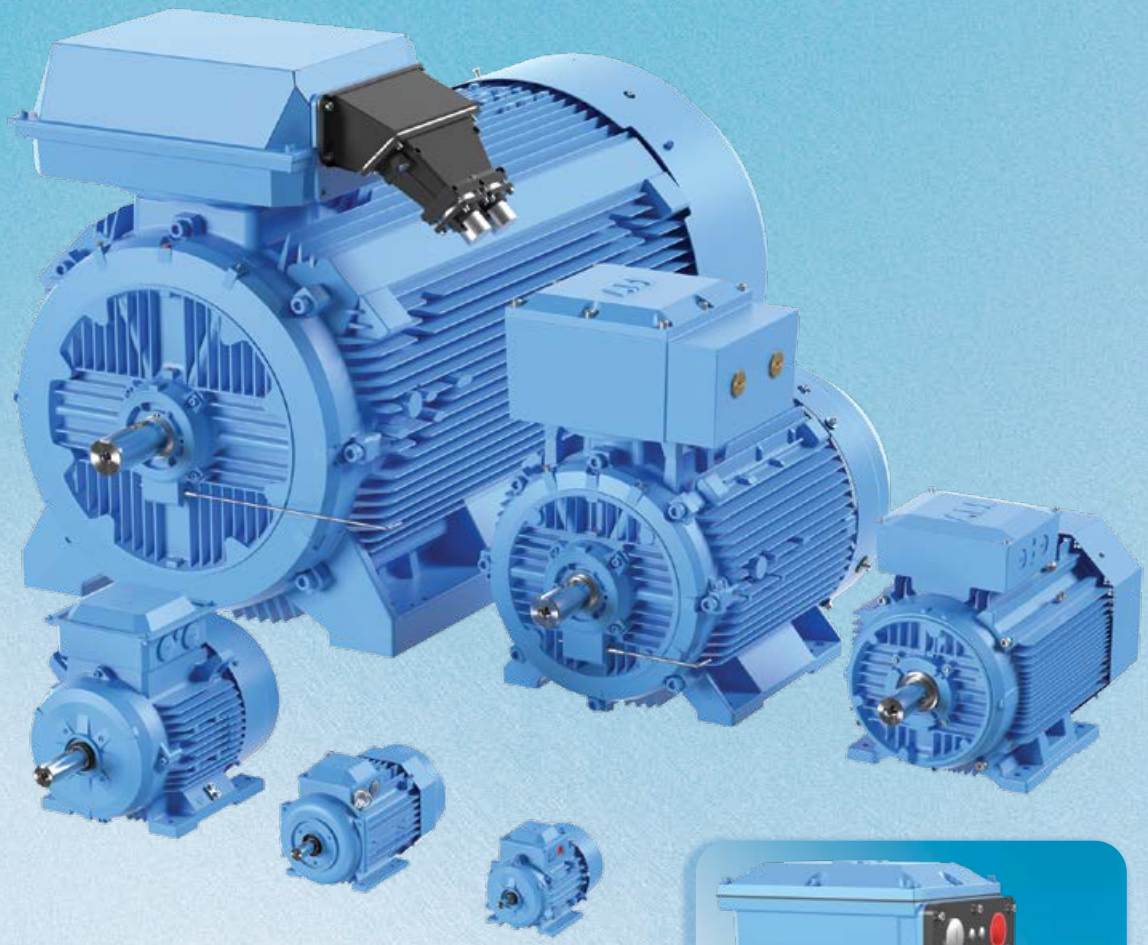
FEATURES:

- Control systems + automation
- Drives, motors + switchgear
- Sensors + switches
- Plant maintenance, test + measurement

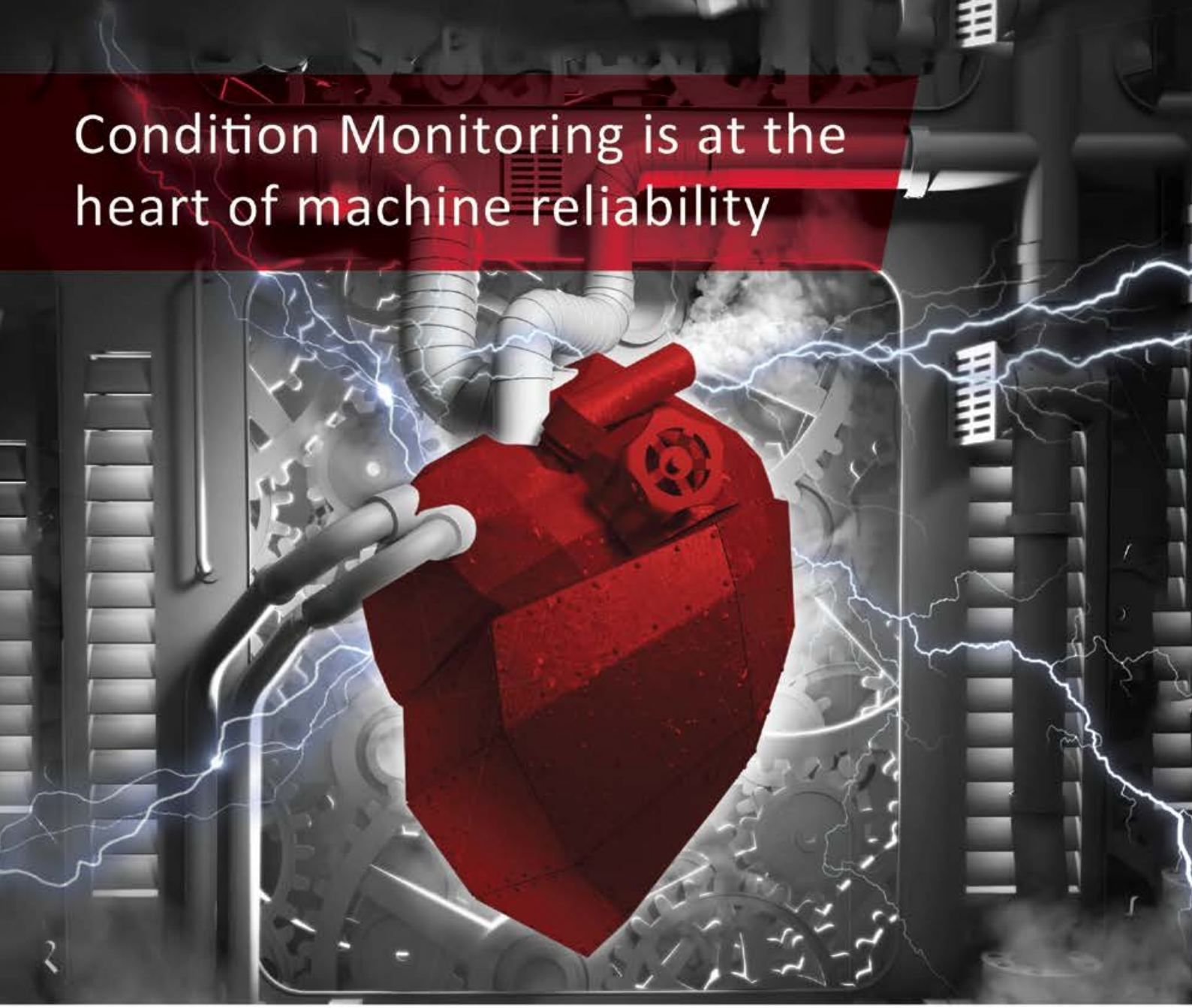


Higher efficiency motors

05/2023

ELECTRICITY + CONTROL

CROWN PUBLICATIONS



WearCheck, Africa's leading condition monitoring company, specialises in a range of sophisticated condition monitoring techniques which help to boost the availability and reliability of machinery, thereby helping our customers to operate more efficiently and save money on maintenance costs.

Machines speak, we listen, you save!

SA Branches

Bloemfontein	+27 51 101 0930
Eastern Cape	+27 82 290 6684
Gauteng	+27 11 392 6322
KwaZulu-Natal	+27 31 700 5460
Middelburg	+27 13 246 2966
Northern Cape	+27 66 474 8628
Rustenburg	+27 83 938 1410
Western Cape	+27 21 001 2100

International Branches

Botswana	+267 311 6829
DRC	+260 977 622 287
Ghana	+233 54 431 6512
Mozambique	+258 85 792 7933
Namibia	+264 81 141 7205
Uganda	+256 78 529 6994
Zambia	+260 212 210 161
Zimbabwe	+263 24 244 6369

Head Office (South Africa)

+ 27 31 700 5460 support@wearcheck.co.za www.wearcheck.co.za

WEAR® CHECK
Condition Monitoring Specialists

Testing and Analysis | Lubricant-Enabled Reliability | Asset Reliability Care

energy + information in industry

Bearings International, a leading distributor of bearings and power transmission products in South Africa, offers a wide range of products, including ABB electric motors, known for their quality and reliability.
(Read more on page 3.)

Editor: *Leigh Darroll*
Design & Layout: *Darryl James*
Advertising Manager:
Heidi Jandrell
Circulation: *Karen Smith*
Editorial Technical Director: *Ian Jandrell*
Publisher: *Karen Grant*
Deputy Publisher: *Wilhelm du Plessis*

Audited circulation Quarter 4 (Oct-Dec) 2022
Total print and e-editions 13 416

Published monthly by:
Crown Publications (Pty) Ltd
Cnr Theunis and Sovereign Sts,
Bedford Gardens, PO Box 140,
Bedfordview 2008
Printed by: *Tandym Print*
Telephone: *+27 (0) 11 622 4770*
E-mail: *ec@crown.co.za; admin@crown.co.za*
Website: *www.crown.co.za/electricity-control*

Electricity+Control is supported by

Automating the right processes – and the best

I note the resilience that so many folk show as we navigate ourselves away from the edge of the precipice.

In a meeting the other day a clear call was made for better automation of specific processes. The point being made was that repeatability and reliability are both improved by automation. Naturally, the next logical intervention is to decide whether the automated process would be improved by adding a level of control.

Although we always assume that we fully appreciate the role of automation and control, we do tend to forget some fundamental elements.

For instance, we can automate pretty much any process – but the most critical element is to be certain that we are automating the right thing! What do we mean?

There are many instances where poorly thought-through or inefficient processes have been automated. The key to automation is therefore first to optimise the process, and then to automate that. Many organisations suffer the consequences of having automated very bad processes. But the process is automated – so everyone feigns happiness.

Then we can consider control – the ability to measure and compare and modify the process on the fly to ensure that the output is the desired one.

Control therefore requires feedback and the ability to ensure that the final output meets the set input. Automated systems may or may not do that for us. Control also means we can set different requirements, and the process can be adapted to meet these.

There is much one can say about automation and control – but for now I think it pertinent to emphasise the first point I made: that is the importance of automating the best process – a process already designed and optimised to deliver the best results. I recall not long ago (oddly, at a time when Eskom was strongly promoting energy efficiency …) when wastage of material and energy was not really carefully considered in so many situations.

I also recall an automated system stamping steel – where some gentle nudging (repositioning where the next stamp was made) resulted in significant material saving. And with that, of course, come the obvious benefits of energy saving and cost saving – and the manufacturer gets more bang for its buck – so to speak.

So, in these challenging times, perhaps we should start by reviewing what we can automate – and once we've identified that, the first step must be to consider carefully how we can optimise the process before progressing to automate it.

And when we do, we must be sure to select the best systems and components to suit the respective plant operations, the most appropriate software, hardware and communications connections, and thus develop an optimum integrated automation system.

Ian

Ian Jandrell

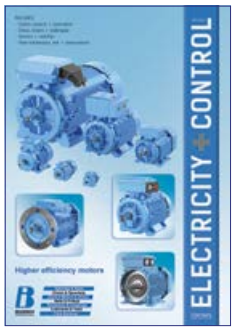
PrEng IntPE(SA), BSc(Eng) GDE PhD,
FSAAE FSAIEE SMIEEE

CONTENTS

FEATURES

REGULARS

Cost savings through Bearings International and ABB electric motors



Bearings International (BI) is a leading distributor of bearings and power transmission products in South Africa. The company offers a wide range of products, including ABB electric motors, which are known for their high quality and reliability. ABB is a global leader in power and automation technologies, providing solutions for a variety of industries and applications. ABB motors are available through Bearings International's nationwide network, making them easily accessible for industrial operations across the country.

Cost saving is a crucial factor for any industrial operation and ABB electric motors are an excellent investment for businesses looking to achieve exactly that. One way in which the motors help in achieving cost savings is through their energy efficiency, which results in reduced operating costs.

"A common mistake made when buying an electric motor is to look only at the purchase price. In most applications, the purchase price of the motor only accounts for less than 3% of the total cost of ownership. The largest capital outlay is in the running costs of the motor, which can amount to as much as 95% of the cost of ownership, with downtime making up the balance of the costs (<2%). It is therefore imperative for businesses to choose reliable and energy-efficient motors if they want to cut costs," says Stephen Bekker, BI Business Unit Leader for Motors & Drives.

Upgrading to premium-efficiency technologies, such as ABB electric motors, is a simple and cost-effective way to cut energy consumption and reduce operating costs. For instance, a recent upgrade to an ABB electric motor in a constant torque application resulted in a 20% reduction in running costs, leading to savings of approximately R21 683 per year. This demonstrates the significant impact that ABB electric motors can have on reducing energy costs for businesses.

ABB electric motors offer a longer lifespan and reduced maintenance costs in a comprehensive range of reliable and high-efficiency motors for all processes and applications. As a value-added service, ABB also offers product innovation upgrades for longer life and less downtime, customer training programmes for proper product application, and inventory management programmes, all to help reduce costs.

By providing customised solutions for specific industrial applications, ABB electric motors can help businesses optimise their operations and achieve cost savings. Whether the setting is domestic or industrial, ABB electric motors are an excellent investment for businesses looking to achieve cost savings.

Bearings International's partnership with ABB provides industrial operations with access to reliable and cost-effective electric motors. ABB's commitment to energy efficiency and cost savings makes its motors a valuable asset for any operation looking to improve the bottom line and reduce their environmental impact. By choosing ABB electric motors through Bearings International, industrial operations can ensure their equipment is reliable, efficient, and cost-effective in the long run.

Through its partnership with ABB, Bearings International offers industrial operations a comprehensive range of energy-efficient motors which deliver long-term cost savings.

For more information contact Bearings International.
Tel: +27 (0)11 899 0000
Email: motors@bearings.co.za
Visit: www.bearings.co.za

R2 trillion investment target next

Propelled by the success of the South Africa Investment Conference (SAIC) held annually in the country over the past five years, President Cyril Ramaphosa has set a R2 trillion target for South Africa to achieve over the next five years.

SA News reports that the recent 5th Investment Conference, held 13 April at the Sandton Convention Centre in Johannesburg and attended by delegates from various industries in South Africa and around the world, saw significant investments announced in the digital economy, manufacturing sector and Special Economic Zones (SEZs). These are expected to pave the way for substantial further job creation and economic growth.

"Today's pledges cover 21 district municipalities across the country. A number of these investments, as well as bringing much-needed economic activity to these localities, are also supporting our overall national development goals," President Ramaphosa said at the conference.

During the afternoon session of the SAIC, investment pledges reached R1.51 trillion, surpassing the initial R1.2 trillion target by some 26%.

Pledges for investments in the digital economy included the following commitments:

- Equinix committed to investing R3.8 billion to developing new data centres in South Africa
- Teraco made its fourth announcement this year, investing a further R2 billion to expand its data centre capacity and developing renewable energy projects to supply its data centres in Gauteng, the Western Cape and KwaZulu-Natal
- Cassava Technologies is investing R4.5 billion towards adding 20 Megawatts energy generation capacity for its data centres in Gauteng and the Western Cape
- Scensos pledged R80 million investment in a call centre in the Western Cape
- Moov, a fintech start up, is investing R284 million in connecting mobility entrepreneurs to the right hailing e-logistics and e-delivery marketplace
- SA Taxi is investing R500 million to providing financing to underserved and developing small, micro and medium enterprises (SMMEs)
- Rain is investing R4 billion in the further rollout of 5G infrastructure across South Africa
- Telkom made its fourth announcement, investing R5.97 billion in information and communication technologies (ICT) infrastructure development across South Africa
- Topping its R50 billion pledge at the inaugural 2018 investment conference, Vodacom committed to invest R60 billion in ICT infrastructure.

Investments committed to the manufacturing sector included:

- Alpha Manufacturing is investing R2 billion in recycling, packaging and manufacturing facilities in Gauteng and KwaZulu-Natal
- Ardagh Glass Packaging committed to investing R1.9 billion in a glass production facility in Gauteng
- Impact pledged to invest R2.5 billion across its paper and plastic production facilities in several provinces
- A Danish company is investing R133 million in the manufacturing of environmentally sustainable building insulation from recycled waste in Gauteng
- Pavati Plastics is investing R125 million in expanding its facility to produce specialised recyclable packaging material in Gauteng
- Defy committed to its third pledge, investing R288 million in its white goods manufacturing facilities in KwaZulu-Natal
- Madinda Utilities is investing R600 million in hardware manufacturing for the electronics industry in Gauteng
- INTECH, from South Korea, is investing R70 million in electric cable manufacturing in Gauteng
- Triple Five Trucking Solutions is investing R118 million in the production of cabling for the renewable energy industry
- Actom is investing R100 million in expanding capacity for products for the renewable energy sector
- SGB-Smit Power Matla is investing R500 million in rebuilding its transformer factory in Gauteng
- Mohlalefi is investing R120 million to produce safety equipment for the mining industry at its facility in Gauteng
- Prism Group is investing R93 million in automotive component manufacturing
- BMW is investing R4.2 billion in plant expansion for the manufacture of new BMW models.

Cassava Technologies is investing R4.5 billion towards 20 MW energy generation capacity for its data centres in Gauteng and the Western Cape.

Investing in Special Economic Zones

A diverse range of companies – involved in the manufacture of, for example, aluminium rods, rubber hoses, steel, heavy-duty trailers, exhaust systems, cement, LPG cylinders, acetylene gas, electrical components, fibreoptic cables, food products, packaging and labelling systems for the FMCG sector, and new energy generation technologies – committed to investing in a number of the country's designated industrial development zones. These extend from Richards Bay Industrial Development Zone and the Dube Trade Port in KwaZulu-Natal to the Coega SEZ in the Eastern Cape, to Atlantis SEZ in the Western Cape, the Tshwane Automotive SEZ and the Vaal River SEZ in Gauteng, and the Fetakgomo Tubatse SEZ in the Sekhukhune District of Limpopo.

For more information visit: www.sanews.gov.za

Energy transition presents opportunities for investment

Speaking in a breakaway session at the recent South Africa Investment Conference, hosted in Johannesburg 13 April, Chief Operations Officer for the Industrial Development Corporation (IDC), Joanne Bate, said although the Just Energy Transition is expected to bring challenges to businesses and society, it also presents major opportunities, not only for bigger companies but also for SMMEs and for localisation.

"If we look at government's Just Energy Transition investment plan and the Green Hydrogen Commercialisation Strategy – we are building, potentially, 5 GW of power for electricity per annum, and 5 GW of power for hydrogen per annum.

"That presents an amazing opportunity for localisation. What does localisation give us? It presents opportunities for additional tax revenues and additional jobs to be created. There's a lot that needs to be done in energy efficiency and in developing own generation capacity as well.

"So, at the IDC, together with National Treasury and the banks, we are looking at schemes to accelerate own generation and the ability of small and medium-sized enterprises to become self-sufficient and greener – because both are important," she said.

Bate said the IDC has development funds available to put into projects to "de-risk" or back projects in their early stages.

"If we look at the scale of new industry opportunities to be developed, other funds will be needed and these particularly for that early-stage de-risking. The only gap we have in really catalysing the green economy is access to those early development funds and partners.

"If we can progress those early-stage industry development opportunities, the opportunities for new economic activity, new export revenue generation, new skills and jobs in our country which will continue to grow the economy and attract further funds into the economy, will be absolutely available," she said.

The IDC says project delivery will attract further investment in the energy transition, with the benefits of growing localisation and creating new jobs.

However, Bate said that investment in the economy needs to be accelerated to enable these businesses to take advantage of the opportunities that present themselves.

"The way we attract the balance of the funding is by delivering. We have a plan. We have projects we need to execute with rigour, speed and focus on the outcomes we want to achieve. We need to improve our integrated planning… to understand what needs to be done.

"If we can get this integrated planning together, we can execute with speed and rigour. We can demonstrate transparency in the measure of what is being achieved and if the plan can be executed and demonstrated, it will attract more funds," she said.

For more information visit: www.idc.co.za

Bheki Nxumalo appointed Group Executive for Generation at Eskom

Eskom has appointed Bheki Nxumalo as Group Executive Generation, effective immediately. His career in the energy sector spans over 20 years from junior to senior management and executive levels. He is an all-round business leader, comfortable in governance, people and technical aspects of the role. He will report directly to the Acting Group Chief Executive, Calib Cassim.

"We have been searching for the Group Executive for Generation for a while now. It has been difficult to find a suitable candidate who would hit the ground running. The Generation Recovery Plan is in full swing. We needed someone who would drive the execution of the recovery plan and inspire staff to reach beyond their reach. Recently, it occurred to us that our candidate was hidden in plain sight. That leader is Bheki Nxumalo," said Cassim.

Prior to this appointment, Nxumalo was the Chief Executive Officer Eskom Enterprise and Eskom Rotek Industries. He has extensive experience in operations, power station management and production. He was the Power Station Manager at two of Eskom's power stations and the General Manager at Kusile Power Station. He also had a brief stint as Group Executive for Generation and Group Capital.

"We approached Bheki to consider the role. Naturally, he took his time to reflect on our request and discuss it with his family and advisers. We are excited that he decided to take the challenge. He is clearly the best person for the job. Our priority is to give him all the support he needs to do what he loves," Cassim said.

On accepting his appointment, Nxumalo said, "I am truly honoured to be asked to lead Eskom Generation at this critical time. I literally grew up in Eskom. I strongly believe that it has the technical and managerial capability to turn things around. The majority of Eskom employees are passionate about their work and the company. I know I can count on the support of my colleagues in Exco and the new Eskom board to make this turnaround a reality."

Cassim also said, "I would like to thank Thomas Conradie, who has acted in this role for the past several months, for his selfless leadership and dedication to our business."

For more information visit: www.eskom.co.za

High-speed assembly with active system monitoring

Stefan Ziegler, Beckhoff Automation

To push the limits of what is technically feasible with computing power that can be scaled as needed, the STIWA Group has been relying on PC-based control technology from Beckhoff since the 1990s. This has resulted in cycle times of less than one second, positioning accuracies in the hundredths of a millimetre range, and active system monitoring that uses sophisticated advanced analytics and AI methods to ensure data-based production optimisation.

To quote the decision-makers at the STIWA Group, creating a successful company means seizing opportunities, recognising forward-looking technologies and trends and implementing them in solutions. STIWA's now 50-year history illustrates this approach. It has risen from being a small mechanical engineering company based in Attnang-Puchheim, Austria, to an internationally sought-after specialist in the field of product and high-performance automation.

"More than anything else, it was Walter Sticht's personality that made this development possible. As a gifted technician with ambition and craft running through his veins, he recognised the potential of PC-based control technology at an early stage and was one of the first to start exploring this new kind of solution, venturing into the market as early as the 1990s," says Michael Pauditz, head of the business unit for software development and innovation at the STIWA Group, as he recalls the beginnings of the company's close partnership with Beckhoff.

At the time, the automation specialist was still a newcomer, but promised, from the beginning, to change the world of automation with revolutionary product developments. "Since then, we have continued to collaborate to push the limits of what is technically possible," Pauditz adds. There is no limit to the range of possibilities for systems made by STIWA, through its use of modular, flexibly adaptable hardware and software and a closed feedback loop within the corporate group.

(© Beckhoff)

The LTM-CI linear transfer system is an example of STIWA's highly complex assembly systems.

A manufacturer and operator

One of the STIWA Group's unique selling points is that, through its work with STIWA Automation GmbH as a machinery manufacturer, STIWA AMS GmbH as a software developer, and STIWA Advanced Products GmbH as a producer for markets including the automotive industry, it is both a manufacturer and an operator of high-performance automation. This means the group can use its own production environment for proof-of-concept work. Continuously recording all relevant machine and process parameters and analysing them in detail allows for the experience gained from ongoing operation to be fed back to the development departments immediately with suggestions for optimisation as they arise. "This close interaction with our production site in Gampern has helped us build up our in-depth process expertise, without which automation at such an advanced level would not be possible," says Michael Fuchshuber, CEO of STIWA Automation GmbH, noting that every microsecond, every hundredth of a millimetre and generally every extra ounce of performance really counts in STIWA systems.

"We purposefully push our systems beyond conventional limits," Pauditz adds, confirming that the group's status as a globally recognised hidden champion in the high-performance automation segment makes it feel obliged to offer the maximum possible in every case. Translated into key technical figures, this means the LTM-CI, a linear (L) transfer system (T) with a miniature design (M), designed for ultra-fast assembly of small parts up to 30 x 30 x 30 mm in size, can carry out: laser welding, screwing, press-fitting, labelling, testing, measuring, and feeding and positioning with 0.08-millimetre precision in the sub-second range with up to 24 processing modules per system as required – and all this with three to five degrees of freedom.

High-performance, standardised software architecture

In Beckhoff, STIWA says it has found the perfect sparring partner for developing such high-tech solutions, which are exceptional in many respects. With their shared collaborative innovation mindset, the companies created a modularly designed PLC framework based on TwinCAT, which can be used to respond quickly to customer-specific requirements. "In total, we spent around 500 person-years on basic development to design a high-performance all-in-one solution that can be used in mechanical engineering as well as in building, process or laboratory automation," says Pauditz. He is referring to a system that is 97% based on the completely integrated software architecture which is consistent and thus extensively tested. Only the remaining 3% has to be tailored to the application. Any storage or computing capacity that Beckhoff makes available with its open, PC-based control technology is fully used.

"With cycle times of 0.5 seconds, we orchestrate up to 50 NC axes via an Industrial PC. At the same time, every single axis movement is monitored to make event-driven adjustments to production processes possible and perform further analyses," Pauditz details.

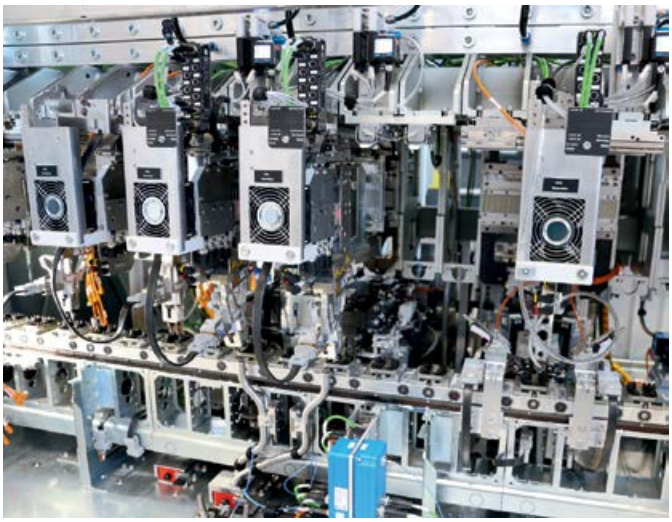
The technological foundation for PLC conversions from axis positions to real-time values and vice versa was created by Beckhoff using EtherCAT and the principle of distributed clocks. STIWA uses this, among other things, to identify workpiece carriers travelling at transport speeds of up to 3 m/s to the next processing station as they pass by. Various EtherCAT oversampling terminals from Beckhoff and the EP1258 EtherCAT Box (8-channel digital input) with time stamp functionality demonstrate their high signal processing capability.

In a typical STIWA system, more than 10 MB of raw data has to be forwarded to various system devices every 0.5 seconds. For this purpose, the Automation Device Specification (ADS) protocol provides a transport layer within the TwinCAT system that enables direct communication between the TwinCAT NC and the TwinCAT PLC. The control algorithms for the individual production processes, such as the control of the scanner mirrors in laser hardening, are stored in the PLC itself. Any deviations from the target times are detected and reported as an indication of a suspected error in order to implement active error monitoring.

Andreas Bernreitner, sales representative at Beckhoff Austria says, "Some features that have found their way into TwinCAT were originally developed for a specific need of the STIWA Group – including the FIFO (first in, first out) function blocks for non-cyclically recurring processes, in which the current axis positions can be permanently 'refilled' by a PLC program."

From contract manufacturer to innovation driver

For the STIWA Group today, it sees its success as the result of its being not just a contract manufacturer during its 50-year history – it has always been a driver of innovation. This began with an early switch to software-based PLC technology, which at the time was recognised as forward-looking by only a few pioneers, and then continued in a digitisation strategy which the company has consistently pursued. Through the use of artificial intelligence (AI) and machine learning (ML), this has delivered results such as active system monitoring and automatic process optimisation



(© Beckhoff)

(© Beckhoff)

Above: The STIWA systems benefit from advanced I/O components including the EP1258 EtherCAT Box modules with time stamp functionality, which can be mounted directly on the machine.

Right: EtherCAT and the corresponding I/O terminals result in highly reliable and ultra-fast data transmission.

at STIWA plants. The major added value is a fully integrated system that sustainably brings significant cost advantages and competitive advantages for customers. The high demand from regular customers as well as further growth in new markets and industries endorse the direction STIWA has taken.

"We have a lot of plans for the future and TwinCAT is an important part of our solutions. Otherwise, we would not be able to regulate the highly complex processes with the levels of quality we achieve today," Michael Fuchshuber adds.

Although STIWA's status as a classic machine builder meant that it previously responded primarily to specific customer requirements (using a build-to-print approach), in future, as a group of companies, it intends to focus mainly on its own product development, explains Fuchshuber: "The automotive industry crisis and other global challenges have clearly shown in recent years that we are facing a very dynamic market and technology environment. This is what we need to respond to. We are therefore increasingly pushing the in-house production of highly innovative new solutions. With STIWA Advanced Products, we create innovative product ideas from prototype to series production at our site in Gampern. In this regard, over the past few years we have also established a joint venture with the Vorarlberg-based innovation hotbed Inventus." In addition, the company XeelTech, founded in 2019, is developing revolutionary new products such as a rotary encoder based on magnetorheological fluids (MRF). This provides the operator with haptic feedback, with the type of feedback pattern freely programmable via the software. □

For more information visit: www.beckhoff.com/en-za/

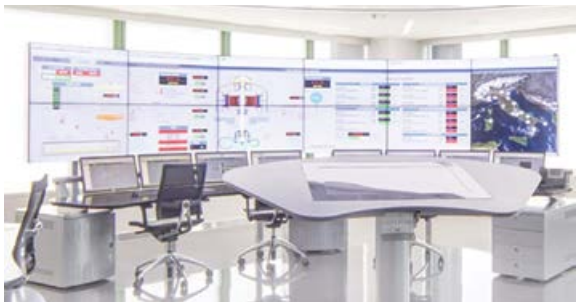
Advancing digitalisation in process automation

The latest release of ABB's Ability™ Symphony® Plus distributed control system (DCS) delivers access to an extended digital ecosystem for the power generation and water industries. Building on ABB's more than 40 years' experience of total plant automation, the latest version of Symphony® Plus will support customers on their digital journey with a simplified and secure OPC UA connection to the edge and cloud, and without interfering with core control and automation functionalities.

The new Symphony® Plus delivers access to digital solutions such as fleet asset management enabled by ABB Ability™ Genix Asset Performance Management. It also enables users to access process and alarm data from mobile devices through the ABB Mobile Operations application, allowing them to stay updated, to respond faster, reduce downtime, and save costs.

With HTML5 web-based operation and engineering tools, critical data can be viewed anywhere, anytime, promoting collaboration and improving plant uptime and performance. Flexible field device management has also been enabled with ABB's Field Information Manager (FIM), making the configuration, commissioning, diagnostics, and maintenance of fieldbus instruments quicker and easier.

"In developing the latest release of Symphony® Plus, our focus has been on creating innovative technology that gives customers access to an extended range of digital applications," said Joerg Schubert, Head of Product & Portfolio Management, Process Automation Systems, ABB. "Our long-term goal is to help society and industry achieve a more productive, sustainable future through safe, secure and seamless operations."



ABB's Symphony® Plus distributed control system delivers access to a range of digital solutions.

A newly added SD Series e-Class process controller offers a low-risk, low-disruption retrofit solution for traditional Harmony Rack (HR) installations. It brings increased speed, higher capacity, and more functionality to HR systems. It delivers innovation with continuity, enabling plant-wide digitalisation while minimising impact on process operations and system infrastructure.

For more information contact ABB Process Automation.
Visit: www.abb.com

Referro Systems recently showcased the latest automation technology for the mining industry at an event in Kathu, Northern Cape.

Showcasing automation solutions for mining

Referro Systems, a leading provider of innovative control and automation solutions for the industrial sector, recently hosted a successful two-day Automation Open Day event at the Sivos Training Centre in Kathu, Northern Cape. The event brought together industry experts and mining companies, offering a showcase of the latest automation technology and innovation. It included live product demonstrations and provided a forum for discussions on business needs and challenges.

Adrian van Wyk, Managing Director of Referro Systems, says the event was a success, with about 100 delegates in attendance. It provided valuable insights and solutions from industry experts representing some of the world's leading electrical, automation, and global software and hardware brands for the industrial sector - such as Rockwell Automation, ElectroMechanica, Comtest (Fluke), Allen Bradley, Marechal South Africa, Throughput Technologies, and AllPronix.

He says, "We believe events like this foster a collaborative approach to problem-solving and driving innovation in the industrial and mining sectors."

He made this point in his welcoming address to the delegates. They then had the chance to enjoy presentations on various topics, including mining operations management, machine safety, renewable applications in engineering, and ThinManager modern automation visualisation. The second day of the event was also packed with informative presentations, including discussions on smart motor control, reducing electricity costs, and alert-alarm notifications.

Van Wyk says the event demonstrated again Referro Systems' commitment to providing innovative automation solutions for its clients, and the attendees appreciated the opportunity to learn from industry experts and explore the latest technological advances.

He says the delegates from the Northern Cape confirmed that they see such events providing great value as a platform to strengthen existing skills and systems that aid the mining and industrial sectors in their region.

"We would like to extend our gratitude to all those who attended, as well as our sponsors and partners who made the event a success," van Wyk says.

For more information contact Referro Systems.
Visit: www.referro.co.za

Mill-wide optimisation for pulp and paper mill operations

Leading global developer and supplier of process technologies, automation and services for the pulp, paper and energy industries, Valmet, recently introduced Mill-Wide Optimisation (MWO) to enhance overall pulp and paper mill performance and profitability. With Valmet MWO, production teams can boost the mill's performance by making well-informed decisions across different process areas to reach shared goals.

The optimisation observes the balance across the entire mill in real-time and considers current and future states of the mill. As a result, sub-optimisation of individual processes that do not align with overall mill goals can be avoided. MWO also provides the ability to balance environmental sustainability considerations with production, quality and costs.

"The pulp and paper industry is transitioning towards self-governing autonomous operations and a younger workforce with new roles and responsibilities. Valmet MWO helps to capitalise on these changes and unlock a mill's full potential," says Greg Fralic, Product Manager, Mill-Wide Optimisation, Automation Systems business line at Valmet.

Optimising production, quality and costs

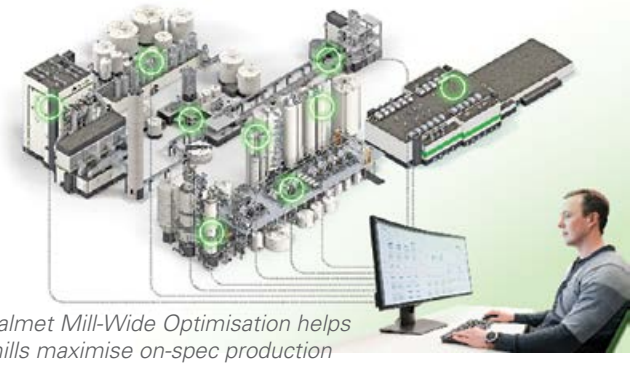
Mill-wide production planning helps mills to keep up with the daily changes in production bottlenecks. Valmet MWO reflects the mill's current state and maximises production, subject to existing and projected bottlenecks, at the same time stabilising the process and balancing pulp and liquor inventories.

Mill-wide quality planning helps attain the intended final product quality while keeping costs low. It adjusts the quality targets at each step, from chip to finished product.

An audit as the first step

To move away from optimising individual processes, pulp and paper mills need to be evaluated as a whole. The Valmet Mill-Wide Optimisation Audit helps to reveal the production potential and the corresponding return on investment. Based on historical data, the audit helps to evaluate potential production increases, identify limitations, and highlight use cases of mill-wide optimisation. It also helps to uncover development opportunities that can move the mill towards fully optimised operations.

For more information contact Valmet.
Visit: www.valment.com



Valmet Mill-Wide Optimisation helps mills maximise on-spec production at minimum cost by steering operations towards shared goals.

Smart IP67 power supply for modular machines

PSU67 series power supply units from Turck Banner enable simpler and flexible installation in distributed and modular plants – directly in the field.

Machines and plants are increasingly designed as modular systems in order to respond quickly to changing production and market requirements. This requires the use of decentralised system components – including cabinet-free power supply.

Turck Banner's decentralised power supply units in its PSU67 series can be installed precisely where they are needed, directly in the field, and without requiring additional protective housing. This gives system builders the flexibility to design applications to meet specific plant requirements.

Communication via IO-Link

The worldwide standard IO-Link technology provides communication from the controller to the field level, where the decentralised power supply is located. And the power supply units supply important data and parameters to the controller, such as error messages, voltage, temperature, fuse status and operating hours, via the IO-Link interface.

IO-Link also enables remote access. This can be used to switch the power supply units on and off, to set the voltage and to reset any triggered channels. The data can be routed from an IO-Link master on to the controller or to the cloud. Thus, the power supply units can be used to extend existing condition monitoring systems.

Field installation

The use of PSU67 power supply units is a significant step towards creating end-to-end decentralisation. Depending on the application, the need for control cabinets and switch boxes can be eliminated completely. With protection to IP67, power supply units can be installed directly at the machine without any additional protective measures. As an alternative to the relay output ('DC-OK'), which is also provided, status monitoring via IO-Link offers additional support for the implementation of modular designs. The LED interface and buttons on the device allow for direct and user-friendly parameterisation and enable use in a wide range of applications. Integrated outputs protected with an eFuse reduce the cabling requirement and make it possible to use cables of smaller cross-sections. This provides the user with more benefits in terms of flexibility and costs, particularly in extensive applications.

With protection to IP67, the power supply units can be installed directly at the machines.

A universal solution

Turck Banner's PSU67 power supply units offer M12 S-coded, 7/8" or HAN Q connection options on the primary side and M12 L-coded, 7/8" or HAN Q connection options are provided on the secondary side. Efficiency is always over 95%, whether a single or three-phase, 200, 360 or 600 W supply is used. The output voltage can be configured either directly on the device, or remotely via IO-Link and can be optimised with 24 to 28 Vdc over long transmission routes. The configurable fuses make it possible to adapt the output power precisely to the requirements of specific applications.

For more information contact Turck Banner.
Tel: +27 (0)11 453 2468
Email: sales@turckbanner.co.za
Visit: www.turckbanner.co.za

The new bus coupler supports all available Inline I/O modules.

New bus coupler for Ethernet

With the new IL ETH BK-PAC Inline bus coupler for Modbus/TCP (UDP), Phoenix Contact has expanded its product portfolio for setting up remote I/O solutions in the control cabinet.

The bus coupler, with IP20 protection rating, supports all available Inline I/O modules, including the branch modules for opening a remote bus branch. It adds another network to the portfolio of the new generation of the compact Inline bus couplers. The new bus coupler with two RJ45 ports enables daisy-chain wiring and automatically detects the network and local bus speed. The firmware update capability means the latest firmware can always be loaded onto the device.

The bus coupler is connected to controllers for Modbus/TCP (UDP) or directly to a PC. With a PC, programming and control can be performed using high-level languages. The integrated web-based management can be used to retrieve static information, such as the technical data of the device, and dynamic information, such as the current local bus configuration. To increase network security, specific individual, unused ports can be blocked via web-based management.

For more information contact Phoenix Contact SA.
Tel: +27 (0)11 801 8200
Email: info@phoenixcontact.co.za
Visit: www.phoenixcontact.com/en-za

Flexibility in compact push button boxes

Push button boxes are used in numerous industrial applications. Connecting these to an IO-Link master usually entails higher costs and additional cabling. It is significantly more economical to connect several push buttons to one port. It has therefore been difficult, so far, to use IO-Link as an interface in push button boxes.

The new CB10 series I/O hubs from Pepperl+Fuchs, with their particularly compact design, offer a solution for direct integration into the smallest installation spaces. The CB10 modules can be connected directly to an IO-Link master and thus they make push button boxes IO-Link-capable.

Versatile and robust

The space-saving I/O hubs enable the connection of up to eight standard devices in IO-Link networks. Freely configurable digital inputs/outputs ensure application diversity, from use in stack lights to the connection of mechanical contacts such as in push button boxes, to the connection of 3-wire sensors. With their compact housing design – 39.5 x 36 x 10.1 mm – the modules can be integrated into the smallest panels and customer-specific electronics.

Innovative hotmelt technology enables the realisation of the space-saving housing design – and the production of robust and shock-resistant housings for the high quality and durability of the CB10 I/O hubs.

Easy installation and commissioning

In addition, the I/O hubs are designed to be user friendly for assembly and commissioning. The modular solution enables easy integration into IO-Link networks and allows OEMs to preassemble push button panels in the plant. This way, the modules are directly connected to the application.

The CB10 modules can be connected directly to an IO-Link master to make push button boxes IO-Link-capable.

The different wire colours and pre-crimped leads facilitate accurate and fast installation of the modules. LED outputs integrated into the housing indicate any errors that may occur.

Key features

- Compact I/O hubs enable the connection of up to eight standard devices to IO-Link networks
- Freely configurable digital inputs/outputs offer maximum flexibility
- Widely applicable: variants to suit mechanical push buttons, 3-wire sensors, and signal lamps
- Different wire colours and pre-crimped leads enable accurate and fast installation
- Space-saving, robust, and shock-resistant housing.

For more information contact Pepperl+Fuchs.
Tel: +27 (0)86 756 8741
Email: info@za.pepperl-fuchs.com
Visit: www.pepperl-fuchs.com/southafrica/en/

A new era in coding and marking

Leibinger, a leading innovator in coding and marking systems, based in Tuttlingen, Germany and operating globally, is introducing an all-new coding and marking system at the interpack Fair taking place in Düsseldorf 4 to 10 May 2023. The company sees this ground-breaking innovation setting a new benchmark and promising a new era in the marking of, for example, best-before dates and other codes on a range of materials.

"Especially in the case of cost-sensitive applications, such as in the food and beverage sector or the fast-moving consumer goods (FMCG) sector, the smooth running of marking systems, without interruptions, is a critical factor. We have developed an entirely new coding and marking system that delivers what it promises: worry-free printing," says Christina Leibinger, CEO of Paul Leibinger GmbH & Co. KG. "We will demonstrate this innovation at our stand at the interpack trade fair." She adds, "Also worthy of mention is that the new system boasts the lowest operating costs in the industry. Just one of the reasons we are talking about a new era."

Leibinger's new Coding and Marking System is designed to deliver smooth marking on a range of materials.

(Source: Paul Leibinger GmbH & Co. KG)

Leibinger is a globally positioned specialist in coding and marking systems with headquarters in Germany. The third-generation family-run company, founded in 1948, develops and produces industrial inkjet printers at its site in Tuttlingen, Baden-Württemberg, with a workforce of some 300 employees. The CIJ systems are recognised for their high quality and a patented fully automatic nozzle sealing technology, which minimises time-consuming printer cleaning. The company's global network with over 150 service partners and subsidiaries ensures that Leibinger maintains close relationships with its customers around the world.

For more information visit: www.leibinger-group.com

Gears, motors & drives – driven by sustainability

Pinpointing climate change as possibly the most serious challenge humankind has ever had to tackle, SEW-EURODRIVE has over a number of years already pursued a sustainability agenda which is applied across every aspect of its business.

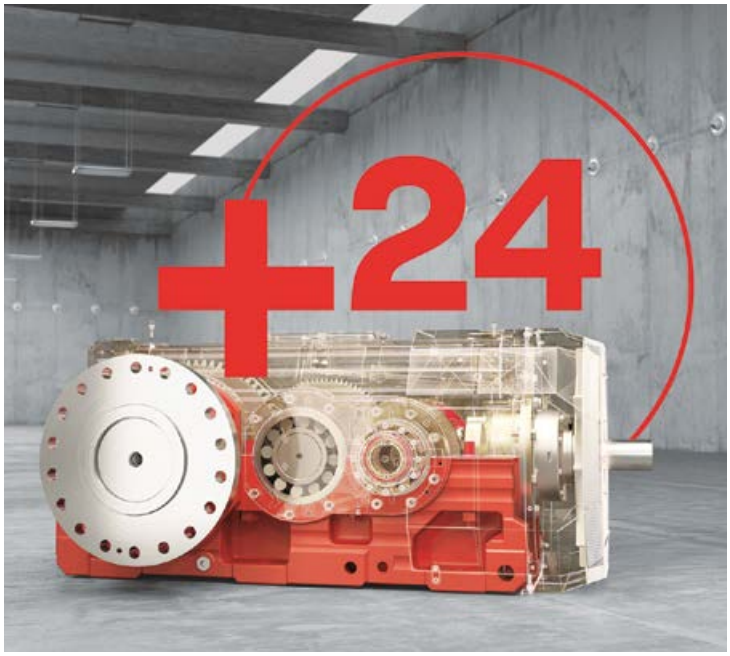
Managing Partner Jürgen Blickle says the company recognises that the number and scale of natural disasters is growing at an alarming rate – threatening people around the world.

"This means every one of us has a responsibility to do what we can to slow down and stop the process of climate change, and this is particularly true for industry," says Blickle. He makes the point that sustainability is not new for SEW-EURODRIVE, which has long seen recycling as an essential step in achieving a sustainable circular economy. The company has also championed renewable and efficient energy sources and maximised the energy efficiency of its drives.

Living up to its responsibilities

"We believe sustainability goes further than that, though," he says. "We are determined to live up to our responsibilities in every way, whether in relation to the environment, our customers, our business partners, our employees, and not least our children and the world in which they will live."

Through a long-term sustainability initiative called 'sustainability@SEW', the company is gradually and consistently working towards safeguarding resources, lowering CO_2 emissions and optimising its entire value chain. Much progress has already been made, as it has for many years adopted a business philosophy and a practical approach centred on sustainable, durable products and an unwavering focus on customers and their requirements.



Extending sustainability to the service side of the business SEW-EURODRIVE's products are designed to be maintenance- and repair-friendly.

This 'cradle-to-cradle' approach – established in 1990 as an end-to-end system for a circular economy – is now a benchmark for the environmentally friendly development of products and associated processes. It means that all the inputs, materials and substances used to manufacture a product can be fully returned to, or reused in, biological or technical loops.

Eco-design

The company's holistic approach forms the basis for planning the rollout of its in-house eco-design guidelines. This is being applied, for example, in the way the company is developing and documenting two projects already under way on the recycling of brake components and magnets. These projects will provide a reference for eco-design to extend to the product categories of motors and electronics.

Another project will take the findings further and incorporate more product families. With its depth of expertise built from its sustained commitment to quality, SEW-EURODRIVE is opening a completely new chapter in product design with its sustainable product concept development. The design guidelines will be distilled into practical recommendations such as avoiding the use of certain adhesives or casting resins, among other things.

Reuse and recycling

The company is also planning to produce an extended product qualification system as a benchmark for product development. Among the focus areas are reuse and recycling, which can give many components a second lease on life. It aims to maximise the scope of recycling and, in parallel, leverage a reuse system that puts as many products as possible back into service.

This means inspecting and cleaning reusable parts to be fed back directly into the production process where possible. It will save on the energy required to recycle copper, steel and die-cast aluminium parts – including the transport, separation and melting down of used parts.

Gear lubricant from sustainable biomass

In another sustainability innovation, SEW-EURODRIVE has developed a CO_2-reduced lubricant for its gear units. With

90 years of experience in developing and building gear units, the company has considerable expertise in tribology – the study of friction, lubrication and wear. Last year, it launched GearFluid Poly 220 E1, the first CO_2-reduced gear unit lubricant made from sustainable biomass – rather than from petroleum or other fossil-fuel raw materials.

"This improves the carbon footprint of the gear fluid by 84% compared to petroleum-based polyglycol base oils. The biomass we have developed does not even need to be specially produced, and it takes up no additional agricultural land. The biomass comes from green cuttings and food waste, which is readily available and can now be easily recycled," says Blickle.

The biowaste is transformed, through a complex synthesis process, into a high-quality base oil. The packaging has also been designed with sustainability in mind, so there is 25% recycled plastic in the cannisters for the oil.

Sustainable service

SEW-EURODRIVE's holistic focus on sustainability extends to the service side of its business – requiring that its products should always be designed to be as maintenance-friendly and repair-friendly as possible. An example of this is in its gear units and gear motors, which can be disassembled non-destructively and then reassembled again once faulty or worn parts have been replaced. The maintenance-friendly connection between SEW-EURODRIVE's gear units and motors is made with a pinion shaft that has a key and a mounted pinion with a corresponding slot. Unlike connections with crimped pinions, this connection can be disassembled without destroying the parts. Any necessary repairs can be carried out at the customer's premises or in one of SEW-EURODRIVE's service centres.

Extending the service life of existing products also means having all individual components available worldwide for decades – to avoid unnecessarily using resources on new equipment.

The company's Life Cycle Services are the next logical step in this strategy. The services are based on the concept of a holistic, closed loop that covers a product's entire service lifespan while in use with the customer. With a dedicated contact, each customer receives the best available expertise and advice on their drive technology.

In conclusion, Blickle emphasises how SEW-EURODRIVE works with dedicated people to ensure the company is focused on people and on the future of humankind. "Maintaining and protecting the very basis of our existence – that is what sustainability means and that is what drives us at SEW-EURODRIVE," he says. □

For more information visit: www.sew-eurodrive.co.za

More benefits from new motor-gearbox adapter

Constantly improving its gear units, geared motors and related products, automation specialist SEW-EURODRIVE has recently upgraded its well-known AM adapter. The new AMS adapter incorporates added features to benefit the end user.

Andreas Meid, Head of Engineering at SEW-EURODRIVE, says the AM adapter has always fulfilled a valuable role in the company's product line-up, providing for SEW-EURODRIVE's IEC motor to be integrated with a SEW-EURODRIVE gearbox. The new AMS adapter has been upgraded with further refinements.

"The first improvement we introduced is to make it more compact," says Meid. "Its smaller footprint allows users to install it more easily in areas where space is constrained. We have been able to reduce its dimensions by up to 25%."

The bearing selection in the AMS adapter has also been reviewed, to optimise the bearing life relative to the operating temperatures. He highlights the growing demand in the market for longer service intervals and more uptime – and this upgrade, he says, is a proactive response.

"We have also considered the specific requirements of vertical installations and included a drain hole to ensure that any liquid can easily exit the adapter," Meid adds. "The flinger transports the liquid to the through bores in the intermediate flange, where it can drain out."

This is important because it means that liquid will not enter the bearings and gears – so it ensures the components can achieve a longer operating life.

"Customers have always appreciated the reliability and low cost of ownership of SEW-EURODRIVE's equipment," says Marcio Sicchiero, the company's Head of Exports. "The AMS adapter comes from the same heritage of high-precision German engineering. The range of frame sizes also makes it versatile, suitable for use across many industry applications; we offer 12 sizes from IEC 71 to IEC 280."

The new AMS adapter is more compact and provides for longer bearing life.

The new version AMS adapter has been well received by existing users of the AM fitting and in the wider market. It is being manufactured at several SEW-EURODRIVE plants around the world.

"The AMS adapters, together with our gearboxes and high efficiency IEC motors, offer customers a full package, which is supplied with a two-year extended warranty," Sicchiero says. "Customers also have the convenience of sourcing from one supplier, and the assurance of support and servicing from SEW EURODRIVE. We look after all that."

He notes that the package is supplied already assembled, reducing the time and cost – and the operational risk – of trying to assemble components on site.

Among the most common applications of the AMS adapter, motor and gearbox are applications in agitation and mixing activities in the mining and water sectors.

For more information contact SEW-EURODRIVE.
Visit: www.sew-eurodrive.co.za

Safeguarding VSDs in mining and industrial operations

Energy-optimising VSDs are widely used in mines today and need to be protected from power disruptions with suitable UPSs.

Variable speed drives (VSDs) are used in most mines today. Michael Young, Pre Sales Engineer, Secure Power at Schneider Electric highlights that they provide an energy-optimised solution for mechanical equipment used in mining operations. For example, VSDs offer significant energy savings when integrated into mines' cooling systems. Savings like this are especially beneficial at this time when operators are under increasing pressure to optimise energy usage.

However, as with many other components, VSDs also undergo tremendous strain when they are exposed to unplanned power outages, as in loadshedding, and this affects their operational effectiveness. The damage caused is often exacerbated by the quality of energy when the power returns. When grid power is restored it's usually not in a pure sine wave and this can damage equipment further.

Young says, "To protect VSDs from outages and reduce downtime, double conversion online uninterruptible power supplies (UPSs) can be connected to the inlet power supply of the drives. A UPS will ensure that when a power outage occurs, the VSD will not experience loss of power. In addition, a double conversion UPS can deliver a pure sine wave, mitigating potential damage to power-sensitive equipment."

He explains that a double conversion UPS protects a VSD from damage by converting power twice. Typically, power coming in from the main grid in the form of an alternating current (ac) input may contain voltage spikes, distortion, and other anomalies. This ac power is converted

Continued on page 15

Premium efficiency motors for water utility

Taking proactive steps to become more energy efficient, South African water utility ERWAT is installing WEG IE3 top premium efficiency and WEG IE4 super premium efficiency motors from Zest WEG. The motors – from WEG's W22 range – will assist in reducing the impact of rising electricity costs and lower the total cost of ownership for the utility.

ERWAT (the Ekurhuleni Water Care Company) provides water and wastewater management services primarily to municipal and industrial customers in Ekurhuleni, Johannesburg and neighbouring areas in Gauteng.

Dillon Govender, Sector Specialist in public sector business development at Zest WEG says the rollout of WEG's reliable W22 low voltage (LV) motors at ERWAT's plants will also contribute to improving the general performance of the plants.

"WEG is constantly improving its W22 motors in terms of energy efficiency," Govender says. "We have made the WEG IE3 top premium efficiency motors in this range available to the local market, and now also offer the WEG IE4 super premium efficiency motors at no extra cost."

Key to ERWAT's decision to install these motors was Zest WEG's local assembly plant and high levels of local inventory, which ensure quick and reliable supply. Another factor was the standard five-year warranty that Zest WEG provides with the motors. The company also equips the motors to withstand the demanding conditions of operating in the water sector, Govender says.

"It is important that our W22 motors are readily available 'off the shelf' to ERWAT, so there is no delay in delivering the equipment as and when they need it. Our warranty provides the customer with the assurance that the motors will deliver maximum uptime for greater plant productivity."

Govender highlights the value of staying abreast of energy efficiency gains in motor technology because a high proportion of the total cost of ownership is the running cost – which is mainly the cost of electricity. He notes that the energy savings gained by using the WEG IE4 super premium efficiency motors reduce the payback times to as little as a year. From this perspective alone, he says, it makes commercial sense to replace older, less efficient motors, rather than to keep repairing them.

Dillon Govender, Sector Specialist at Zest WEG.

"In addition to reducing energy consumption on the plant, these WEG LV motors reduce the carbon emissions related to electricity generation in South Africa," he adds.

Migrating from the W22 IE3 model to the W22 IE4 is seamless, as the critical dimensions are the same. The WEG W22 IE4 super premium efficiency motor is designed according to the DIN EN 50347 standard, which means it can replace an IE1, IE2 or IE3 motor with similar frame sizes and no modifications are required when the new motors are mounted to the existing base plates.

To operate effectively in a water treatment plant, the motors have to withstand the wet, damp and corrosive environment. This can require solutions ranging from the use of specialised epoxy paint and internal tropicalisation measures, to the supply of canopies for vertical applications.

"At present, water treatment plants in South Africa also have to contend with the disruption of regular loadshedding, which can reduce their ability to treat the required volumes each day," says Govender. "This reinforces the need to avoid any unplanned downtime in operations." He says the installation of WEG's W22 LV motors will ensure not only higher energy efficiency, but also greater reliability for smoother and trouble-free pumping.

For more information contact Zest WEG.
Visit: www.zestweg.com

WEG IE3 top premium efficiency and WEG IE4 super premium efficiency motors are readily available to support greater energy efficiency in plants.

Continued from page 14

into direct current (dc) where voltage spikes and distortions are removed with the use of the rectifier and the dc power leaving the rectifier is then fed to an inverter, and used to charge a set of batteries. The dc power is then 'Inverted' back into ac power which is tightly regulated by the UPS – and thus all power leaving the UPS is clean, as connected to the VSD drive.

Although there is an interruption in power during loadshedding, the dc link within the UPS is maintained by the battery and the output voltage is unaffected and continuous.

Young emphasises: "It's important to understand that a UPS is a temporary power solution, providing energy until power from either the main grid or other energy resources such as generators is restored."

For more information visit: www.se.com

The NewFeed Microgrid Feeder Protection Relay is a microcontroller-based intelligent electronic device.

Advanced feeder protection relay

NewElec's NewFeed Microgrid Feeder Protection Relay is designed to provide motor and feeder protection in low voltage (LV) and medium voltage (MV) environments with multiple curve selections as well as positive, negative and zero sequence voltage and current.

Phase angles are measured and integrated into most relevant ANSI protection features, which can be set for disabled, warning or trip protection mode. A variety of MV and LV current transformer module blocks (CTMBs) cater for different current ranges with easy interfacing to higher current and system voltages using interposing current transformers and voltage transformers, the ratios of which are selectable on the configuration software. This enables full isolation as well as flexible range settings. An external core balance current transformer caters for sensitive earth leakage detection.

The relay is an ISO 9001:2015 compliant IED (intelligent electronic device). It is a microcontroller-based precision instrument with ANSI protection elements, advanced control features and switchgear controller logic. Integrating motor and feeder control functions with pre-start, close command execution time and continuous breaker state monitoring with load current feedback, it detects unauthorised operation or starting as well as breaker failure.

The NewFeed relay is fully configurable with the aid of front-end configuration software. Event records can be downloaded onto a memory stick for further analysis. The relay has an on-board database where time- and date-stamped fault records (36 last faults) and event records (940 events) are kept. The relay also has a data recorder and spectrum analyser, which can be used to analyse motor performance and supplied power quality respectively. The spectrum analyser can detect harmonics up to the 9th on any of the three phase currents.

For more information contact NewElec.
Tel: +27 (0)12 327 1729
Email: info@newelec.co.za, visit: www.newelec.co.za

Fast set-up of motor control systems

The programming of motor control systems and their integration into machine environments often takes several days, amounting to substantial costs. With its motion sample programs available free-of-charge, igus is removing this hurdle. The sample programs make it possible for users to commission the igus dryve series motor control systems in just a few minutes, and connect them to higher-level programmable logic controllers (PLCs). This benefits automation newcomers as well as experienced professionals.

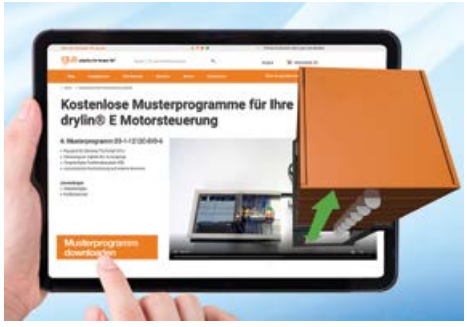
The level of automation is increasing in many companies – and the workload for technicians and engineers responsible for programming and synchronising automation movements is increasing accordingly.

"To ease the burden, users of igus' drylin E motor control systems can download sample programs for our dryve motor control systems for free," says René Erdmann, Head of Business Unit drylin E Drive Technology at igus.

Customers worldwide use the cost-effective control systems mostly for comparatively simple automation tasks – such as controlling dc, EC and stepper motors in single axes, line robots, flat linear robots, room linear robots and delta robots. "With the ready-made sample codes, users can integrate the motor control systems into higher-level PLCs and machine environments quickly and define motion sequences in a time- and cost-saving way," says Erdmann.

The sample programs are compatible with PLCs from manufacturer Siemens, as well as with industrial PCs, microcontrollers, such as Arduino, and single-board computers, such as Raspberry Pi. Further sample programs for Beckhoff, Wago and Eaton are already being planned.

igus sample software programs make it easy for users to commission drylin E motor control systems fast.



Users can save days of programming

Access to the sample programs is barrier-free. On the igus website, users can find videos that show the most common automation movements – such as a trolley moving to different target positions on a linear axis. If the motion program seems suitable, the user can download the software code and load it into the master control system. The motor's actions can then be parameterised and adapted to individual requirements via an intuitively understandable graphic interface. No programming knowledge is required to set travels, target positions and accelerations.

The advantage is clear. "Initial customer feedback confirms this. With some sample programs that map more complex motion sequences, users save several days of programming work," says Erdmann.

So far, the range includes 19 sample programs, suitable for positioning tasks, testing and experimenting devices, pick-and-place handling, automatic assembly machines and feeding systems. "In future, we will add motion programs that customers need most frequently. If users can't find a sample program, for a special application, for instance, or for a different master control system, they can request it via the igus website."

For more information contact igus.
Tel.: +27 (0)11 312 1848
E-Mail: ihewat@igus.
Visit: www.igus.co.za

Medium voltage switchgear for mine solar plant

Last year ACTOM's MV Switchgear Division was awarded a contract for the manufacture, supply, installation and cold commissioning of all the MV switchgear equipment for a 40 MW photovoltaic solar power generation plant being constructed at a gold mine in Gauteng.

The solar plant, covering an area of over 100 ha, will generate over 20% of the average electrical energy consumption of the mine.

The fast-track contract awarded to MV Switchgear comprised three parts.

- An extension to an existing 11 kV substation switchboard to accommodate the additional load coming in from the solar plant. For this extension MV Switchgear produced, supplied and installed 18 double-busbar panels of its premier switchgear product AMV12.
- Two containerised collector substations, each containing 12 x 11 kV GELPAG solid insulated switchgear (SIS) units. GELPAG SIS features high operational efficiency, low maintenance, compactness and built-in immunity to pollution and humidity. It is one of only a few MV switchgear products in the world capable of using solid dielectric insulation without forced cooling for continuous current ratings up to 3 150 A.
- Ten 17.5 kV solar circuit breakers, each housed in an outdoor kiosk. The circuit-breaker kiosks are installed at various points throughout the solar plant site to feed the solar-generated power from transformers via cables to the collector substations, These panels in turn transfer the collected power to the extended 11 kV substation.

Due to the advantages of GELPAG solid insulated switchgear the customer did not hesitate in accepting it as an alternative solution to gas insulated switchgear (GIS) for the collector substations.

Caroline Baptista, Senior Sales Engineer at MV Switchgear said, "An additional noteworthy feature of the GELPAG SIS switchgear is that it can reach a higher continuous current (up to 4 000 A) and short-circuit current (40 kA) ratings, compared to alternative products of similar technology on the market."

A separate contract was awarded to MV Switchgear After-Sales to refurbish the existing protection schemes for the 11 kV substation's main switchboard.

Both the substation extension and the collector substations have been supplied with battery tripping units from ACTOM's Static Power business unit.

For more information contact ACTOM MV Switchgear.
Tel: +27 (0)11 820 5111
Visit: www.actomswitchgear.co.za

One of two 12-panel GELPAG SIS switchboards installed in the containerised collector substations.

Wireless remote monitoring

Darren Barrett, Product Manager, Omniflex

Wireless telemetry systems are becoming increasingly important for plant-wide monitoring and control applications as cabling cost and the disruption caused by the associated installation and maintenance work become prohibitive.

In many cases, the cost of installing control cables is many multiples more than the cost of the instrumentation, making wireless networks a much more attractive option, particularly for specialist applications such as petrochemical plants.

Wireless remote monitoring technology provides a convenient and cost-effective method for plant and asset managers to monitor and manage all important system data across their sites. In highly regulated industries, such as the petrochemical sector, laying cables for data monitoring applications across plants is not always feasible because of strict regulations and the extensive planning permissions required. Here, wireless communication systems can help facility managers retrieve and manage critical data from the field wirelessly, safely, and efficiently.

When dealing with radio-based wireless telemetry systems, it is important to remember that radio transmission distance and bandwidth are finite. This is based on factors such as the power of the transmitter, the sensitivity of the receiver, the distances involved, the type of antenna used, the operational frequency, and weather conditions too can play a part. These factors will determine whether the signal is good or not.

In most countries, globally, the radio spectrum is regulated using licensed and unlicensed frequency bands to prevent interference between different users. Space on licensed frequency bands is at a premium and, with more businesses setting up radio telemetry equipment, demand will only increase. Until January 2018, there were just eight frequencies for licence-free radios in the UK, ranging from 446.00625 MHz to 446.09375 MHz. Since then, the frequency spectrum has expanded significantly. For example, the 5 GHz band runs from 5 150 MHz to 5 850 MHz, before being broken down into three A-C bands.

For many plant managers, the need to pay a fee for exclusive transmission rights makes operating on a licensed band undesirable. Instead, many opt for licence-free bands that are open to everyone. Two of the most common unlicensed bands in South Africa are 2.4 GHz, which is the same frequency as WiFi and Bluetooth, and 868 MHz.

The narrow coverage area and lack of penetrability of 2.4 GHz signals mean its application is often confined to residential settings. In contrast, 868 MHz can transmit across longer distances and penetrate most objects. Although it requires a larger antenna than 2.4 GHz, it has a range of up to 800 metres and a lower power consumption. Where mobile phones, WiFi networks and other similar devices operate on 2.4 GHz, 868 MHz can support much of the radio equipment found in industrial settings, such as remote sensing, security and alarm systems.

Although offering nonexclusive access, interferences are rare on 868 MHz bands. The bandwidth is open to all devices but 868 MHz is used predominantly for industrial, scientific, and medical applications; this means there is less competition from neighbouring sites for bandwidth.

Wireless telemetry systems provide a safe and cost-effective alternative to laying cables for plant-wide data monitoring applications.

A good wireless telemetry partner can integrate radio equipment seamlessly across plant sites, providing support from the initial enquiry to purchasing and installation. Omniflex's Teleterm remote terminal unit (RTU) range provides users with a small programmable RTU that is configurable and allows users to choose between analogue and digital inputs and outputs. Facility managers can integrate them with SCADA (supervisory control and data acquisition) systems to achieve wireless connectivity in different licence-free bands.

For example, Omniflex recently provided a wireless telemetry system for one of the world's largest chemical manufacturers, Inovyn. Using the Teleterm M3 RTU module, which operates wirelessly on the 868 MHz unlicensed radio band, Inovyn can collect all plant data conveniently and cost effectively. □

For more information visit: www.omniflex.com

Pressure sensors in wind turbine gearboxes

In a wind turbine, a proportion of the kinetic energy generated by the wind is transformed into electric energy and fed into the closed power network.

The usable kinetic energy from the wind increases with the wind speed. Wind turbines use the kinetic energy to generate torque and then rotational movement. The rotor, consisting of three rotor blades, transfers the kinetic energy, passing it on to the generator, which in turn produces an electric current.

Most wind turbines use adjustable gearboxes which match the wind-dependent speed of the rotor to the constant speed of the generator within the housing of the nacelle. While the rotor only turns slowly at a very high torque, the torque of the faster-rotating generator is low.

The transmission ratio between the two different torques determines the overall size of the gearbox. The efficiency of the gearbox in a wind turbine is required to be very high and because the transferred power output is particularly high, there are also significant energy losses.

This mostly concerns loss through heat, which is why the gearbox must be cooled. Cooling is achieved with the use of sophisticated lubrication technology in the gearbox. Oil pressure and temperature measurements are needed for the process. The oil pressure is constantly monitored by sensors. Keller has provided the required pressure transmitters from its 21Y series to a client who supplies gearboxes for wind turbines.

Keller's 21Y piezoresistive pressure sensor is welded, fully insulated and encapsulated with no internal seals.

Keller's 21Y series pressure transmitters are used in cooling the gearboxes in wind turbines.

Its robust, stainless steel housing and compact design make it suitable for use in space-critical industrial applications, heat pumps, air conditioning technology and in the food industry. The sensor's direct analogue signal path with high bandwidth guarantees long-term stability.

The Keller 21Y delivers accuracy at + 0.5% FS, with a total error band of 1.5% FS at -10…80°C, and operates in the pressure range of 0…2.5 to 0…1 000 bar.

Keller instruments are available in South Africa from Instrotech.

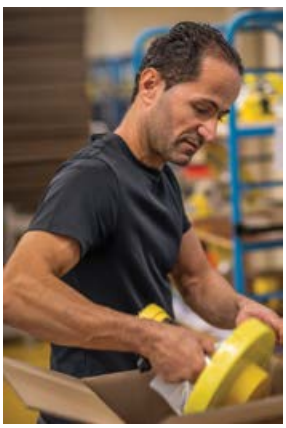
For more information contact Instrotech.
Tel: +27 (0)10 5951831
Email: sales@instrotech.co.za
Visit: www.instrotech.co.za

Security first in new level sensor

In January 2023, VEGA delivered to its customers the world's first level sensor with built-in cybersecurity features. With this new development VEGA is sending the strong message that it recognises the increasing threat of cyber criminality in industry and is taking action to combat it. The Black Forest-based manufacturer of level, switching and pressure instrumentation is on a security mission.

Looking at the VEGAPULS 6X radar sensor from the outside, customers would not see anything different or unusual: the sensor, together with its documentation, fits neatly into its tailor-made carton which, at the end of the packaging line, is labelled for shipping. Address: a chemical company in northern Hesse, Germany. However, what the customer receives is something quite different from all the other level sensors previously available in the market. For the first time, this sensor is supplied with cyber protection as an integral component. It was developed in compliance with Industrial Cyber Security Standard IEC 62443-4-2 and thus meets the highest standards currently in place in the process industry.

"Being able to use secure measurement data at all times is now one of the most important requirements of our customers," says Florian Burgert, who was involved in the conception of the universal level sensor from the beginning. "We hear this from customers in almost every industrial sector." For effective security at this extensive level, the production system as a whole has to be secure, as well as all the built-in components. Everything must comply with the standards.



Particularly when it comes to cybersecurity, plant operators want equipment they can depend on in order to stay one step ahead of the latest threats. Having developed one instrument in compliance with IEC 62443 VEGA will use its certification as a guide as it develops future products in accordance with all existing security requirements from the start. Furthermore, protective measures will be consistently expanded to create a reliable basis for secure plant operation into the future.

The VEGAPULS 6X radar sensor marks a world first as a level sensor with built-in cybersecurity.

For more information contact VEGA.
Tel: +27 (0)11 795 3249
Email: info.za@vega.com, visit: www.vega.com

TSS sensors advance industrial efficiency

In industry, companies are always seeking new ways to improve efficiency, reduce costs and enhance safety in their operations. In this regard, the development of sensors has had a significant impact. Sensors are now used extensively across many industries to monitor various parameters and support optimal performance. Prei Instrumentation is at the forefront of this field. In its portfolio of process instrumentation, it includes state-of-the-art TSS sensors.

TSS stands for total suspended solids: TSS sensors measure the concentration of suspended solids in liquids. Suspended solids refer to particles in water or other liquids that are not dissolved, such as sand, silt and organic matter. The sensors work by shining a light through a fluid sample and measuring the amount of light scattered by the suspended particles. This information is used to calculate the concentration of suspended solids in the liquid.

TSS sensors are widely used in various industries. For example, in the wastewater treatment sector, they are used to monitor the level of solids in the water, which is a critical parameter in the treatment process. If the level of solids is too high, it can cause problems such as clogged pipes and reduced treatment efficiency. In the food and beverage industry, TSS sensors are used to monitor the concentration of suspended particles in liquids like juices and dairy products, as this can affect the quality and consistency of the final product.

Prei Instrumentation's TSS sensors incorporate cutting edge technology. The sensors use a unique algorithm to differentiate between different types of suspended solids, such as organic matter and inorganic particles. This is important because different types of solids have different properties and can affect processes differently. For example, bacteria can break down organic matter in wastewater treatment processes, and inorganic particles can accumulate and cause blockages.

Prei Instrumentation's TSS sensors are highly accurate and reliable. They can operate in harsh industrial environments and withstand high temperatures, pressure, and corrosive substances. In addition, the sensors are easy to install and maintain, with a user-friendly interface enabling operators to monitor the data in real time and make adjustments as needed.

TSS sensors help improve efficiencies in the food and beverage and dairy industries, among others.

One of the key benefits of the TSS sensors is that they contribute to improving industrial efficiency. By monitoring the concentration of suspended solids in liquids, companies can optimise their processes to reduce waste and improve product quality. For example, in the wastewater treatment sector, TSS sensors can be used to adjust the dosage of chemicals in the treatment process, reducing costs and improving the system's efficiency. In the food and beverage industry, the sensors can be used to adjust the production process to ensure that the final product meets set quality standards.

In addition, TSS sensors can enhance industrial safety. For example, in the oil and gas industry, they can be used to monitor the level of solids in drilling mud, a critical parameter for ensuring the safety of drilling operations. If the level of solids is too high, it can cause blockages and lead to dangerous conditions such as blowouts.

For more information contact Prei Instrumentation. Visit: https://prei.co.za

Electronic pressure switch for hygienic applications

The PSD-4 electronic pressure switch offers a versatile solution for pressure measurement.

The PSD-4 electronic pressure switch from Wika offers a universal solution for pressure measurement in industrial automation – including in hygienic applications and under harsh conditions.

With certification in terms of EHEDG (the European Hygienic Engineering and Design Group) and 3-A Sanitary Standards, the pressure switch is suitable for use in industries with high hygiene requirements.

It provides an accuracy of < ±0.5% and minimal long-term drift, ensuring accurate representation of the process pressure for more than 100 million load cycles. The pressure switch is available with a digital output signal as well as a switchable and scalable analogue output. In addition, it can be easily monitored via the self-diagnostics.

Condition data and the diagnostic functions allow consistent process monitoring. Pressure or temperature values that are above or below the specifications are displayed directly in the system. The data also allows for conclusions to be drawn about changing process conditions. Additional information helps to check the loading.

The scalable analogue output enables the measuring range to be adapted at a ratio of 5:1. The output signal can be configured specifically for the application, supporting the PSD-4's versatility.

Continued on page 21

Accurate flow measurement for ultrapure water

The SU Puresonic sensor from ifm provides for accurate flow measurement of pure and ultrapure water. It detects water flow rates with high precision at volumes up to 1 000 l/min. Ultrasound technology enables this to be done also for ultrapure water with low conductivity, as produced in reverse osmosis plants. Thus, use of the SU Puresonic sensor in combination with conductivity sensors of the LDL family provides for reliable quality control to be established in the filtration process.

The measuring pipe of the SU Puresonic is made of stainless steel and is free of measuring elements, seals and moving parts. This means faults caused by damage, leaks or blockages, which can occur in mechanical systems such as impellers or turbines, or, design-related pressure drops are excluded from the outset

Signal strength indicates process quality

Continuous monitoring of the signal strength enables the user to draw conclusions about the quality of the medium or the need for maintenance. A declining value can be an indicator of an increase in particles in the medium, or deposits on the inner wall of the pipe. The signal strength is transmitted a-cyclically via IO-Link and thus provides for maintenance work to be scheduled or the process sequence adjusted at an early stage. This ensures a high quality end product.

The same functionality can be implemented for conventional systems that do not yet have IO-Link. If the signal strength falls below a predefined level, the device status will change and the sensor will signal this via the diagnostic output and the operating status LED.

LED signals device status

The clearly visible operating status LED keeps the user on site always informed about the status of the sensor. The colouring corresponds to Namur Recommendation (NE) 107 for self-monitoring and diagnostics of field devices.

Using ultrasound technology the SU Puresonic provides for accurate flow measurement of ultrapure water and water.

A simple plug and play system

Compared to clamp-on sensors, which need to be adjusted to the application depending on the installation situation, the SU Puresonic is a simple plug and play system: influencing factors such as varying wall thicknesses and pipe materials no longer need to be considered with the highly accurate inline measurement process. And there is no need for time-consuming programming or adjustments, which means a considerable amount of time is saved during implementation.

The SU Puresonic is made of stainless steel, offering high media resistance and permanent ingress resistance.

Maximum flexibility

The stainless-steel measuring pipe ensures the SU Puresonic's resistance to a variety of media and the compact design makes the ultrasonic sensor versatile and easy to use. The dimensions of the measuring and operating unit are kept narrow so that several sensors can easily be installed next to each other in a standard water manifold with a pitch of 50 mm.

Process values via IO-Link

In addition to the flow rate and the sensor status, the total flow rate and the temperature are also available via IO-Link.

For more information contact ifm South Africa.
Tel: +27 (0)12 450 0400
E-mail: info.za@ifm.com
Visit: www.ifm.com

Continued from page 20

Ultra-high purity transducer

Wika also has available the WUD-2x-E model, which is a particularly compact, ultra-high purity transducer for high-accuracy pressure measurement of ultrapure gases used in the semiconductor industry. It is the first transducer to use the SDP 5003.2080 and offers a sound investment.

Due to minimal signal noise, the sensor provides precise measured values over the long term. It incorporates active temperature compensation, even with high temperature fluctuations and the measured values can be viewed on the display.

With EtherCAT®, the WUD-2x-E model does not have to be disconnected from the network for firmware updates or troubleshooting. This avoids production downtime which can result from incorrect installation or removal, maximises process safety and allows for updating of the instruments.

In addition to pressure values, temperature data or error status can also be transmitted. Instruments can thus be monitored extensively and problems can be detected at an early stage.

For more information contact
WIKA Instruments.
Tel +27 (0)11 621 0000
Email: sales.za@wika.com
Visit: www.wika.co.za

The WUD-ex-E model is an ultra-high purity transducer for high accuracy pressure measurement of ultrapure gases.

Commissioning, monitoring and maintaining PV systems

High precision handheld devices used to measure the solar irradiance on photovoltaic installation sites and the performance of the system are increasingly in demand. Fluke, locally represented by Comtest, provides a range of tools that support initial design and the safe and effective installation, commissioning and maintenance of PV systems.

Importantly, when commissioning a new installation, the baseline performance should be established – for customer acceptance as well as for ongoing maintenance. This also serves to optimise the longevity of equipment and ensure safety, ROI, and warranties.

Commissioning a photovoltaic system for maximum performance.

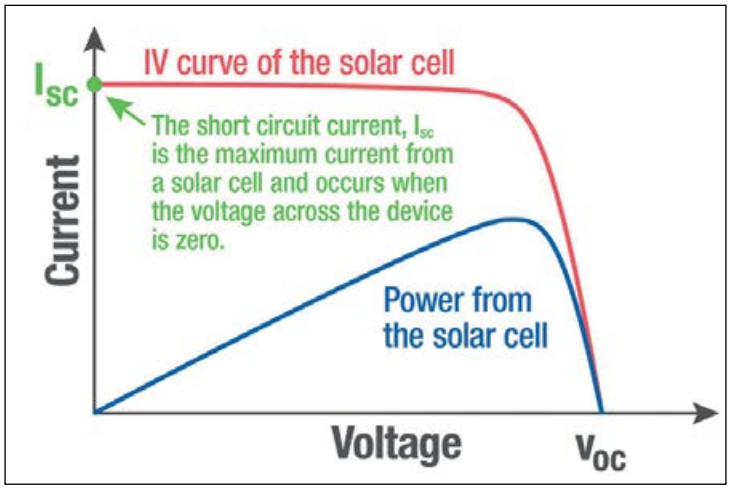
System design and the solar resource

The first step in considering a new installation is to determine expected solar energy output at the site by measuring the solar resource and taking into account any shading of the panels that may occur. The solar resource is measured in peak sun hours, which is the number of hours the installation achieves 1 000 watts per square metre per day. If the solar resource is good, this may be 6 000 watts per square metre, or six peak sun hours. The Fluke IRR-1 Solar Irradiance Meter can be used to determine the solar irradiance (watts/m^2) and shading at the site to establish a baseline.

For example, in a 10 kW PV array, the expected annual production can be calculated by multiplying the 10-kW array x 6 peak sun hours x 365 days per year x 0.85 (allowing 15% derating due to power losses in wiring and the inverter). This array should produce 18 615 kWh of energy for use per year, or 51 kWh per day.

Measuring performance

Once the system is installed, its electrical characteristics and the power output of the array should be measured to make sure it is operating as designed.



The current-voltage (IV) curve of a PV module.

The performance of a PV array is based on its current-voltage (IV) curve. The inverter used in PV systems to convert dc to ac also maximises power output by capturing the current and voltage – since power is voltage x current – at which the string is producing the most power. The short circuit current (Isc) is the maximum current from a cell and in this state no power will be produced because there is no voltage difference: the positive and negative wires are touching. The open circuit voltage (Voc) is the maximum voltage from a cell: no power will be produced because the circuit is open. The point at which the module produces the most power is called the maximum power point (mpp).

The values of the Voc and Isc will be listed on the module datasheet and, to check that an array is working as designed, the Voc and Isc should be measured before and after installation, to ensure they align with the specifications.

Voc can be measured using the Fluke 393 FC CAT III Solar Clamp to determine the voltage between the positive and negative terminals. The 393 FC is CAT III 1 500 V / CAT IV 600 V rated, which makes it safe and reliable for making measurements in CAT III environments like solar installations. The Fluke 64 MAX IR Thermometer can be used to determine the temperature of the modules to account for the effect of temperature on Voc (the lower the temperature, the higher the voltage and vice versa).

The 393 FC provides an audio polarity warning when testing Voc. If it is reversed, the combiner box or other circuits may be unintentionally connected in series, resulting in voltages over the maximum inverter input voltage.

To test Isc, all parallel circuits should be disconnected and the circuit safely shorted. The current between the positive and negative terminals can be measured using a multimeter, with the dial set to a current greater than expected. The values of Isc and Voc can then be recorded on the Fluke Connect™ app and saved to monitor trending and for reporting.

The insulation resistance of conductors, the connections between modules and between modules and racking, and the resistance to ground, should all be measured. This can be done using the Fluke 1625-2 FC Earth Ground Tester to measure earth ground resistance and ensure a resistance of less than 25 ohms.

The Fluke 393 FC can be used to measure voltage, current, and dc power and it provides an audio indicator for incorrect polarity on PV panels.

Diagnosing variances

Even when installed correctly, a PV system may not meet the expected electrical output. It is important that the electrical characteristics should be specified per module because an inverter has a minimum and maximum input current, below and above which it will have no power output.

In some instances, for example, the open circuit voltage or short circuit current might be higher or lower than specified on the datasheet for one or more modules in the string. Where the open circuit voltage is out of range, this means the inverter may not output power. Where the short circuit current is out of range, this indicates that there may be a module mismatch, which can severely degrade the array's performance because the current of a string is limited by the module with the lowest current. In such cases, the faulty modules should be identified and replaced.

In cases where the power output is lower than expected, there may be a problem. While some fluctuation in output is expected, consistently less than predicted output could be a sign of a faulty string, a ground fault, or shading.

This could be caused by hot spots – that is, the accumulation of current and heat on a short-circuited cell – which leads to reduced performance and the risk of a fire. Thermal imagers like the Fluke Ti480 PRO Infrared Camera or the Fluke TiS75+ Thermal Camera can quickly identify hot spots.

Ground faults are another possible cause, but they are harder to diagnose and require testing the voltage and current of each conductor and the equipment grounding conductor (EGC), which carries stray current to the ground. Voltage and current on the EGC indicate a ground fault. Ground faults can occur due to damaged conductor insulation, improper installation, pinched wires, or water, which can create an electrical connection between a conductor and the EGC. Once the source of the problem has been located, any damaged wires should be replaced or conditions adjusted to rectify the fault.

Shading and/or inappropriate tilt and compass direction (azimuth angle) for the location can also be the cause of low power output. A solar pathfinder can be used to find any new sources of shading and remove them, if possible. While it may not be feasible to change the tilt and compass direction of the array to orient the panels more directly towards the sun, it is important to know the tilt and azimuth angles to provide a baseline for future reference.

The Fluke 393 FC is a CAT III 1 500 V-rated solar clamp meter, safe to use on solar installations.

In large-scale PV systems, the power from a solar system goes through transformers after being inverted to step up the voltage, then to switchgear and medium voltage cables where decreased insulation resistance is a common issue. To test insulation resistance on medium and high voltage cables, the Fluke 1555C FC 10 kV Insulation Tester can be used, to test up to 10 000 volts.

For systems with batteries, the expected battery voltage and state of charge should be measured and compared with the actual status and this can be done using the Fluke 500 Series Battery Analyser. □

For more information visit: www.comtest.co.za

Dwibin Thomas, Schneider Electric.

Using digital twin technology to monitor the energy grid

The benefits of digital twin technology have attracted considerable attention in the past year. Serving multiple industries, it has become a well-recognised technology and, according to Dwibin Thomas, Cluster Automation Leader at Schneider Electric, the returns are notable. However, he says the role of digital twins in the power utility sector and to observe the grid is not as well-known as some other applications. This makes it important to unpack its benefits and returns.

A digital twin is a digital representation of a physical asset or system – it can be seen as a bridge between the digital and physical world. Currently, there are two versions that are pertinent to the power and grid industry.

- Asset digital twins – at the asset level, a digital twin can model the performance of power equipment such as a transformer, generator, or a protection device. These assets are designed, built and operated in usually widely digitised environments.
- System digital twins – a digital twin can also be used to model systems such as electrical networks, power plants, cable systems or complete substations.

Diagnostics

As a diagnostics tool, digital twins can provide valuable insight into why a power outage occurred, help determine the root cause, and build a plan that will mitigate similar events in future.

Here, the power management platform – represented by the digital twin – is built on top of a model of the electrical network itself. In turn, this introduces new workflows that can help find the root cause of an outage faster. For example, it allows the engineer to replay an incident step by step, inspecting measurements on any part of the network at any time.

Those same measurements from the real system can also be fed as inputs into the asset digital twin to determine if, for example, a breaker operated as it should have, and if not, why.

A digital representation of the real

Digital twins allow operators to run simulations before deploying the technology. It is therefore also a valuable training and maintenance tool. As a real-world example, if a technician is scheduled to visit a substation to maintain transformers, he or she might have to go through a complex set of operations such as isolating each transformer from the utility and powering the downstream feeder from another transformer.

This procedure can be fully simulated on the digital twin of the substation before the technician leaves the office. In addition, when on site, with a connection to the digital twin, the technician can verify the planned switching actions before executing them.

Designing new electrical networks for large facilities is another important application where digital twins add value. Automation and control schemes, communication architectures, and switchgear and cabling layouts benefit from being tested and validated in a digital twin simulation before the system designer and/or the customer invests in costly construction and commissioning.

A mirror ball

One of the most common uses of digital twins today is in predictive maintenance. For example, a digital twin of a

Digital twin technology can play a valuable role in the power and grid industry, from design through operations and ongoing maintenance.

generator can tell the asset owner and/or service provider when maintenance is needed by comparing the actual behaviour to the predicted behaviour based on historic activity.

Forecasting energy use in a facility and validating consumption is another common predictive application. Here, data relating to the process, occupancy, temperature, or other parameters is fed into the digital twin of the facility and, on this basis, it outputs the expected energy consumption over the next day, week, or season. The information can be used to justify investments in improvements, confirm the facility is operating as expected, or validate previous investments.

Sustainability

Interestingly, one of the emerging uses of digital twin technology is in the design of 'environmentally conscious' grid infrastructure. In this regard, the digital twin model can play an important role in the decarbonisation of equipment and systems as it provides valuable data at all stages of the product and project lifecycle.

During the design stage, digital twins are used to build and update a virtual model. Input simulates each aspect of the project on a single platform, including, for example, the equipment's mechanical, electrical, thermal, and environmental properties. Digital twins thus provide a risk-free way to analyse, test, and experiment with different design scenarios, processes, equipment, and operations before making any changes to the design of the physical asset.

Digital twin technology has the potential to play a valuable role in the power and grid industry, in daily operations and in building the sustainable infrastructure of the future. □

For more information visit: www.se.com

Services and solutions to support energy efficiency

Legrand South Africa has introduced a new services and solutions plan to meet customers' requirements in ensuring the highest standards in electrical and digital infrastructure in commercial buildings and industrial facilities.

The Legrand team understands that dependable power and networking services are critical in many sectors. The company recognises that it is increasingly important – as South Africa's power crisis deepens and there is a greater need for digital stability – that professionals assist industry, business owners, healthcare institutions, data centres and others to continue operating. It is committed to working closely with customers to ensure sustainability, energy efficiency and optimum performance of equipment in all installations.

Legrand South Africa has entered into service agreements with strategic partners, enabling the team to offer direct installation and after-sales services. Legrand specialists work with partners to provide in-house CAD services for project requirements and ensure suitable products are selected for specific applications.

The Legrand team includes highly skilled engineers and technicians in Cape Town, Johannesburg and Durban and the company extends its services also to Botswana, Namibia and Zambia. After-sales service technicians and factory trained technicians handle repairs or breakdowns efficiently to ensure that backup power solutions deliver reliable performance, cost-efficiently.

Legrand's new services and solutions cover key aspects of electrical systems, including transformers, busbars, uninterruptible power supply (UPS) systems and distribution boards. The company's transformers range from 650 kVA to 3 000 kVA and its busbar installations handle the distribution of power from 63 A to 6 000 A. Because it is critical that planning of a busbar system is done correctly from inception, the team assists with

Legrand South Africa has introduced a new services plan to maintain customers' electrical infrastructure.

design and CAD modelling. This service is supported by engineers who are responsible for on-site installation and commissioning, as well as after-sales service.

Legrand also offers comprehensive UPS services which extend from planning to maintenance. Every part of the process is critical and consistent services and regular maintenance are essential to ensuring users have power when they need it.

Distribution boards form the backbone of every facility, ensuring optimum efficiency and safety in electrical installations. Legrand services for distribution boards include all aspects from pre-sales consultation, to switch-on of the system, and ongoing maintenance.

The company's new services and solutions initiative is supported by ongoing technological developments in its product portfolio, in terms of energy efficiency, quality power supply, safety and aesthetics.

For more information contact Legrand SA.
Tel: +27 (0)11 444 7971
Email legrand.south-africa@legrand.co.za
Visit: www.legrand.co.za

WearCheck's new laboratory in Longmeadow Business Estate, Johannesburg, is running smoothly.

New testing labs in Kathu and Johannesburg

Condition monitoring specialist company, WearCheck, recently opened its newest laboratory in Kathu, the 'iron ore capital' of South Africa's Northern Cape province.

Although for many years there has been a WearCheck office in Kathu where used oil samples could be dropped off, the nearest laboratory was in Johannesburg, where the samples were processed. Now the samples are processed in Kathu, reducing turnaround time for local samples to 24 hours or less.

The name Kathu means 'town under the trees' and WearCheck is pleased to invest further here, where local industry welcomed the company and has supported it for more than a decade.

The Kathu laboratory is created from three remodelled shipping containers. They were repurposed at WearCheck's head office in Westville and equipped with the latest laboratory instruments. WearCheck's container labs also incorporate ventilation, air extraction and fire prevention systems and are fitted with uninterrupted power supply systems, air conditioning and burglar bars. They are designed to accommodate new industry developments, when they arise.

Managing Director, Neil Robinson says WearCheck is addressing the infrastructure deficit in Africa by providing world class scientific analysis services in remote areas near mining and other industries. He says establishing a brick and mortar laboratory in some locations is often hindered by the lack of basic infrastructure, whereas the container laboratories are relatively simple to place in areas with limited resources.

"Ensuring consistently accurate test results is critical, therefore each mobile laboratory is connected to the WearCheck South Africa LIMS (Laboratory Information Management System), which guarantees quality control," Robinson says.

WearCheck Johannesburg moves to Longmeadow

In another move, WearCheck recently relocated its Johannesburg laboratory, WSL (WearCheck Specialist Laboratory) as well as its dedicated divisions – asset reliability care (ARC), transformer oil testing, water analysis and lubricant-enabled reliability (LER) services – to a convenient, modern new location in Edenvale.

"With all our services under one roof, WearCheck Johannesburg is a hub for customers that make use of more than one of our condition monitoring programmes," says Robinson.

The company's growing footprint extends across nine countries in Africa and beyond, and includes many satellite offices and 15 world class laboratories.

For more information contact WearCheck.
Tel: +27 (0)31 700 5460 (Head Office)
Tel: +27 (0)11 392-6322 (Johannesburg)
Visit: www.wearcheck.co.za

PowerBase software for substation inspections and assessment

In a recent blog piece published on the Doble Engineering website, Joe Stevenson in Protection Testing noted that more than 80 utility and industrial customers use Doble PowerBase™ software for tracking protection engineering and test data, though the system is not limited to these use cases. Recent examples among customers include the use of the software for substation inspections and condition assessments, both of which validate PowerBase for holistic asset management purposes and can be readily configured using existing system tools.

Stevenson explains that Doble PowerBase is enterprise database management software that integrates engineering, test and work management data for consistent, uniform power system asset records. For years, companies have used PowerBase to manage relay settings in parallel with Doble RTS™ test procedures, to achieve trackable datasets and specific reporting to meet numerous operational and regulatory demands.

Doble RTS is universal power system electrical test software with which procedures can be created and field data collected. It offers an advanced paradigm to accurately model and automate the work of the technician in the field.

The integrated PowerBase-RTS system provides seamless office-field data exchanges with mirrored database architecture shared between the two systems. It also provides for design of test routines, for any purpose, in RTS, linked to nameplate, settings, and work assignment data in PowerBase. The corresponding test results contain work completion data and verify that the setpoints, programming and performance of devices in the field match the data on record in the office.

For substation inspection and condition assessment use cases, administrators can create SmartForms™ in RTS which use logic to supply the correct data, files and messages in line with any given step of field procedures. Algorithms in PowerBase can be adapted to assign asset health scores to RTS results data associated with SmartForms being used for substation inspections and condition assessments.

For more information visit: www.doble.com

Doble PowerBase integrates power system engineering and maintenance data into a central database environment.

(Credit: Doble)

O&M for industrial steam and boilers

As the power crisis persists and South Africa struggles to rebuild and grow its economy, for the local manufacturing and industrial sectors the optimisation of energy production processes is fundamental to keeping the wheels of industry turning. Steam and boiler operations and maintenance (O&M) service provider, Associated Energy Services (AES), has been assisting industrial plants to optimise energy usage and implement best practices for more than 25 years.

Managing Director, Chris Paterson notes: "I believe our services have never been more important in the country than at this time – and particularly in the context of South Africa's declining gross domestic product. The current energy and productivity crisis requires agile, flexible and diverse solutions. As an experienced, innovative, reliable and well-established steam and boiler O&M service provider, we can assist industry to optimise energy efficiency with a range of services and solutions."

These include:

- Mitigating risk and reducing energy plant downtime
- Assistance with the care of assets over an energy plant's lifetime
- Achieving efficient fuel combustion
- Diversifying a plant's energy resources
- Improving site operations, and
- Reducing a plant's carbon footprint.

Reducing plant downtime

Commercial Director, Dennis Williams says: "At AES we are committed to mitigating risk and reducing plant downtime for our customers by providing effective operations and maintenance services. Optimising thermal energy streams from coal, liquid fuels, biomass or gas, we enable our clients to improve energy efficiencies, safeguard their plants from energy interruptions, and secure ongoing sustainability and profitability.

"Effective O&M is critical in driving an energy plant to achieve successful and sustainable operations; we enable our client-partners to benefit from the constant availability of steam and the reliability of assets, at an equitable price."

Williams points out that AES is fuel-solutions- and technology-agnostic, saying: "We believe coal will be the mainstay in South Africa regarding power generation for the next 10 years at least, and the same goes for process energy, which also has a substantial fuel requirement. However, AES provides solutions to diversify the fuel mix and we can assist clients in diversifying by providing access to various fuel and technology-based energy solutions: from coal and LPG (liquid petroleum gas) to biogas, biomass and more.

"We can also mitigate fuel risk through an established fuel procurement offering. Being extremely stringent in terms of the quality of fuel which we provide, we assist in plant efficiency improvements, using less fuel and improving the plant's carbon footprint."

Various operating models

Williams continues: "The production of thermal energy is integrated into a client's overall production. We always see the boiler house as the metaphorical 'heart' of the operation and, if this is inefficient, it has a knock-on effect on the quantity and quality of product produced – which, in turn, negatively affects the bottom line.

Chris Paterson, Managing Director, AES.

Dennis Williams, Commercial Director, AES.

"With resources and skills shortages playing a significant role in today's economic challenges, AES offers its clients a fully outsourced energy plant operation. This includes the provision of our own team members on site for operations, maintenance and training. We can also offer a 'cradle to grave' approach, paired with a 'build, own, operate, transfer' model. We are flexible and work according to the client's requirements."

Pioneering O&M services

Paterson says AES operates across a broad range of industrial sectors and has a well-established national footprint. It promotes optimised energy processes in the power generation industry as well as in the mining, chemical, timber, pulp and paper, textiles, dairy, poultry, and food and beverage industries.

Williams adds that AES is widely regarded as a pioneer in providing local O&M services in the steam and boiler plant management and maintenance field, based on its nearly three decades in operation and the size of its client base.

He highlights that AES was the first in its field to offer an industry uptime and availability guarantee, which endorses its commitment to risk mitigation, and confirms its status as a pioneer in the sector.

People and safety first

AES operates according to strict safety standards; it holds ISO 9001, 14001 and 45001 certifications.

Paterson comments: "AES is committed to quality, diverse and sustainable technology advances and the development of human capital on an equal opportunity basis. Our certifications ensure that we maintain a focus on achieving, benchmarking and optimising our internally and externally focused processes and activities.

"The current energy crisis requires robust, sustainable solutions. At AES we are committed to play our role by optimising industrial energy efficiency," he says.

For more information contact AES.
Visit: www.aes-africa.com

Service agreements help contain compressed air costs

With the unprecedented rise in energy prices globally, owners of compressed air systems are seeking new ways to improve the energy performance of their installations – and many are realising the benefits of a comprehensive maintenance regime.

Gary Spence, Service and Technical Operations Leader at CompAir says the company, through its Assure service agreements, is helping its customers to optimise compressor uptime and performance and in doing so, mitigate the risk of spiralling energy costs.

It is commonly accepted that as much as 10% of all the energy consumed by industry is used for compressed air and operators should look to all opportunities to optimise energy usage. Poor equipment performance can place strain on components, whereas a professionally and regularly serviced compressor will deliver long life, reliable operation and overall, better energy performance.

Consider the complete system

Achieving cost savings not only by minimising energy consumption, but also by ensuring complete visibility of system performance and ancillary equipment is a common benefit that many customers recognise.

All CompAir Assure service agreements are supported by iConn, an intelligent digital platform that can assist compressed air users with production planning and help them protect their investment. Delivering historical, real-time predictive and cognitive analytics, iConn ensures potential issues can be rectified quickly, before they become bigger problems, which can be costly and time-consuming to resolve.

Three levels of service

Assure service agreements from CompAir are available in three packages, to suit customers' respective operations and budgets.

AssureCOMPLETE provides 100% coverage of all parts and service, alongside regular oil sampling. It delivers a fixed cost of ownership, assisting with budgeting, and reduced risks if issues arise. Downtime is kept to a minimum, with CompAir helping to keep assets operational at improved efficiency levels.

The second level, AssurePLAN+, provides planned servicing and maintenance, assuring the customer of continuing operations. It offers early detection of potential problems, as well lubricant condition monitoring. Oil-free air ends are warranted for six years, rising to 10 years for oil-lubricated models.

Thirdly, AssurePLAN covers the timely replacement of consumable components such as oil and air filters, separators, and oil, with a 12-month warranty on these assets.

Use cases

In a use case example, CompAir outlines how a minerals and lime plant in Germany invested in a comprehensive

Compressed air specialist CompAir provides several maintenance service options to keep compressed air systems operating optimally.

maintenance package after upgrading its compressed air network. Here, operational risk is transferred completely to CompAir, with planned maintenance work and short response times. The company also benefits from predictive analysis which supports uninterrupted operation of the compressed air system.

A compressed air system depends on correctly specified components. Replacing the right parts at the right time ensures longer life and reduces the likelihood of equipment breakdown. All packages therefore benefit from genuine CompAir parts, which limits unnecessary equipment wear and tear and enables optimal performance. This is supported by automated shipment of components and scheduled reminders to ensure maintenance is carried out when necessary.

In another case, where CompAir supplies its maintenance service for a glass recycling company in Spain, the customer commented on the service received, saying: "Since we have been using the service package, we have received the best service and maintenance, providing complete peace of mind as far as our compressed air supply is concerned. The cost over the years is worth it, as it has meant we can concentrate on our core business activities."

Service is provided by factory-trained technicians and supported by the company's lubricant analytics and mechanical condition-trending service to help avoid any unplanned downtime.

An automation business in the Netherlands has also benefitted from this comprehensive level of support, as one of the company's supervisors reports. "The compressors and all the other ancillary systems such as air dryers and filters are serviced each month and are replaced when needed. Potential issues are detected quickly and resolved even before they occur. Now our Technical Department has more time to concentrate on other tasks and we don't have to worry about the air supply in our factory."

For more information visit: www.compair.com/en-gb

Technical skills to tackle SA's youth unemployment

Although South Africa's youth unemployment rate dropped slightly in the fourth quarter of 2022, the situation remains critical, with the latest Quarterly Labour Force Survey (QLFS) revealing that 4.6 million young people are looking for jobs. Considering that 90% of the country's employment opportunities require youth with technical and vocational skills, as reported by the Human Resource Development Council, equipping them with these skills is fundamental to reducing the country's unemployment rate.

Dr Andrew Dickson, Engineering Executive at CBI-electric: low voltage, says currently, there is a widespread need for technical skills, particularly in the areas of electrical, mechanical, industrial, and civil engineering. In addition, there is an increasing requirement for artisans and technicians to support base operations within the engineering disciplines, especially as infrastructure repair and maintenance become more crucial than ever to keeping the country's energy supply system operational.

President Cyril Ramaphosa has recognised that technical skills are what South Africa requires, stating that the skills the country needs, the jobs that can grow the economy, and importantly, the avenues for entrepreneurship that are so sorely needed, can best be achieved by increasing learner access to technical and vocational subjects. "However, government is limited in its ability to bridge the skills gap, so the private sector needs to step in by investing either in institutions or in individuals," says Dickson.

He notes that, with state funding being reduced for universities and TVET – Technical and Vocational Education and Training – colleges, additional support is essential. "This option may not at first appeal to company owners or shareholders, but it is important to see the bigger picture where the value lies in investing in employees of the future who will be key to taking the country forward.

"Another option is for businesses to work with education institutions by providing practical learning opportunities for graduates so they learn how to apply the skills and knowledge they have acquired," he adds. "For example, at CBI electric: low voltage, we provide training to electrical engineering students at TVET colleges around the country on electrical safety compliance as well as the practical use of products like circuit breakers, wiring accessories and earth leakage devices.

"Our holding company has taken this a step further with the establishment of Reunert College, which offers a bridging programme for school leavers from previously disadvantaged communities. It enables them to improve their Matric results which might otherwise have prevented them from getting a university exemption and/or from attending other tertiary education institutions or becoming employed," Dickson adds. "Many participants who have successfully completed the programme have secured bursaries to study further."

With regard to investing in individuals, he recommends that more industries consider making apprenticeships mandatory, as they are in the professional fields of accounting and law for example, where new graduates are required to do their articles. "It ensures that companies take on apprentices and equip them with the experience they need to meet the demands of the working world.

Dr Andrew Dickson, CBI-electric: low voltage.

"For businesses that choose this route, it is important to note that they need not shoulder the total cost alone, as government provides support via the Skills Development Levy and the provisions of the Income Tax Act," says Dickson. "But what this does require is that, if individuals are trained, they need to then be placed in a position in a company."

He highlights that, "One of the biggest skills gaps plaguing the country, particularly in the technical and electrical environments, is a lack of practical know-how among new employees. In the past, this practical know-how would be passed down by veteran employees, but without apprenticeships in place – since the practice has been largely discontinued and as well experienced, seasoned workers retire, inherent institutional knowledge is being lost. Mentorship must be provided to develop newly hired personnel into competent employees who can acquire the intricacies of practical hands-on experience and, in turn, pass this on to the next generation."

Dickson points out, "South Africa has the highest unemployment rate in Africa, and the third highest in the world, according to a global list of 82 countries monitored by Bloomberg. Our plight is far too big for government to tackle alone. With there being 3.1 million companies in South Africa registered by the Companies and Intellectual Property Commission (CIPC), imagine what could be achieved if they all invested in institutions and individuals, especially those operating in the technical space."

For more information visit: https://cbi-lowvoltage.co.za

Industry support for technical skills training and practical experience can help overcome SA's critical unemployment level.

Steve Flynn, ESET Southern Africa.

ChatGPT: What AI means for digital security

As AI technology like ChatGPT evolves, so do the strategies and tactics used by cybercriminals. Steve Flynn, Sales and Marketing Director at ESET Southern Africa, says ongoing awareness is essential in understanding how to manage potential cybersecurity challenges posed by these developing tools.

As artificial intelligence (AI) technology becomes a new reality for individuals and businesses, its potential impact on cybersecurity cannot be ignored. For instance, OpenAI and its language model, ChatGPT may offer significant benefits to almost every industry, but they also present new challenges for digital security. ChatGPT raises concerns due to its natural language processing capabilities, which could be used to create highly personalised and sophisticated cyberattacks.

The impact of AI on cybersecurity

Here, there are several factors to be considered.

- The potential for more sophisticated cyberattacks: AI and ChatGPT can be used to develop highly sophisticated cyberattacks, which can be challenging to detect and prevent as natural language processing capabilities may bypass traditional security measures.
- Automated spear phishing: With the ability to generate highly personalised messages, AI can be used to send convincing targeted messages to trick users into revealing sensitive information.
- More convincing social engineering attacks: AI and ChatGPT can also be used to create fake social media profiles or chatbots, which could be used to engage in social engineering attacks. These attacks can be difficult to detect, as the chatbots can mimic human behaviour.
- Malware development: AI can be used to develop and enhance malware, making it more difficult to detect and clean out.
- Fake news and propaganda: ChatGPT could be used to generate fake news and propaganda, which can manipulate public opinion and create panic and confusion.

It's in the user's hands

However, as with any other tool, the use (or misuse) of AI depends on the hand that wields it. Organisations like OpenAI are visibly committed to ensuring their technology is used ethically and responsibly and have implemented safeguards to prevent misuse. Businesses can do the same. To protect their digital assets and people from harm, it is essential to implement strong cybersecurity measures, and to develop ethical frameworks and regulations to ensure that AI is used for positive purposes and not for malicious activities.

Enhancing safety

Businesses can raise security barriers by implementing specific, effective protection measures.

- Implementing Multi-Factor Authentication (MFA): MFA adds an extra layer of security, requiring users to provide multiple forms of identification to access their accounts. This can help prevent unauthorised access, even where a hacker has compromised a user's password.
- Educating users about security dos and don'ts: Continuous awareness training about cybersecurity best practices, such as avoiding suspicious links, updating software regularly, and being wary of unsolicited emails or messages, can help prevent people from falling prey to cyberattacks.
- Leveraging Advanced Machine Learning algorithms: Advanced machine learning algorithms can be used to detect and prevent attacks that exploit OpenAI and ChatGPT. The algorithms can identify patterns and anomalies that traditional security measures might miss.
- Implementing network segmentation: Network segmentation involves dividing a network into smaller, isolated segments, which can help isolate the spread of an attack if one segment is compromised.
- Developing ethical frameworks for the use of AI: Setting up ethical frameworks and regulations can help ensure that ChatGPT is used for positive purposes and not for malicious activities.
- Increasing monitoring and analysis of data: Regular monitoring and analysis of data can help identify potential cybersecurity threats early and prevent attacks from unfolding.
- Establishing automated response systems: Detect and respond to attacks quickly, minimising damage.
- Updating security software regularly: Ensuring that security software is up to date can help protect against the latest cybersecurity threats.

Safeguard against misuse

By leveraging the power of AI technology, businesses and individuals can drive innovation and improve productivity and business outcomes with powerful new solutions. However, it is important to balance the potential benefits of AI technology with the potential risks and ensure that AI is used ethically and responsibly. By taking a proactive approach to AI governance, we can help minimise the potential risks associated with AI technology and maximise the benefits for business and humanity. As AI technology evolves, so too must our cybersecurity strategies.

For more information visit: www.eset.com/za

Generative AI is changing the way businesses operate

New research from Accenture has found that generative AI and other rapidly evolving technologies are ushering in a bold new future for business as physical and digital worlds become inextricably linked.

The Accenture Technology Vision 2023 report: *When Atoms meet Bits: the Foundations of our New Reality*, explores the technology trends underpinning the convergence of the physical and digital, as businesses look to accelerate enterprise reinvention in the here and now.

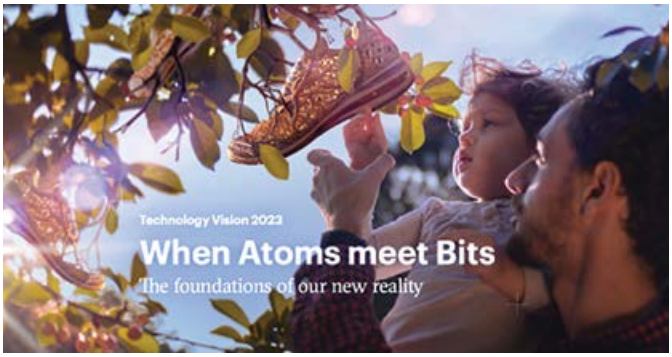
According to Paul Daugherty, Group Chief Executive at Accenture Technology, "The next decade will be defined by three mega technology trends – cloud, metaverse and AI – which collectively will collapse the distance between our digital and physical worlds. While generative AI will have far-reaching impact, leaders must dive in now to achieve its full promise, as it will require significant investments in data, people, and customising foundation models to meet organisations' particular needs."

The meteoric rise of ChatGPT captivated the world's attention. It demonstrates the power of generative AI to augment human capability. Accenture estimates that, going forward, as much as 40% of all working hours will be supported or augmented by language-based AI. Among business leaders, 99% of South African respondents agree that AI foundation models will play an important role in their organisation's strategies over the next three to five years.

Accenture's Technology Vision 2023 identifies four trends key to unlocking this new shared reality.

- Generative AI: Advancing human capability as a co-pilot, creative partner or adviser, nearly all South African executives agree that generative AI will spark significant creativity and innovation (98%) and usher in a new era of enterprise intelligence (97%).
- Digital identity: The ability to authenticate digital users and assets – the foundation for traversing digital and physical worlds – is now recognised by 79% of local executives as a strategic business imperative, not just a technical issue.
- My data, your data, our data: AI cannot reach its full potential until companies figure out data. That means breaking down data silos and modernising their data foundations. 93% of South African executives believe data is becoming a key competitive differentiator within organisations and across industries.
- Our forever frontier: The feedback loop between science and technology is getting faster, with each accelerating the advance of the other, in ways that 67% of South African respondents believe could begin to unlock the world's grand challenges.

Kgomotso Lebele, Technology Lead for Accenture in Africa says, "The next wave of business transformation will create the foundations of a new reality – a shared reality that seamlessly converges the physical lives we've been leading with the digital lives we've been rapidly expanding. Looking at generative AI – right now, scores of people are using it to generate purely digital images and content, but we already see how it's poised to shape the future of science, enterprise data, how we design and manufacture products, and much more."



Accenture's Technology Vision 2023 report explores the key technology trends underpinning the convergence of the physical and digital worlds that affect business operations.

Accenture has established an AI/LLM Centre of Excellence which brings together professionals and experts from across the group to help guide and inform business leaders.

Building on years of research and client work, Accenture has established a company-wide team – the Generative AI and Large Language Model (LLM) Centre of Excellence – which brings together 1 600 professionals dedicated to generative AI and leverages the depth and experience of more than 40 000 AI and data professionals across Accenture. To help guide and inform business leaders, Accenture has published *A New Era of Generative AI for Everyone,* an in-depth study of generative AI/LLM that provides actionable insights on how leaders can best use this disruptive technology.

For 23 years, Accenture has taken a systematic look across the enterprise landscape to identify technology trends with the highest likelihood of disrupting businesses and industries.

For the Technology Vision 2023 report, *When Atoms Meet Bits: The Foundations of Our New Reality*, Accenture gathered input from an external advisory board of more than two dozen practitioners spanning public and private sectors, academia, venture capital and entrepreneurial companies. In parallel, Accenture Research conducted a global survey of 4 777 C-level executives and directors across 34 countries and 25 industries. The survey was fielded between December 2022 and January 2023.

For more information visit:
www.accenture.com/technologyvision

Green hydrogen in SA

Hydrogen fuel cell technology was invented by Welsh scientist William Robert Grove in 1839 but had to wait until the 1960s for NASA to put it to commercial use – to power its probes, satellites and space capsules. Today, much of the world is pinning its energy-transition hopes on green hydrogen as a fuel source. Dr Karen Surridge, Project Manager Renewable Energy and Cleaner Fossil Fuels at SANEDI looks at why this is important for South Africa. The reasons are many, varied and compelling.

In very simple terms, hydrogen is produced when an electric charge splits a water molecule into hydrogen and oxygen in an electrolyser. Hydrogen is an energy carrier that can be used to generate electricity either indirectly, by generating heat through combustion, or directly, through an electrochemical process that takes place in a fuel cell. In both cases, water is the only by-product of the energy generation process.

Hydrogen is not in itself a green or renewable energy because the process to produce it is electricity intensive. Green hydrogen is so called because the hydrogen is produced using electricity from any renewable energy sources – such as wind, solar, hydro power.

The literature refers to various colours of hydrogen across the spectrum. The gas itself is colourless; the terminology relates to the source of energy used to produce the electricity for the water splitting process. Thus, depending on the type of energy used, different colour names are assigned to the hydrogen produced. For example, hydrogen produced using steam reforming from natural gas (methane) is called 'grey hydrogen'; grey hydrogen is currently the most commonly used form of hydrogen.

Hydrogen is a highly versatile energy carrier that can be used in a wide range of applications. Technologies for its safe storage and transport are also understood. It has the potential to decarbonise traditionally 'hard-to-abate' sectors such as heavy-duty transport, aviation and the maritime industry, as well as industries like steel, cement and ammonia manufacturing that cannot be fully decarbonised through the use of renewable energy and direct electrification or through renewable energy with battery storage.

Why should South Africa focus on green hydrogen?

Firstly, because it is a technology that can help the country towards achieving net-zero carbon status by the 2050 target date, and because South Africa already has well developed expertise in the Fischer-Tropsch technology (used in the liquefication of coal and in gas to liquid technology to produce liquid hydrocarbons).

Secondly, and at least as important, are the opportunities to industrialise the economy that green hydrogen can create, given that South Africa is home to some of the most important raw materials needed to produce it. These include platinum group metals (PGMs) and abundant sun- and wind-energy resources, as well as the land on which to establish industrial-scale renewable energy plants. PGMs are used extensively in the manufacturing of the membranes and catalysts in electrolysers – and South Africa has the world's largest resources of these metals. South Africa can also be a major exporter of green ammonia (a carrier of green hydrogen) to Europe and the Far East.

The combination of these resources, and the anticipated local demand for green hydrogen created by carbon intensive industries, makes the country an attractive base for original equipment manufacturers to establish manufacturing plants for the components needed to build renewable energy plants and produce green hydrogen. In addition, South Africa has an established manufacturing industry, expertise in the production of synthetic fuels and a labour force that is "completely trainable", in the words of the country's Green Hydrogen Commercialisation Strategy.

Local manufacturing creates jobs, energy self-sufficiency and security, and export opportunities, all of which are needed to ensure an energy transition that is not only just, but also delivers tangible socio-economic benefits to all South Africans.

State of play

Global demand for hydrogen reached an estimated 90 million tons in 2020 and is expected to grow to between 500 million and 680 million tons by 2050. Of this, the export market will account for 100 million to 180 million tons.

Given this potential, South Africa's nascent green hydrogen economy is being studied and structured from different angles.

In June 2021 the Minister of Trade, Industry and Competition established the Green Hydrogen (GH2) Commercialisation Panel, which is led by the Industrial Development Corporation (IDC). The panel has private and public sector members and, drawing on the Hydrogen South Africa (HySA) programme and the Hydrogen Society Road Map (HSRM), developed South Africa's Green Hydrogen Commercialisation Strategy and Action Plan that was approved by Cabinet in 2022.

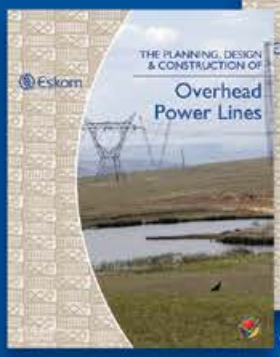
Over the past few months, Infrastructure SA, a programme within the ministry of public works, identified a pipeline of 19 green hydrogen projects valued at more than R300 billion. The IDC also secured €23 million in grant funds from the German government to support the development of South Africa's green hydrogen economy and help accelerate the country's transition to renewable energy.

The notion that, in this process, we could grow into a significant supplier of the raw materials, technology and product the world needs to clean up its energy act, is an exciting and inspiring goal to unite behind as a nation.

For more information visit: www.sanedi.org.za

Eskom

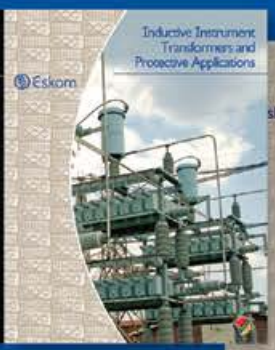
The Eskom Power Series was conceived in response to the continuing worldwide loss of critical technical skills and experience. The aim of the series is to promote international best practice, including experience acrued by Eskom over the years, as a guide and legacy and to serve as a source of reliable, reputable and highly technical information.



Volume I: The Planning, Design and Construction of Overhead Power Lines

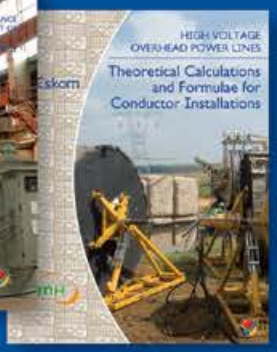
Volume 2: The Fundamentals and Practice of Overhead Line Maintenance

Volume 3: The Practical Guide to Outdoor High Voltage Insulators

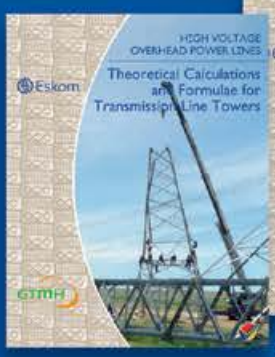


Volume 4: Inductive Instrument Transformers and Protective Applications

Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers



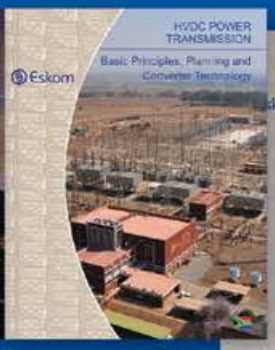
Volume 6 (Part 1): High Voltage Overhead Power Lines: Theoretical Calculations and Formulae for Conductor Installations



Volume 6 (Part 2): High Voltage Overhead Power Lines: Theoretical Calculations and Formulae for Transmission Line Towers

Volume 7: Corona in Transmission Systems: Theory, Design and Performance

Volume 8: Power Quality in Electrical Power Systems: A Holistic Approach



Volume 9 (Part 1): HVDC Power Transmission: Basic Principles, Planning and Converter Technology

Volume 9 (Part 2): HVDC Power Transmission: Lines Book

Volume 10: Thermodynamics for Students and Practising Engineers

Volume 11: Thermal Sciences for Engineers

Volume 12: Basic Engineering Toolbox

Volume 13: Applied System Dynamics with South African Case Studies

The Eskom Leadership & Management Series was introduced by Eskom at the request of readers and stakeholders of the Power Series who felt that the series should be expanded to include non-technical topics. These topics are often not well understood by technical practitioners and can pose a risk to the sustainability of their businesses. To date, the Power Series team, with assistance from experts in the various fields, has produced two volumes.

Volume 1: Mentorship and Coaching

Volume 2: Winning with People ... Insights for Leaders and Organisations

Volume 1: Procurement Management Key Concepts and Practices

Based on the success of the Eskom Power Series and the Eskom Leadership & Management Series, the Professional Development Series was created. It aims at developing various professions within South Africa so that large state-owned enterprises and the private sector can grow and facilitate job creation in the country. Unlike the Power Series, both the Eskom Leadership & Management Series and the Professional Development Series have a broad readership, including those residing in the private sector, State Owned Companies (SOCs) and academic institutions.

Eskom has also published: GENERATION, TRANSMISSION AND DISTRIBUTION: A large Southern African utility. This is an introduction to the technology that has developed, over time, in response to growing demand in the electricity utility industry in South Africa. It provides a 'soft-landing' for those who need, or want, to engage with the technology in a large electricity utility.

Contact: Sanjeev Bisnath
Tel +27 11 629 5072 Email: sanjeev.bisnath@eskom.co.za

Visit our website: http://www.eskom.co.za/AboutElectricity/EskomPowerSeries/Pages/Our_Products.aspx

Issued by Research, Testing and Development (Innovation Circuit) • Eskom Holdings SOC Ltd Reg No 2002/015527/30

DON'T GET TIED UP

The decentralised IO-Link masters are used as gateways between intelligent IO-Link sensors and the fieldbus. Thanks to their special housing materials and high ingress resistance (IP 69K), they can be used directly in wet areas in the food industry. The materials and production methods are identical to the ifm jumper cables of the tried-and-tested EVF product series. The ecolink technology guarantees reliable, permanently ingress-resistant M12 connections of the connection cables. High-quality materials especially suited to the application and intensive monitoring during and after production guarantee maximum quality standards.

ifm – close to you!
www.ifm.com/za