It is by nature a disruptive process, and therefore, one which very few organisations can manage by themselves.

A comprehensive strategy is the key and this is what differentiates the PwC offering.

“We bring vendor neutrality to the table,” outlines Maharaj. “Our process starts with a detailed plant assessment. Once we have interviewed management we move down and observe what is happening on the shop floor. Then we look at the current data collection and analysis capabilities, together with other important IT issues like cybersecurity.

“Once we have collated our research, the next step is the Opportunity Spotting workshop. Here we get together with a core team made up from all the plant’s divisions to discuss recommendations that would add value if they were pursued to implementation.”

The outcome of this workshop is a prioritised, time-based roadmap that captures all angles of the proposed transformation strategy. Thanks to its history in auditing and management consulting, PwC is able to factor areas like tax optimisation, HR and change management into the strategy – value-add beyond the capacity of most pure technology consulting service providers.

“When all is said and done, we see ourselves as ideally positioned to act as a trusted advisor for the long haul,” concludes Maharaj. “What we deliver initially is a business case for the deployment of automation technology to unlock new business value. We substantiate our ideas through proof of value projects designed to test the recommended strategy. Then, once we have buy-in at all organisational levels, we proceed with full implementation. We don’t take a ‘Big Bang’ approach though, but rather we break things down into a series of smaller projects designed in such a way that ROI generated by the first is used to fund the second, and so on. Any strategy we propose extends beyond pure technology advice to include areas as diverse as tax efficiency, reskilling of staff to avoid redundancy, change management and that all-important matter of cybersecurity. But the one thing that must never be forgotten is that everything hinges on that initial digital maturity assessment.”

The service offering Maharaj describes makes undeniable sense within the blue-chip environment that is PwC’s target market. Managing the disruption of a smart factory transformation is a natural extension to the company’s traditional consultancy-based services, and, given how fast the manufacturing sector in South Africa is being overtaken, many local blue-chip companies stand to benefit from an exploratory meeting with the PwC team.

Case study: Digitising companies for Industry 4.0

Challenge: At its production line in Saarbrucken, Germany, ZF produces about 10 000 automatic gearboxes for cars per day. During this highly complex process specific machine parts scuff out – and therefore, stop working from time to time. The machines stand still and the manufacturing process is delayed. This costs time and money.

Approach: PwC helped ZF to establish a predictive maintenance system. To run this, ZF needed to collect and utilise the information to subtract their next step. Therefore, PwC specialists helped develop a system that utilised data gathered by sensors throughout the production line and, using AI, identifies patterns indicating tool breakage. Hence, the output indicates when ZF needs to maintain or shut down a machine. Additionally, PwC took steps to find out why breakage occurs and gathered ideas on how to prevent crashes in the future.

Engagement impact: Post implementation, 99 percent of all tool breakages can be supervised in real-time. Thanks to data based prognosis and learning algorithms, ZF will likely be able to predict when the need for maintenance will occur. Through this project, ZF gained valuable insights into its processes, which will help the company further enhance the efficiency of its production.
Artificial intelligence in manufacturing – a practical and simplified view


Why AI in manufacturing?
Competitiveness ultimately drives any company, especially in manufacturing. Hence, it is no surprise that manufacturing companies are now investing more resources in AI for automation and complex analytics. We believe that AI is a force multiplier on technological progress, and specifically in the manufacturing competitiveness. According to McKinsey Global Institute, manufacturing stands to benefit the most from AI, and specifically in applications such as predictive maintenance. AI's ability to make sense from data, including audio and video, means it can quickly identify anomalies to prevent breakdowns, whether that be an odd sound in an engine or a malfunction on an assembly line detected by sensors.

Looking at and interpreting data generated during the manufacturing process to find ways to reduce waste, improve quality and increase yield is not new. However, the increased use of digital technologies in manufacturing is changing the analytical landscape. Data is generated by digital sensors and actuators, connectivity of machines and the manufacturing environment, and many other sources generally described as the Internet of Things (IoT). This explosion of data increases the complexity for humans to find patterns and trends in the masses of data.

Traditionally, manufacturers have financed improvements as capital expenditures. AI offers a lower cost alternative by enabling companies to use software to analyse the vast amount of data available in and around the factory. AI enables the manufacturer to get more out of its heavy assets by improving throughput, reduced energy consumption, and better process and quality control.

What is AI?
AI is the term that encapsulates machine learning and deep learning. Machine learning is used to ‘learn’ how to execute a specific task from data. Image-recognition is one example where a machine is given thousands of pictures to analyse and acquire the ability to recognise patterns, shapes, faces, and more (based on the features extracted). In machine learning, you need to choose for yourself what features to include in the model, e.g. which features represent the data best to execute the task. Deep learning is an advanced form of machine learning that mimics the layers of neurons in the brain (neural network) to build up a complex AI model, similarly how a small child learns from experience – (s)he would recognise a chair even it does not have four legs, a seat and a backrest. You do not need to understand which features provide the best representation of the data; the deep neural network learns how to select critical features, which are then used to ‘learn’ how to execute a task.

AI and robotics are often used interchangeably, but are two different concepts. AI takes robotics (virtual or physical) and automation to the next level by introducing human-like cognitive abilities. Robots with AI can act beyond rules. AI enables learning in processes and machines thereby making them more effective for the task at hand, using data to modify and adapt behaviour, especially where tasks are repetitive.

Using traditional statistical methods (with the aim to analyse and summarise data) is very dependent on the user and his/her capability to identify possible patterns and trends in data; constrained assumptions are made about the problem and data distributions. AI, using machine learning and deep learning techniques, can analyse massive amounts of data to better understand what the outcomes might be for all (or at least many more) possible options; no firm pre-assumptions about the problem and data distributions are made as the goal is to learn from the data.

Use cases
In operations, machine learning is applied to enable supply chain and inventory optimisation. This includes prediction of optimal stock levels, best routes for delivery and collections, warehousing and other logistics; all leading to cost reduction and improved productivity. Predictive quality management is applied to identify quality issues earlier in the production process leading to a reduction in waste, improvements in quality and an increase in yield.
Predictive analytics provide new ways to better understand when equipment may fail; when it requires maintenance, repair or replacement (in part or whole). This impacts directly on the supply chain by decreasing the levels of stock to be carried ‘just in case’ something breaks. Another way to use predictive analytics is to predict demand for products, even products that are not currently manufactured (new pipeline). Augmenting the manufacturing process data with customer behavioural data can provide a further competitive edge, for example, customisation of goods to specific customer needs.

Advanced business and economic analytics, sales demand forecasting, and predicting the ideal time to purchase material and parts considering exchange rate fluctuations are examples where AI is applied. Intelligent process automation is used to alleviate the burden on administrative personnel to perform tedious or manual tasks which in turn improves administrative productivity in the organisation.

AI in marketing and sales significantly improves the customer experience and effectiveness of marketing efforts. Machine learning techniques applied to cluster an organisation’s customer base enables personalised and directed marketing, automated personalisation of products and services, and prediction of customer needs. The company’s brand is protected through automated monitoring and sentiment analysis of emails and social media; personalised customer engagement is thus possible over multiple channels including conversational online assistants. The effectiveness of sales efforts is assessed, and sales trends and patterns are predicted near real-time through machine learning techniques.

Certain health and safety concerns are effectively addressed through the application of AI. High-risk situations can be identified, and incidents predicted enabling managers to mitigate risks and prevent incidents. Compliance to health and safety regulations are monitored through real-time video and image analysis.

Other operational efficiencies can be obtained from AI in energy management and resource optimisation.

**Practical AI implementation considerations**

**Data**

Appropriate data is important. If sufficient data is not available, data can be sourced by adding IoT, integrating with other business and surveillance systems, or accessing external information. Master data management can be applied to assist in understanding and managing data at a macro level.

Clean data is important. Many successful AI projects entailed significant effort in cleaning the data before machine learning can be applied.

**Computing power**

Significant processing capability (computing power) is used in building and training the initial AI models. Deployment of the AI system will require computing power to continuously refine the models in the operational environment. This should be addressed once as part of project design and implementation.

**Expertise and methodologies**

Access to AI expertise: staff with the relevant experience in applying machine learning techniques to manufacturing problems are in short supply. Work with a dedicated AI team, often located at an industry partner and use methodologies specific to developing AI implementations, including AI readiness assessments, AI roadmaps, model development, etc. Focus on understanding the business, stakeholder/customer needs, and opportunities to maximise the value from the AI implementation.

“An AI readiness assessment will map out where you are on the AI journey.”

**Threats**

- Will AI create unemployment? This is not a new fear. In the beginning AI will eliminate some of the human tasks; we need to find ways to adopt and re-skill ourselves. Then it has potential to create more jobs than it eliminates.
- This is maybe somewhat similar to transition from horses to cars during the first industrial revolution. Similarly, when ATMs or computers came around in the 70s and 80s. Like with other revolutions, AI adoption requires mastery of new skills.
- Bias: AI models are created with the data at hand. If the data is not fully representative of the problem space, the model will be biased and will not provide fair and reasonable decisions for all instances where it is used. AI can be used to influence perceptions which ultimately can negatively impact on possible decisions. Therefore, AI implementation needs to be cognisant of potential bias and ensure representative data.
- Governance and ethics: software glitches could easily cause AI mistakes. There needs to be clear accountability and regular ownership, e.g. who is responsible if a self-driving car or a drone makes a severe accident? Society needs to ensure that our complex AI systems do what we want them to do.

Where are you on the AI journey?

An AI readiness assessment will map out where you are on the AI journey, and where AI can have the biggest impact. The following describe broad categories of where organisations may find themselves in their AI journey:

- You have not yet implemented any digital technologies. You stand to gain the most from this journey towards AI. Implementation of a cost-effective digitalisation program aligned to your business strategy will lay a solid foundation for your AI journey. This can be achieved through the introduction of IoT as an example.
- Your factory is equipped with many sensors and systems to generate lots of data (already IoT enabled). You are ready to fast track your AI journey. Your opportunity is in the integration of your data in process management and control. The challenge is to identify and address the missing data that will get you the biggest leverage from AI. Early AI implementations can already start.
- You have implemented a digital strategy. Your data is integrated with integrity and complete. You are ready for full-scale AI implementation with continuous improvement.

**Conclusion**

In summary, adopting AI will lower cost, improve yield and empower the manufacturer to provide distinct value to customers. As part of mainstreaming AI, various use cases provide evidence of the improvements generated using machine learning and deep learning.

Many of the exceptional companies are embracing AI fully – for any organisation that have not yet taken AI seriously, now is the best time to start getting up to speed.

Partners with capabilities in AI can collaborate with manufacturers to implement AI. We propose that an AI readiness assessment be performed, and an AI roadmap developed to guide implementation and investment to accelerate technological progress and manufacturing competitiveness. Early implementation of AI use cases can start in parallel to AI readiness assessments.

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Rittal’s new innovative adaptor

Answering to the call by Industry 4.0, Rittal’s Blue e cooling units can now integrate into existing condition monitoring and IIoT systems thanks to a special adaptor that retrofits comprehensive communications capabilities.

**Higher system availability**
The new adaptor can be used to set up condition monitoring for up to 10 cooling units in a master/slave arrangement. That means not only can data be recorded, but efficiency analyses can also be carried out on the cooling solution. A monitoring system that issues automatic notifications can also be set up to detect faults and limit breaches, thereby helping boost availability and prevent expensive machine downtime.

The new adaptor is compatible with all Blue e units that use a Comfort Controller and both wall and roof-mounted cooling units can be made fit for Industry 4.0. This applies to both standard units and stainless steel versions. Similarly, Rittal cooling units with a NEMA 3R/4 or NEMA 4X classification – which are often used outdoors – are ideally suited for incorporation into IIoT applications. Typical examples of outdoor applications for these units include renewable energy facilities such as solar and wind power plants. As these plants are usually located in isolated areas, it is essential that they incorporate remote monitoring for panel building and switchgear manufacturing.

**Straightforward commissioning**
Rittal has developed the new IIoT adaptor because the older Blue e units cannot communicate directly with the IIoT interface. The whole system can be configured and commissioned via the web server integrated into the IIoT interface – quickly, conveniently and without the need for any programming.

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

Intelligent data glasses support production

Augmented Reality (AR) has arrived in the workplace: for the last three years, a consortium of six companies and institutions chaired by Siemens has been researching the use of augmented reality (AR) in industry. The aim of the project – known as Glass@Service – was to be able to use intelligent data glasses as personalised information systems by combining them with new types of interactions, such as eye and gesture control, and innovative IT services. The first practical tests in actual production and logistics processes have now been successfully completed.

Digitalisation is increasingly making its presence felt in manufacturing. In some areas, primarily when retooling machines and picking orders, employees are often still working with printouts, printing stocks of labels for marking material, and laboriously recording all the data in the inventory control system at the end of the process. Investigations have therefore been in place for several years now to assess the extent to which AR could be used in these areas. However, it is only now that the technological components required for this, such as micro-displays, controller electronics, 3D cameras, and sensors, have become sufficiently sophisticated that they can be combined to form an innovative human/machine interface and be integrated into the IT landscape of a manufacturing plant.

“Siemens wanted to play an active role in shaping this change to the workplace right from the start,” explains Frank-Peter Schiebelbein from Siemens Corporate Technology, the Siemens arm of the Glass@Service project.

The practical tests took place in the Siemens Electronics Factory in Amberg and at the Fürth manufacturing site. The AR system’s software had to be specially adapted to the demands of each site. In logistics, the primary concern is to provide employees with warehouse orientation aids in the form of wearable devices and to identify, mark, and process the products online without error in the inventory control system. When retooling or maintaining machines, the data glasses can provide invaluable assistance by showing each work step on the display and supporting the employee as he operates the machines. Eye movements are captured with an eye-tracking camera. It is therefore possible to interact with the system through specific control of the line of sight and, for example, to scroll through a data sheet or activate virtual buttons.

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The technology landscape: insights from 2019 conferences

Industry leaders and governmental agencies across the globe recognise technology as the cornerstone for economic development. President Cyril Ramaphosa famously posited: “The clear implication for South Africa is that we need to move with greater focus and urgency to develop the skills, human capital, institutions and strategies required to seize the opportunities for technological change”. Implementing technology as an economic development tool is a key insight arising out of the many Industry 4.0 conferences taking place in South Africa. “The jobs are here, where are the people?” was a notably frequent remark heard at technology conferences in 2019. The Accenture & WEF 2018 report ‘Unlocking digital value for business and society in South Africa’ contends that digital initiatives hold the key to unlocking R5 trillion of value in South Africa over the next decade.

Local and global experts shared their thoughts gathered through practice and research on how monetary and social value can be achieved.

The philosophy that underpins Industry 4.0 was initiated in Germany to specifically solve German problems, some of which were ageing infrastructure and population. The consequent inescapable question is whether other countries such as South Africa are abreast of domestic problems that require addressing, thus avoiding the pitfall of being technology-centred as opposed to focusing on economic development and social well-being. The challenge for South Africa is how to use technology to convert its unique challenges into opportunities for all. In attempting to grapple with this principle, the following propositions emerged:

**Occupation and qualification flexibility in South Africa**

Against the backdrop of education and training in South Africa, an innovative approach to talent development for manufacturing is nearly obligatory. A major shift from traditional qualifications and occupations to more flexible modular competency-focused capabilities for specific business needs is essential. Experimentation in piloting the future skills pipeline capacities is a greater need in this developing dynamic environment.

**Cross-functional government and willing private sector in South Africa**

Conflicting priorities coupled with dislocations among governmental bodies and private associations appear to be crippling the co-creation of value necessary for economic development. An integrated approach would allow the formulation of effective methodologies for emerging global developments. For example, would regulatory approval of autonomous electric vehicles sink demand for new vehicles? What would the implications be for the vehicle value chain and thus car dealers, maintenance and vehicle insurance companies? What would be the scenario be for oil demand and price as the world transitions to the use of electric vehicles? Could aggregate savings from low oil prices boost annual disposal income for households? These are examples of urgent and legitimate policy and planning discourses that require co-creation and an integrated approach.

**Sacrificing short term gains for long term growth**

What is unequivocally clear is that sacrifices are necessary for South Africa to transcend its current impediments and bring the benefits of Industry 4.0 to bear. A focus and emphasis on the following critical areas is needed:

- Capital investment at scale.
- Private and capital alignment.
- Belief in theoretical benefit (data driven approach and not only political ideology).
- Long term profitability horizon.
- Legislative flexibility.
- Skilled labour.
- Acceptance of immediate job losses.
- Shift in consumer mentality (made in South Africa should become attractive).

To conclude, the main takeaway this year is that the discourse should not only be about technology but should include an in-depth analysis of the societal and business pain points at hand. This would render technology as a powerful tool with the promise of delivering value to South Africans and aiding in building the South Africa we all want.

Oratile Sematle
Executive director, SAIMC

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**Oratile Sematle**

Oratile is the electrical and instrumentation manager at Sasol Group Technology. He holds a bachelor of science degree in electrical and electronic engineering as well an MBA from the University of Cape Town. As the former president of the Society of Automation, Instrumentation, Measurement and Control (SAIMC), he helps to drive the vision shared by council to address issues specific to the automation industry, and is partly accountable for the development of the automation engineering profession in South Africa. Oratile is a conference speaker and has spoken at engineering events such as Industry 4.0 and African Automation Fair. His ambition is to form cross-industry coalitions to tackle the social and educational problems experienced by disadvantaged communities.
VinFast deploys Siemens technology to deliver cars ahead of schedule

VinFast, Vietnam’s first volume car manufacturer, has successfully produced its first cars ahead of schedule using Siemens’ portfolio of integrated software and hardware. By deploying its portfolio, Siemens helped VinFast achieve its automotive production timeline for building the factory, car design and start of the production in only 21 months, well ahead of an already ambitious schedule. This is half of the average time to build such a manufacturing plant. The VinFast plant in Hai Phong went live in June 2019 and has a total design capacity of 250 000 cars per year. The first vehicles have been E-scooters, compact cars, sedans, and SUVs. These will be followed by battery electric passenger cars as well as electric buses.

The entire value chain has been integrated and digitalised with Siemens’ Digital Enterprise portfolio, which includes the Xcelerator software solutions and Totally Integrated Automation (TIA). Xcelerator enables creation of an accurate digital twin, melding model-based simulations with test data and real performance analytics with intelligent edge control. VinFast is using Teamcenter software as the backbone of collaboration for product lifecycle management and NX software, a leading integrated solution for computer-aided design, manufacturing and engineering (CAD/CAM/CAE), to develop the digital twin of cars and production. Teamcenter connects the digital twin with a consistent digital thread, which is helping VinFast increase speed and flexibility in development, optimise its manufacturing processes, and use the insights gained from product and plant operations to improve future performance. VinFast has also implemented Siemens Opcenter software (formerly Simatic IT Unified Architecture) to increase production speed and quality. This MES solution supports closed-loop manufacturing by driving real-time production data to the digital twin of product and enables innovation of product design and production operations.

Automation is realised by the modular and flexible automation concept Totally Integrated Automation (TIA), that controls and drives all productions. VinFast deployed Siemens’ automation equipment for its manufacturing lines in all shops: press shop, paint shop, body shop, assembly shop, sub-assembly and engine shop. Simatic Controllers enable VinFast to automate factory operations such as robots or conveyor lines, including safety functionality. VinFast uses the engineering framework TIA Portal to program automation tasks from the press shop through to the final assembly. Simatic HMIs are widely used in the factory, allowing VinFast to operate and observe the status of machines and entire systems for the production staff. Using Siemens’ Industrial Identification products, VinFast can track and trace parts and optimise the entire flow of materials. In addition, Sinumerik controls guarantee highest efficiency and quality in their powertrain machinery. Further portfolio provided by Siemens features network components, power supplies, control products, low voltage distribution and switchgears, an energy distribution system as well as motors and drives. The comprehensive automation components from Siemens enable VinFast to build up the factory with high quality of global standards.

“VinFast and their new production site are a great example of how the automotive industry is driving the digital transformation of manufacturing,” concludes Bernd Mangler, senior vice president automotive solutions at Siemens Digital Industries. “We are proud that we contributed with our offerings to create the virtual and real production lines including the technology for continuous optimisations along the entire lifecycle of the equipment – and of course, it all had to happen in record time.”

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ACCESS ALL IO-LINK DEVICE DATA. With one intelligent software system, you can have it all with a few clicks.

- Connect automatically from anywhere
- Unlimited and bi-directional communication
- Bridge shop floors and Industry 4.0
- Operated with nearly any PLC

Access all IO-Link devices in a multiprocessing automation system with a single tool: the FieldEcho® software tool from SICK Automation. Parameterise, diagnose and monitor all IO-Link devices integrated into a machine or plant – independently of the manufacturer, throughout the entire life cycle of the plant and regardless of your PLC and fieldbus architecture. With FieldEcho® software, you get a fully parameterised system in just a few clicks. Now that’s intelligent.

THIS IS SICK
Sensor Intelligence.
As I have mentioned in previous articles, Greg McMillan, one of the world’s top control experts, has said that he finds temperature control loops generally the worst optimised processes as most people try tuning them without any scientific tuning tool, and the average human being has not got a long enough life span to tune them properly by trial and error. I recently came across a good example of this when optimising some controls in a chemical processing plant.

The loop in question is a temperature control loop with which the operators in the plant were having great difficulty. It was terribly slow and never seemed to be controlled. It is a critical temperature, and the operators were terrified of it moving more than one or two degrees. (The transmitter range is 0-150°C). A plant control engineer had spent many days trying to get a good step in manual to be able to determine the dynamics of the process. However, it seemed almost impossible to get any meaningful response from the steps. The temperature didn’t seem to move properly (repeatably) in spite of numerous small steps that were made.

The operators were finally persuaded to let us make much bigger steps on the controller’s output, and after quite long tests taking nearly two days, we were able to get a process response that was representative of the dynamics. We could then try tuning.

Slow control to avoid instability
The dynamics of the process turned out to be extremely unusual. Basically, it is a self-regulating process with a deadtime of about 14 minutes and time constant of 8 minutes. This makes it decidedly slow and hugely deadtime dominant – characteristics regarded as making a process difficult to control. Such processes need to be controlled with a slow control to avoid instability. Even more interesting is the fact that the proportional gain of the process is 0.04 which is unbelievably small for a self-regulating process. (As a rule of thumb, self-regulating processes should have a process gain between 0.5 and 2).

The gain of 0.04 means that the process can only be controlled over a range of 4% of the measuring span, for a full movement of the valve from zero to 100%. To express it in another way, it means that in this case control is only possible over a range of 6°C, which is very small and could result in no control if the process changes over a bigger range.

In this case the plant personnel previously had little luck in trying to tune the loop by trial and error, and the existing tuning parameters as found in

![Figure 1](image1)

![Figure 2](image2)

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

**Case History 169**

Tuning a very difficult temperature control loop

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
Greg McMillan, one of the world’s top control experts, has said that he finds temperature control loops generally the worst optimised processes as most people try tuning them without any scientific tuning tool.

The controller were $P = 0.1$, $I = 4.5$ min/repeat, and $D = 1.1$ minutes. The closed loop response to a setpoint step change of 3°C is shown in Figure 1. (These tests were done on an accurately modelled simulation, as it would have been difficult and time wasting to do them on the plant). It showed the process took an absolutely amazing 75 hours to reach the new setpoint! It is also interesting to see how far the controller output had to move to make the small process change, all because of the ridiculously small process gain.

New tuning gives faster response
Once we had completed the open loop step test to obtain a response truly representative of the process dynamics, we could then use the Protuner to tune it. The new tuning is $P = 6.0$, $I = 12$ min/repeat, and no derivative. The final closed loop simulated test is shown in Figure 2 on the same time scale as used in the first figure so one can compare the difference in response. The process got to setpoint in 3 hours i.e. 25 times faster than before.

Out of interest, the control worked extremely well and the response was very similar to the simulated one. The loop has been running in automatic and keeping the operators happy ever since.

In conclusion
To finish off this article, I have included a test performed on a flow loop which tended to cycle. Figure 3 is of a closed loop test performed on the loop, which shows that the valve has a very interesting and unusual characteristic that I have not come across previously. It sticks very badly, but only when opening. In the figure one can see on the first two steps how the valve sticks for approximately 8 seconds before it starts moving. However on the third step when the setpoint stepped down, the valve reacted immediately, and started closing downwards.

It is possible to get some sort of control even with this bad valve behaviour, which can and did, cause cycling with normal tuning. One must tune the controller to react slowly in order to compensate for the 8 second sticking period, which should be considered as deadtime in the loop. Obviously this situation should not be left like this, as the control is now terribly slow, and the valve should be fixed.

One other thing that can be seen in the test is that the valve/positioner combination has problems (possibly in a linkage) which causes the valve to jump around sometimes as annotated in the figure.
Setting the future standard for 3D image processing

SICK Automation has set the future standard for 3D image processing with regard to technology, speed, resolution and ease of integration. The company’s Ranger3 3D vision camera is capable of taking high resolution 3D measurements of dimensions, contours and surface properties in real time. The camera is integrated into a robust frame to protect the cameras and laser transmitters from the surrounding environment, and are cooled for inspection. The meteorological components are always manufactured to the highest quality. This ensures products are always manufactured to the highest quality.

Case study
IMS Messsysteme, a measuring systems company in Heiligenhaus, Germany, develops and produces isolate, X-ray, and optical measurement systems for industrial applications in the steel and non-ferrous metals industry. Their focus is on continuous casting plants, hot rolling mills and tube rolling mills. One of their solutions is the X-3Dvision measurement system, which features between three and eight SICK Ranger3 cameras depending on the type and contours of long products to ensure 360° inspection.

The measurement system checks long-goods profiles and pipes in terms of their dimensions, contours and linearity, as well as for surface defects such as cracks, deposits, inclusions, or indentations under harsh conditions. To detect faults early, IMS Messsysteme measurement systems are used as far upstream as the thermal processes, where profile and pipe temperatures are close to 1000°C. The X-3Dvision measurement systems are used for 360° inspection of products with a wide range of geometric properties. To capture the entire surface of profiles or pipes seamlessly, multiple cameras and laser lighting devices are integrated into a single, circular measurement setup through which the long goods is passed for inspection. The meteorological components are integrated into a robust frame to protect them from the surrounding environment, and the cameras and laser transmitters are cooled by air and water to ensure stable ambient temperatures for precise and reproducible measurement results.

For contour measurements, the company offers a resolution of 0,05 mm and repeatability of ±0,08 mm. For surface inspections, furrows, cracks and scratches measuring as little as 0.3 mm wide, 10 mm long, and 0.3 mm deep can be measured and detected reliably. This means that both the dimensional and contour measurement as well as the inspection of the surfaces can be carried out with a specified level of accuracy and repeatability, right down to the sub-millimetre range. This ensures products are always manufactured to the highest quality.

Zvezdan Pejovic, product and sales manager for optical 3D inspection systems at IMS, says that in one of its latest plants the company integrated 22 Ranger3 units. “This allowed us to meet our customer’s request for a single, high-precision measurement and inspection system to handle its full range of profiles and sheet piling walls.”

The unit’s compact design, 55 x 55 x 77 mm, enabled space-saving and application-oriented integration of the camera within the measurement setup. It has a profile rate of up to 47 kHz and a resolution of 2560 x 832 pixels, meeting the highest requirements in terms of metrotechnical performance. Its state-of-the-art 3D algorithm offering reliable detection of the laser line on the object means that the appearance of the profile and pipe surfaces has no impact on the availability and accuracy of the camera. This is despite the potential for flickering due to thermal radiation. Each camera features an optimised bandpass filter as well as an infrared blocking filter to act against thermal radiation on the corresponding laser light.

The CMOS sensor in the Ranger3 converts the laser line recorded on the object into a precise 3D representation. This means that the camera can store complete 3D coordinates for the X-3Dvision measurement system without the need for complex post-processing. The Gigabit Ethernet interface for the streaming camera ensures that large volumes of measurement data can be transferred in real time. “Depending on the application, the cameras are capable of creating up to 24 000 profiles per second, which represents a data throughput for all of the cameras of up to 4 gigabits per second,” says Pejovic.

“The Ranger3 cameras have allowed us to develop our X-3Dvision into an inline system for multi-profile inspection, capable of achieving an extremely high level of accuracy at challenging speeds. At the same time, it can pick up the tiniest deviations to ensure adjustments can be immediately made to casting and rolling processes,” Pejovic adds.

He concludes by saying that with the help of the Ranger3, IMS not only ensures maximum quality in terms of both products and processes, but also opens up new market opportunities for companies. “The high measurement and transfer rates of the 3D vision sensors from SICK open up whole new fields of application for our inspection systems wherever high process speeds are required in production processes.”

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A modern, built-for-purpose operations experience
A new kind of industrial controller simplifies IIoT projects

All controls engineers are familiar with PLCs and PACs (programmable automation controllers). Both have been used and improved over many years, incorporating capabilities that used to be found only in scada systems, adding communications with Microsoft Windows-based HMIs, running on standard Ethernet networks, and so on.

But now we need more from our automation systems. For the kinds of applications we want to do in the future, we need a new approach that simplifies connections and communication – a new product that does much more than a PLC or even a PAC. We need an automation product that shrinks or eliminates the middleware and lets us move data from where it is produced to where it needs to be, in far fewer steps. Fortunately that product has recently appeared on the market. It is called EPIC – an edge programmable industrial controller.

Controller

At heart, an EPIC device is a real-time industrial controller designed to run control applications – a device that does everything we have always expected from a PLC or PAC.

Programmed with standard automation tools like flowcharting, structured text, and even traditional ladder logic, an EPIC works just like a PLC or PAC in a control system – but an EPIC device is much more than just a controller. Its I/O modules offer multiple channels. Modules with isolated channels are also available. Analog and discrete I/O accepts a variety of signals, through channels that are software configurable.

Taken as a whole, an EPIC system offers significant options for automation and IIoT projects, which include security, gateway functions, HMI, data communications, control and scalability. EPIC devices offer a new kind of industrial controller – an edge programmable industrial controller – that not only gives automation engineers real-time control for all kinds of traditional automation applications, but also positions them to be able to provide the IIoT and data-based tasks companies want to do now.

Interested readers can download a complete Opto 22 White Paper, which includes a more detailed description as well as a real-world case study at: https://instrumentation.co.za/papers/J4922.pdf

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One problem with PCs in industrial automation is that an off-the-shelf PC cannot be trusted to stand up to harsh environments. Only a more expensive industrial PC will work.

In contrast, EPIC devices grew from real-world automation experience and were designed to withstand tough conditions. Industrial-grade components and processors are designed for long life. UL hazardous locations approval and ATEX compliance are standard. Operating temperature ranges are wide, for example, -20 to 70°C, while EPIC I/O is hot swappable.

Stainless-steel chassis come in different sizes to fit enclosures or machine designs and can be DIN-rail or panel mounted.

So what exactly is EPIC?

Let’s take a look at each part of the acronym and see what it means for an automation application.

Edge

All data acquisition starts at the edge because that is where data is produced. A manufacturing line or shipping department in a factory, refrigerated rooms or barcoded containers in a warehouse, pumps and pipes and storage tanks at remote sites: all are at the edge of the network, and all have data that could be used to improve processes and profits.

If we can get that data directly from the source, then we know it is accurate. So an EPIC device sits at the edge and connects directly to sensors and actuators through its I/O, the inputs and outputs that gather sensor data and send control commands. It also connects to existing PLCs or other devices to gather their data and issue commands, if needed.

Programmable

An EPIC device is not a PLC, not a PAC, and not a PC, but like them it must be programmed for control. An EPIC device gives you several programming options, some of which reflect traditional automation tools and others that come from PC and Internet backgrounds.

An EPIC device does not limit your programming options like PLCs and PACs, or force you to learn a new programming language in order to use it. Instead, it lets you leverage what you already know, so you can build control, data exchange, and HMI programs more quickly.

Industrial

As engineers, we often have to place controllers in severe environmental locations.
Brain Gain!
HMI Panels and Block I/Os with CODESYS 3 PLC

TX700: Modern HMI/PLC compact devices with capacitive multitouch and gesture control enabled

TBEN-L-PLC: Rugged CODESYS v3 PLC for intelligent control concepts without cabinet

PG-V3: Programmable modular I/O systems with PROFINET, EtherNet/IP and Modbus TCP slave

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Managing processes where root cause identification is rapidly identified can generate substantial savings through improved productivity and implementation of planned preventive maintenance schedules. Knowing what happened first in a chain of events in the plant quickly leads to the appropriate corrective action. Omniflex has spent 50+ years in alarm and event management system design and development, providing 1 millisecond discrimination to trip alarming status enabling the plant to quickly identify root cause. The company’s Time Stamp at Source philosophy immediately differentiates its trip recording by being far more accurate than supervisory system PC or DCS time stamping, which are unable to account for propagation delay of network signal and the I/O scanning ability of the front-end devices. The more I/O the longer it takes. Omniflex adopted a fixed scan cycle (independent of I/O count) and a time stamp at source for every change of state. Having a GPS time synchronised clock source provides unparalleled alarm time accuracy right where it is needed.

Many time synchronising standards have been used over the years, from pulse inputs to IRIGB popular in the electrical field, and more modern plants adopting the Network Time Protocols (NTP) server technology on networks or IEEE1588 Protocols, to bring all time stamping to a single time base. All of these require a significant investment in hardware and software and even dedicated networks to provide plantwide synchronisation.

The issues are affordability in remote or isolated plants and achieving a cost-effective solution to time synchronisation. Sub-stations, pumping stations or remote process plants away from their main plant often need to be reviewed on the same time base as they are interrelated.

The Omniflex TSM enables any isolated programmable equipment to synchronise its real-time clock to satellite time. The sequential events recorder, Maxiflex can thus provide one millisecond discrimination in chains of events at different geographic locations and when this data is overlaid the root cause can quickly be uncovered as the time base is down to one millisecond resolution. Any programmable device (PLC) with a serial port can be configured to get real time from the Omniflex TSM. Features include:

- Independent of plant network propagation delays with direct accurate satellite synchronisation.
- Compact weather proof enclosure, so no antenna required.
- Simple setup plug and play.
- Supports the uses of either an RS-232 or RS-485 interface port.
- Easily used with third-party PLC, DCS or PC based systems.
- Eliminates real-time clock drift errors.
- Operates off 9 to 30 V DC supply.

Benefits are:

- Compatible with third-party devices like PLCs.
- Allows sensible aggregation of time stamped data collected from different sites.
- Compare similar installations by alarm performance.
- Accurate alarm time logging over large geographic areas.

These benefits make it ideally suited for any remote monitoring operation requiring accurate time.

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

The bright, uniform output of the WLB72 reduces shadows, improves visibility and gives workers the light they need to work efficiently and without making mistakes. A diffuse window minimises eye strain and eliminates hotspots, and translucent endcaps enable users to create a continuous line of light for a more seamless aesthetic. With 0-10 V dimming, users can personalise light levels to their preferred brightness.

Energy efficient, cost-effective design
The WLB72 basic strip light is an energy efficient device with an output of 130 lumens per watt. Like all Banner lights, the WLB72 Basic features a low total cost of ownership (TCO) and provides years of reliable, maintenance-free operation, with no bulb or ballast changes required throughout the entire lifespan of the device.

Quick, easy installation
WLB72 strip lights seamlessly replace bulky fluorescent lights and easily install into existing infrastructure. The bright light output allows users to install fewer lights in total, reducing installation time and costs. All models are cascadable, simplifying installation and wiring for additional ease of use. Integral mounting options and add-on brackets (sold separately) meet a wide variety of application requirements.

Compatible with backup batteries for emergency lighting
Each WLB72 work light is compatible with a backup battery (sold separately) for emergency lighting during power outages.

Applications
WLB72 strip lights are ideal for industries that require uniform illumination, such as automotive, material handling and general manufacturing. These bright lights improve safety, productivity and quality in a wide variety of applications including:
• Assembly line illumination.
• Inspection lighting.
• Workstation and robot work cell illumination.

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

The Ideal IIoT Controller

Bright, versatile illumination

Energy efficient, cost-effective design

Quick, easy installation

Compatible with backup batteries for emergency lighting

Applications

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za
In 2012, Beckhoff set a new benchmark in intelligent parts transportation with the introduction of its eXtended Transport System (XTS), which has since been fitted to numerous generations of manufacturing machines. XTS does more than merely replace conventional conveyor belts; instead it enables completely new and innovative machine designs. Working with flexible motion profiles, it allows users to create processing sequences ranging from the very simple to the highly sophisticated and so optimise their entire manufacturing process.

XTS is a smart transport system of magnetically driven movers that travel along tracks consisting of motor modules and guide rails. A Beckhoff Industrial PC is able to control the movers independently according to individually defined motion profiles. The motor modules can be arranged in a variety of layouts to create both open and self-contained tracks. Up to now, movers have been confined to travelling on just one such track, but with the new XTS Track Management software functionality, track sections in one XTS can be exchanged among each other and ultimately combine multiple tracks within a single system. The new track management capabilities make it possible to transfer motor modules, complete with the movers on them, between multiple XTS systems with the aid of a suitable mechanical device, such as a spindle axis or linear motor. The motor modules and movers remain fully operational throughout this process, and the track sections transferred remain fully usable. The XTS Track Management capabilities will be incorporated into the TF5850 TwinCAT 3 XTS Extension.

A PLC application program decides which track each mover should travel along. The movers are controlled using an extensive command set contained in the Motion Control Toolbox. Now though, a position set point defined in a given motion command no longer applies to the system as a whole but to a specific track. During program execution, a move command for an individual mover can be switched to a different track – at any time and on the fly. The only condition is that the track part on which the mover is located when the switch happens must also be part of the new track sections.

When an XTS system is configured, all motor modules are initially grouped into contiguous segments known as track parts. These may consist either of one single motor module or any number of consecutive motor modules. The track parts, in turn, form building blocks from which a large number of contiguous routes or tracks can be defined. A track may consist of one or more track parts; also, a track part may occur more than once in a given track, and may also be included in multiple tracks.

A PLC application program decides which track each mover should travel along. The movers are controlled using an extensive command set contained in the Motion Control Toolbox. Now though, a position set point defined in a given motion command no longer applies to the system as a whole but to a specific track. During program execution, a move command for an individual mover can be switched to a different track – at any time and on the fly. The only condition is that the track part on which the mover is located when the switch happens must also be part of the new track sections.

New XTS functionality enables novel solutions in machine building
track to which it is switching. Again, this is best illustrated with a road navigation analogy: A vehicle’s route may be altered at any time, but the road on which it is currently travelling is, of course, always part of the new route, too.

Enabling movers to travel on multiple tracks opens up a wealth of possibilities when it comes to designing transportation tasks for an XTS system. The additional flexibility afforded by the track management functionality creates valuable advantages, both for the machine builders designing systems and for the end users who later operate the machines.

**Maximum flexibility without downtime**
For several years now, in areas such as the food and cosmetics industry, there has been a sharp rise in the numbers of product variants within manufacturers’ product ranges. Inevitably, this has led to smaller lot sizes and significantly shorter production runs, and as a result is driving up demand for machines that allow flexible format changing. XTS already supports fast, software-driven format changes using product-specific parameter sets. Shapes and packaging sizes can be changed without the need for manual intervention. Now XTS also supports software-based tool changes: With the new track management capabilities, movers fitted with different tools can be fed in and out on a flexible basis, without leading to downtime. With this freedom to select a range of different tools, users can now set up tool magazines and, besides being able to switch to a completely different tool format, they can create custom tool combinations as well.

In addition, the setup described above makes it easy to accommodate maintenance intervals in the production process. For instance, a mover that has reached a predetermined limit for the number of products handled or, perhaps distance travelled, could be ejected and automatically replaced by another mover that has been refurbished. The ejected mover can then be serviced outside the actual production system. This means that machine processes no longer have to stop at set intervals to allow maintenance.

**Parts storage but with a small footprint**
Production processes often need to halt temporarily once a certain number of steps have been completed – to give products time to cure, dry or cool, for example. To avoid stoppages and maintain a continuous production flow, product buffers can be created to feed the next processing station downstream. This requires additional machine space; how much depends on the size of the product and on the length of the necessary wait in relation to the processing time.

With the new track management, track parts can now be stacked to create compact and efficient product holding capacity while maintaining a small overall machine footprint. Furthermore, in contrast to conventional buffer systems, there is no need to create extra parts handling capacity because the products are stored together with their movers and therefore remain clearly identifiable and easy to control.

**Optimised utilisation of processing stations**
Track management also offers advantages when products need to pass through specific processing stations multiple times. Consider, for example, a coating process in which several layers need to be applied to achieve a specific thickness and a molding cycle is required after the application of each layer. One way to achieve the desired output rate on machinery performing a task like this is to set up a sufficient number of processing stations in series. This approach, though, is costly and the individual processing stations often end up not working at full capacity.

Track management can improve efficiency by separating these processing stations from the main product flow on the primary XTS and putting them on a secondary, self-contained XTS. With this arrangement, products can pass through the processing stations multiple times in succession without having to switch direction. Once the required number of passes has been completed, the products are merged back into the product flow of the primary XTS.

**Individual quality control, even at high output rates**
One of the greatest challenges facing machine builders is how to incorporate individual quality control into the production process. Now, with the track management capability to flexibly feed products into and out of the process, these quality inspections can be performed without interrupting production flow, allowing high production output rates to be sustained, even with time-consuming, random inspections.

By contrast, in systems where quality control is built directly into the primary production process and multiple products are subsequently extracted in parallel, prior ejection of flawed products must not leave any gaps. To prevent a flawed product from causing all the products before it to run through the process chain again, track management can extract the flawed product and its mover from the product stream. After reworking a product at a manual work station, for example, the product can simply be returned to the product stream along with a mover, or, if the part is scrapped, an empty mover can be inserted back into the stream.

For more information contact
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Couplings for high torque applications

Available in a variety of configurations, SKF’s range of Disc Couplings provide affordable, lubrication-free service in medium to high torque applications that require torsional rigidity.

These innovative couplings feature two hubs and a laminated stainless steel disc pack secured by a series of fitted bolts retained by nylon insert lock nuts. With a capacity range up to 178 kNm in a variety of configurations including single disc, double disc and spacer for both horizontal and vertical mounting, these couplings deliver several benefits to a vast selection of applications.

“In many applications, the challenge posed by exposure to the elements requires quality parts that continue to operate smoothly,” says David Beggs, SKF Power Transmission global technical manager. “The couplings offer robust performance, with all-steel machined components that allow for high-speed applications to be handled with ease. With two-plane dynamic balancing, higher speeds are often permissible.”

By offering particular allowance for misalignment and with no need for lubrication, maintenance on these cost-effective devices is significantly diminished. Single couplings accommodate angular offset, while double disc pack units with a spacer will enable angular, parallel or combined offset. The prime mover and driven machine do not need to be moved due to the fact that the disc pack or spacer can be removed and re-installed radially.

SKF Disc Couplings encompass hub pilot bores to simplify boring to requirements. This subsequently brings cost effective high performance to a range of applications and industries such as petrochemical (direct drive fan drives, pumps and compressors), printing and paper (positioning), plastics, power generation (high speed turbine type drives, alternators, pumps), refrigeration (compressors) and marine.

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

BMG’s Light Materials Handling division supplies and supports a comprehensive range of belting products suitable for the food processing, bottling and packaging sectors.

“New to BMG’s range of belting certified for safe food handling, is the KleenEdge non-fray series, developed by Ammeraal Beltech to minimise the problems of belt-edge fray and associated contamination issues, ensuring absolute hygiene in food processing” explains Ryan Forsyth, business unit manager, Light Materials Handling division, BMG. “Another popular product in the local food handling sector is BMG’s new Ammeraal Beltech Pop-up flight solution for inclined food conveyors, which has been designed to reduce waste, enhance efficiency and minimise costs.”

Easy-to-clean KleenEdge belting has been designed with a high-strength, low-stretch fabric reinforcement, which is held securely in a tough, non-cracking thermoplastic structure. This durable assembly prevents the risk of contamination, belt shrinkage and distortion that may occur from belt-edge wear during use.

KleenEdge is suitable for use in arduous applications, particularly where knife edges are present. This belting can also be safely used on roller supports, slider bed and troughed applications. Typical applications include high-risk food processing areas, like bakeries and confectioneries, meat, poultry and fish processing, the dairy industry and fruit and vegetable processing.

BMG’s Ammeraal Beltech Pop-up flights for inclined food conveyors, are integrated into modular belt systems, to prevent product residues left on the belt and they also minimise droppage onto the floor.

These Pop-up flights, which are suitable for direct food contact, improve efficiency, hygiene levels and profitability in various food processing and packing applications and are especially suitable for products that tend to stick to conveyor belts. Applications include fresh and frozen meat and fish processing, the washing and packing of salads and green leaf vegetables, confectionery packing and pasta and rice processing.

All components of this system are easily mounted and removed, with effortless cleaning and maintenance procedures.

Also in BMG’s range of belting for food processing are Rexnord slat-top chain, Uni Modular belting, flat food processing synthetic belts and Rapplon flat processing transmission belts.

All products for food handling, bottling and packaging applications, are carefully selected by BMG specialists, to meet the highest conveying and packaging standards, in terms of reliability, flexibility and consistent quality and hygiene controls.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
AGV systems need wireless networks

In order for factories to perform their tasks efficiently and optimise production, automated material handling (AMH) systems, such as AS/RS and AGVs, need the flexibility to move around on their designated paths without obstruction, while maintaining constant communication with the control centre through a wireless network. Additionally, the control centre needs a reliable wireless network to monitor and control the AS/RS and AGV systems, as well as sufficient bandwidth to send data and instructions and receive data without delay, including live video recordings from the IP cameras installed in these systems.

Deploying a wireless network on a factory floor or in an automated warehouse is not an easy task and requires in-depth RF domain knowhow, and also some IT knowledge. However, understanding basic wireless principles and key challenges can go a long way in determining the success of the implementation. RJ Connect and Moxa are committed to providing easy to use and deploy radio equipment to help build efficient wireless networks for AS/RS and AGV systems.

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za
Banner Engineering simplifies monitoring of rotating equipment

Banner’s Wireless Solutions Kit for vibration monitoring is a fully integrated and easy-to-use solution for monitoring assets with rotating motion. It is designed to make it easy for users of any experience level to setup a wireless network, establish performance baselines and thresholds, and collect data from motors, fans, pumps, compressors, and similar equipment.

**Key benefits**
Reduce downtime and increase productivity: avoid unexpected downtime and make more informed decisions about maintenance schedules by detecting problems early before a failure can occur.

**Simple setup:** plug in the box, bind the nodes through the HMI screen, install vibration sensors and nodes on the equipment, and start collecting data. Performance baselines and thresholds are automatically generated and no programming is required.

**Visualise data and alarms:** HMI clearly displays alarms and graphs of raw vibration data along with baseline, warning and alarm values.

**Local and remote monitoring:** access raw data right on the HMI or via the cloud from any network accessible location.

**Scalable solution:** monitor and collect data from up to 16 assets.

Wireless Solutions Kits for vibration monitoring can be used with virtually any machine with rotating motion. These kits help users to:

- Identify machine performance issues caused by misalignment, unbalance, bearing failures, pump cavitation, blade damage, etc.
- Identify equipment requiring full spectrum analysis.
- Establish more strategic scheduling of equipment maintenance

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

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Precise ToF distance sensor for demanding applications

Thanks to the innovative on-chip time-of-flight principle with PMD technology (photonic mixer device), the new OGD precision sensor from ifm electronic, offers all the capability of an extremely precise measurement system. The distance information can determine the presence of parts or their correct installation, e.g. if an O-ring has or has not been mounted. The excellent reflection resistance and background suppression, together with a high excess gain, enable reliable operation. The PMD technology of the OGD is vastly superior to conventional diffuse reflection laser sensors and the device is available with an extremely small light spot at a 300 mm range for the detection of very small parts. The switch point is easily set to the nearest millimetre via the three operating keys or alternatively via IO-Link, which also allows read-out of the current distance value.

For more information contact ifm – South Africa, 086 143 6772, info.za@ifm.com, www.ifm.com

Light grid with integrated muting unit

The new generation of light grids from ifm electronic allow for the muting mode without an external junction box or a muting relay being required, as they are already integrated into the receiving element. The supported muting versions are available as either crossbeam or parallel muting. Both versions allow transported material to be safely passed in or out, via the protected area. A status light, integrated into the receiver, allows for indication of the operating status. The muting arms can easily be directly installed on the light grid and are available in two versions: either as muting arms with multi-beam sensors, similar to a miniature light grid, or as pre-mounted mounting set with single-beam sensors. No complex installation and adjustments are necessary anymore. In conclusion, a complete package for increased safety, configured for quick and easy mounting in the application.

For more information contact ifm – South Africa, 086 143 6772, info.za@ifm.com, www.ifm.com

Millimetre perfect from ifm electronic

RS introduces flush-mount devices for smart manufacturing

RS Components has added the Schneider Electric Harmony XB4F series of flush mounting pushbuttons, selector switches and pilot lights to its product portfolio. Designed for use in industrial automation and smart manufacturing applications, the series gives new machines and control panels an attractive, modern and ergonomic look and feel, and is also ideal for upgrading existing equipment without significant cost.

The Harmony XB4F series is part of Schneider Electric’s broader Harmony XB4 range of modular metal control and signalling units, which combine simplicity of installation, efficiency, flexibility and robustness. Characterised by a chromium-plated metal bezel, XB4 units feature an ingenious locking system consisting of a snap-fit head and body, secured with a single screw, and contacts designed to prevent vibration, helping to ensure easy yet secure mounting and wiring.

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The Harmony series retains all the qualities of the original XB4 range, and also features 30 mm-diameter bezels mounted flush with the panel for a more elegant appearance. The series includes:
• Spring-return pushbutton units, unmarked or with functional markings, including options with a projecting button or integrated LED illumination.
• Selector switches with standard or long handle and LED illumination options.
• Key switches with spring return or stay-put options.
• LED pilot lights.

All Schneider Electric Harmony XB4F control and signalling units are IP66, IP66K, IP67 and IP69 rated to ensure reliable operation.

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

For more information contact
ifm – South Africa, 086 143 6772, info.za@ifm.com, www.ifm.com
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<td><a href="mailto:brandon.topham@turckbanner.co.za">brandon.topham@turckbanner.co.za</a></td>
<td><a href="http://www.turckbanner.co.za">www.turckbanner.co.za</a></td>
<td>55*,57,63</td>
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<td><a href="mailto:leandi.hendrikse@vega.com">leandi.hendrikse@vega.com</a></td>
<td><a href="http://www.vega.com">www.vega.com</a></td>
<td>5</td>
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<tr>
<td>WIKI Instruments</td>
<td>+27 11 621 0000</td>
<td><a href="mailto:sales.za@wika.com">sales.za@wika.com</a></td>
<td><a href="http://www.wika.co.za">www.wika.co.za</a></td>
<td>9*,34</td>
</tr>
<tr>
<td>Zest WEG Group</td>
<td>+27 11 723 6000</td>
<td><a href="mailto:info@zestweg.com">info@zestweg.com</a></td>
<td><a href="http://www.zestweg.com">www.zestweg.com</a></td>
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