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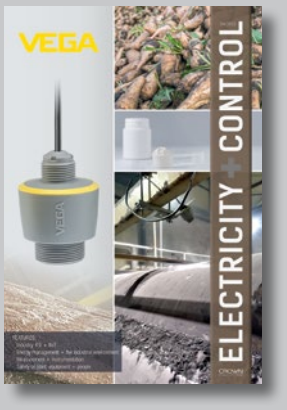

At Cosucra, where production processes range through every kind of challenging environment, VEGAPULS C 21 ensures reliable operation of a key element – the rotating filter.
(Read more on page 3.)

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Electric energy – consider a different paradigm

It seems impossible not to reflect, briefly, on the energy environment. We have had a spate of load shedding and we see the international fuel market facing a few head winds based on some uncertainties in that other hemisphere.

Let's consider for a moment the other hemisphere. What is worth noting is that it's actually quite far from us. That sounds trite, but one does tire of hearing of the 'challenges of the global south' without remembering that all is nowhere near well in the global north, now, is it?

There are many times when we must realise that being a part of Africa, and the global south, is not such a bad thing at all.

In fact, it may provide us with opportunities to break the mould – and do things that may seem unheard of elsewhere.

Remember the penetration of cellular telephony? This continent did not suffer the vested interest posed by fixed line providers in so much of the so-called developed world.

Imagine how archaic those systems were? A phone connected to a fixed point? You would hear it ring and go rushing to it. And if you were not there, you did not get the call … admittedly, that was not always a bad thing.

This continent was way ahead of the field in having individuals contactable by a single number – no matter where they were. That was remarkable – and if we look about, the fixed line industry has really been overtaken by new tech.

Now, consider energy for a moment: this continent is big. The transmission network is fairly well developed in some places, but generally not that well established on the continent as a whole. So large tracts of the continent are not served by traditional transmission and distribution systems. This means that, with a few exceptions, the vested interest which may actively discourage investment into alternative energy solutions is limited – again, far more limited than in the developed world.

Herein lies the opportunity.

(And, it would seem, that where the infrastructure was well developed, neglect of the system over some time actually removed some of the potential vested interest discouraging the go ahead with alternative energy solutions. A bitter pill, and frustrating. But possibly an opportunity.)

We must also admit that many industries are not running on renewable energy (a phrase generally loosely used) systems, but are rather burning fossil fuels just to keep the lights on out of necessity. I am based right now on a site where exactly this is being done – so that I can work, and our systems (it's a large load) can continue uninterrupted. We have begun installing renewable energy systems.

But the challenge is our current view of what electric energy must be: it must be there all the time because that is how our industry runs.

Let me urge you to begin to think about a different paradigm. Imagine that we craft an economy which is able to survive – and indeed thrive – based on renewables alone. And we understand that this means there may well be interruptions.

Imagine that?

Imagine a world where we run the system on 'this' weekend because the wind is blowing; but go off for two days (in the middle of the week) because it isn't.

Madness? I think not. We need to flip this and imagine a different and sustainable world. I challenge you to think this through in your own context.

Ian

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

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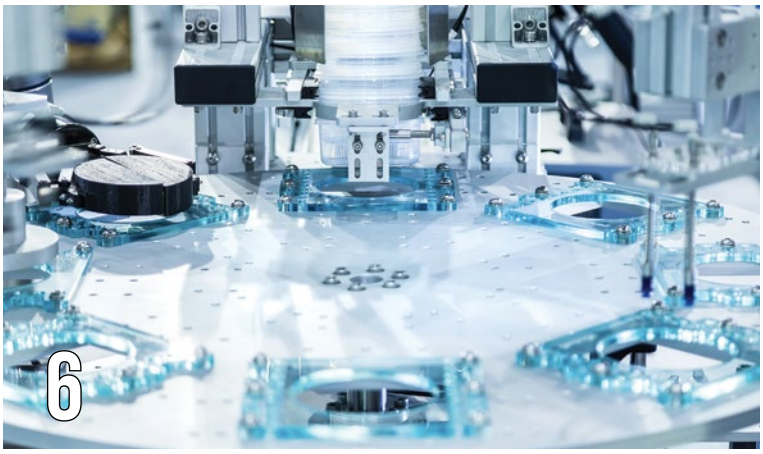
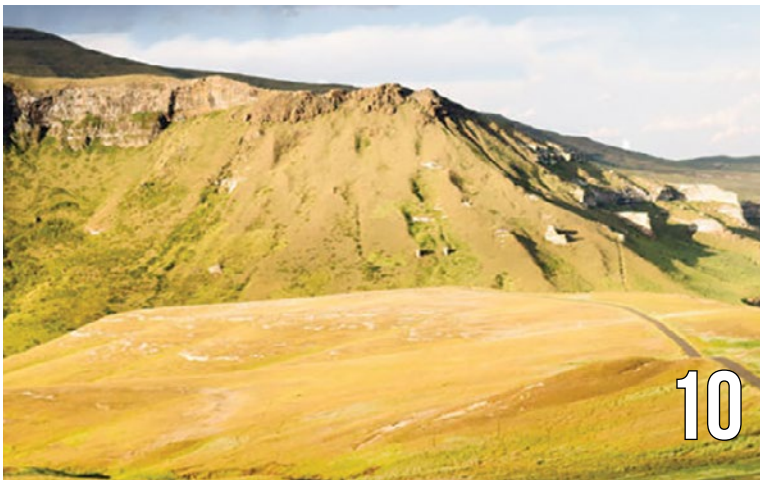
REGULARS





When the heat gets hot in the process

The production processes at the Belgian company Cosucra are diverse, beginning in the field and ending in the clean room. Which means the company has to deal with everything from sand-contaminated raw materials to the strict hygiene guidelines of EC 1935/2004. VEGAPULS C 21 keeps its cool to ensure reliable operation in the rotating filter.

Cosucra was founded in 1852 in Warcoing, in the Walloon region of Picardy, and was originally involved in sugar production. Over the past twenty years, the group has become a leader in the production of plant-based natural ingredients. Derived from chicory and peas, its products are supplied to food and nutritional health markets worldwide.

The production process starts in the fields where the chicory and peas grow. The raw materials, to which initially a lot of sand and dirt adhere, are processed in total compliance with hygiene regulations. “Our production site has every kind of challenging environment. The processes are either outdoors or in the clean room, dusty or aggressive; processes that operate under positive pressure or negative pressure; and in some processes we have to deal with strong vibration or an ATEX environment,” says Vincent Vercamst, Maintenance Manager in the electrical and instrumentation department at Cosucra. Under these conditions, VEGAPULS C 21 ensures the proper functioning of a key element in the process, the rotating filter.

Hot processes require robust sensors

With measuring instruments like VEGASON, VEGACAP, VEGADIF, VEGABAR or VEGATOR, VEGA has been helping to ensure reliable production at the Warcoing plant for over 25 years. “An unbeatable price/performance ratio, low maintenance, high long-term reliability and incredible robustness,” says Vercamst, summarising the reasons that tipped the scales in favour of the ‘sensors from Schiltach’.

New – from the beginning of 2021 – is the compact radar level transmitter VEGAPULS C 21. It is used in the process producing inulin. This process is divided into the following steps: washing – grinding – filtering – evaporation – bagging and storage. Process temperatures of up to 90°C are completely normal.

Preparation of the sand layer on the rotary filter.

Deployment in the rotary filter

A rotary filter rotates in a trough filled with water and sand, which is sucked up at the circumference of the filter with the help of a vacuum pump. The vacuum pump runs during the entire sand collection process. The trough is emptied and then filled again with product ready to be filtered. The VEGA sensor first measures the distance between the sensor and the empty filter – this is basically the zero point. During the filtration process, VEGAPULS C 21 continuously measures the thickness of the sand layer on the outer side of the rotating filter. With this data the sand thickness in the critical area will be constantly checked. In the past, there were recurring problems with sand stability, which resulted in high costs. Now, with the VEGA sensor, the filtration process can be controlled very precisely.

Radar replaces visual monitoring

The big advantage of VEGAPULS C 21 is that it delivers exact measuring results without effect from the medium or the process and ambient conditions. Besides the 80-GHz radar technology, it is mainly the optimised signal processing that enables the sensor to deliver reliable measured values virtually around the clock. The sensor is also so small that it can be installed almost anywhere. And Coscura was able to install the new sensor quickly thanks to Bluetooth and the intuitive adjustment structure. Bluetooth makes everything much easier – set up, display of readings and diagnostics – especially when the sensor is installed in a harsh environment, in an Ex area or at a measuring site that is difficult to access. □

Above: Mechanical protections in place on the rotary filter.

Left: The sand-coated rotary filter in operation.

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Visit: www.vega.com/en-za

Smart manufacturing for the future battery gigafactory

Dominique Scheider, Transportation Industry Strategy & Marketing Manager EMEA at Rockwell Automation, explains why smart manufacturing is pivotal to future battery gigafactories.

Batteries will have a central place in future energy markets, for mobility and energy storage. According to the International Energy Agency (IEA), global production capacity for electric-vehicle (EV) batteries will need to more than triple from 2020 to 2025 to meet the world's estimated EV production target.

To deliver the billions of watts of energy that EVs will need in the coming decades will require 'gigafactories' for battery manufacturing. This means more than simply scaling up traditional production techniques and technologies. It will require new ways of thinking about production processes to maximise speed, flexibility and throughput. Smart manufacturing will be a crucial tool in battery production. We call it the 'digital thread' because smart manufacturing affects not only the execution system, but also the entire lifecycle optimisation.

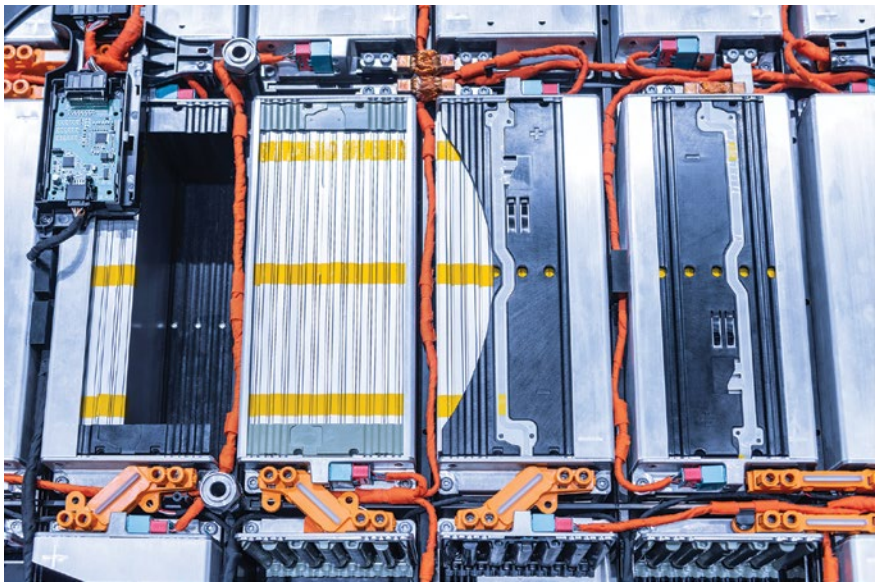
It begins in the early stages of research and development where the chemists and engineers develop new battery concepts. They use the tools offered by computational chemistry and CAD for design, together with product lifecycle management (PLM) to manage product development. The digital thread starts as the information is aggregated in a virtual environment. Throughout the testing cycle, tools such as MATLAB and Ansys generate more valuable data.

This data is used to develop digital twins of machines that will be used later in the manufacturing process, planning and testing operations in the virtual world. Digital twins can also be used to help train staff in the virtual world and allow fast ramp-up of production when it begins. Beyond that, as the products are manufactured, sold and used, data is collected in the physical world and fed back into the virtual world, enabling products and processes to be optimised. This merging of the physical and virtual worlds will be central to the future of battery manufacturing.

Smart production monitoring

One of the most important facets of the digital thread is increased visibility through production monitoring. Production monitoring forms part of Manufacturing Execution System (MES) software. MES has been used in automotive manufacturing for decades and will be crucial for battery manufacturers, especially with regard to customisation. As the market develops there will likely be a greater demand for customisation – potentially calling for unique lots for each model or car.

With MES software it is possible to integrate control and business systems to execute and track orders across the enterprise. Users also gain the additional context needed to turn production data into actionable information. And a manufacturer can start small with MES applications that address specific manufacturing challenges. If the manufacturer needs to understand defects, an MES quality application can be used to track, identify and raise an alert when either a machine process or the operator's processes go outside of the prescribed limits.

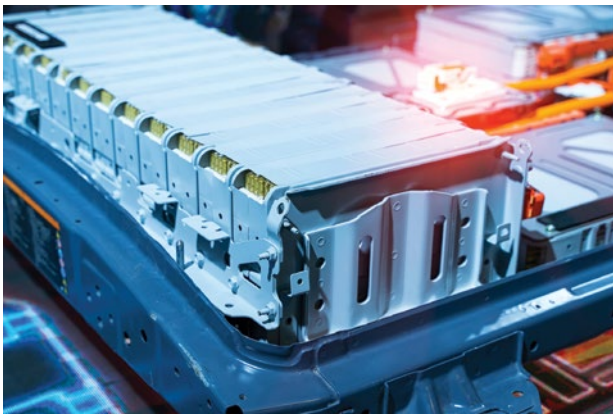


Smart data collection will enable battery production at scale, with flexibility and insight.

Another application would be in track-and-trace systems to enable traceability of batteries through the manufacturing process and help ensure that batteries are safe for use.

Over time, users can scale up the applications to the MES software suite to gather 'one version of truth' across their operations.

Importantly, automated and smart paperless data collection is also essential to the Global Battery Alliance's (GBA) Battery Passport. The Battery Passport provides trusted information on indicators related to responsible and sustainable practices. This results in a quality seal, capturing authenticated records of the responsible sourcing, management, recycling and use of a battery across its full lifecycle.



According to the IEA, global production capacity for EV batteries will need to more than triple from 2020 to 2025 to meet estimated EV production targets.

The Battery Passport's role in underpinning a responsible battery value chain has been endorsed in global policy discussions, including at the 2021 G7 Leaders' Meeting, as well as in the draft EU Directive on Batteries and by the Canadian and US administrations. All the data for this will have to be aggregated automatically.

Better by benchmarking

Together with Samsung SDI, a leading manufacturer of Li-Ion batteries and energy storage systems, Rockwell Automation has developed an MES system that is paperless and complete with quality loops. Every single production step is documented by the MES. For example, FactoryTalk® Analytics™ could point out that increasing error rates at a station where batteries are bonded directly correlates to the adhesives drum recently integrated into the manufacturing process. According to Samsung SDI, this analysis tool contributes to significant increases in efficiency in the most diverse areas. As well as addressing the obvious, it links the correct dependencies for a continuous improvement process, and it is easy to use. The fact that gaining insights which used to take at least an hour can now be achieved within five minutes indicates how quickly this solution can amortise its cost.

Looking to the availability of the data outside of the MES, we work with PTC on its IoT platform to increase the visibility of assets. With the data collected and the increased visibility this provides, users can benchmark different machines around the world. If a business has ten manufacturing plants, it can see which plants, lines and machines are performing better than others. It can aggregate real-time information from the shop floor and other data sources to gain a 360-degree vision of its operations.

Intelligent conveyor systems

Some may think that smart manufacturing is all about software. However, hardware will also play a crucial role in gigafactories, with high-performance, flexible machines. Equipment such as traditional conveyor systems may only slow things down. These systems use motion-control technologies with hundreds of mechanical details, like rotary-driven chains, belts and gear boxes. As a result, they have limited flexibility and operational speeds, and acceleration/deceleration speeds that may fall short of the gigafactory's needs.

A better alternative is a motion-control system with Independent Cart Technology (ICT). Free from the constraints of a traditional conveyor system, this can create faster, more flexible battery lines using independent, programmable movers. It can reduce changeover times significantly with simple software profiles that allow the user to change products at the push of a button. In one case, Eagle Technologies used this technology on a battery pack assembly machine it developed to help maximise EV battery throughput. The machine's capabilities span from individual cell sorting to full battery module and pack assembly, as well as performing required testing. The machine incorporates linear servo motors that position loads in precisely the correct direction at high speeds. And changeovers involve simply selecting the correct mode from the operator interface.

At a glance

- The billions of watts of energy that EVs will need in the coming decades will require 'gigafactories' for battery manufacturing.
- The digital thread generated through smart manufacturing, from R&D through product lifecycle management and ongoing optimisation, will be a key enabler.
- Smart, flexible, high-performance machines will also play a crucial role.

The drive to decarbonise mobility is pushing demand for new battery technologies and higher production levels.

Charging ahead

In order to play its part in the decarbonisation of mobility, the fast-growing EV market will need highly efficient and flexible factories to produce EV batteries in high volumes, at high speeds and at a consistently high quality. The end-to-end digital thread will play a crucial role in delivering these smart data-driven facilities. □

For more information visit: www.rockwellautomation.com

Digital transformation is here to help

The digitalisation of industrial processes is fundamental for businesses to thrive in a market that is ever more demanding and where competition is fierce. With a plethora of innovative technologies available, driving this transformation with a sustainable strategy is key. This must suit the specific needs and challenges of a company in order to maximise the return on investment (ROI) and benefits – and minimise disruption. John Browett, General Manager of CLPA Europe, looks at the benefits of digital transformation and the steps for a successful journey.

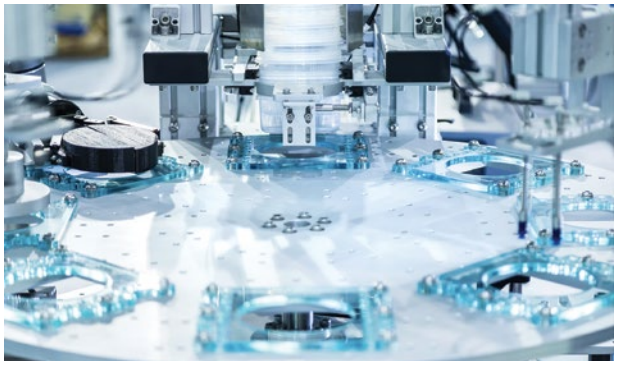
Digital transformation is a fresh, forward-looking approach that focuses on having an empirical, comprehensive understanding of processes, operations and equipment conditions in order to drive efficiencies. Enhanced productivity, responsiveness and flexibility are just some of the benefits for companies embracing this change.

The insight at the core of digitalised frameworks is obtained primarily by gathering key data and turning it into knowledge that supports factual decision making as well as smart, automated control and operations based on accurate predictive models. These setups are achieved by connecting disparate systems within an enterprise to share pieces of information which, like the pieces of a puzzle, offer a full picture when put together. In particular, a holistic view can be generated by integrating the insights from information technology (IT) and operational technology (OT).

Not just about technology

Although technologies are extremely important to support the digital transformation of businesses, this requires much more than the simple, default implementation of more machines, robots and automation solutions, which can demand substantial investment. A successful digitalisation strategy involves the fundamental rethinking of the way industrial activities and business models have traditionally been set up in order to make them significantly better.

Digital transformation requires upfront planning and continuing iterations. [Source: iStock/NicoElNino]



Digitalisation should offer businesses a holistic view of their operations, integrating data insights from IT and OT systems.

Technology and technological innovations are a means to achieve this goal, and it is important to select the solutions that can best address the specific goals of an intended application. Businesses should not rely on buzzwords, but should invest solely in what can help them succeed.

Essentially, digital transformation calls for a transformational mindset. It is not about a single project or a destination, but rather a long-term, ongoing journey. It requires continuing iteration, as the company itself evolves and suitable technologies become available.

This also means businesses do not need to replace or upgrade all their existing equipment at once to become digital. Instead, it is possible – and recommended – to proceed in stages, reducing costs and ensuring support for legacy devices. It is then possible to adapt processes and frameworks over time.

A successful journey

To reap the full advantages of digitalisation, companies need to set up a customised plan divided into small projects. These should address the most immediate shortcomings, challenges or bottlenecks first and then move on to the next issue. By overcoming identified limitations progressively, it is possible to benefit from quick returns on investments, and rapidly enhance competitiveness.

Typically, companies can start by automating a particu-

larly repetitive task. This can help them begin to gather key data for monitoring purposes. Once this project has been completed, the insight generated can be used to reshape the activity more radically, innovating further if appropriate by using the new in-depth understanding gained to set up automated control systems.

TSN as an enabler

In addition to selecting appropriate projects and technologies, companies need to select a suitable solution that can transfer data to and from all relevant parties. The most effective way to achieve this is via an open industrial Ethernet network that supports Time-Sensitive Networking (TSN). This is key to offering the level of connectivity needed to converge the IT and OT domains and ensure deterministic, reliable communications. In effect, it provides the connectivity infrastructure for digitalisation.

Furthermore, a business needs to select a solution that can help it make sense of its data. Understanding what information is needed and the type of analytics required is crucial for digitalisation projects to succeed. This means incorporating information modelling within industrial communications frameworks. This can be done via files that contain information on machine specifications, the data to be acquired from the machine and its acquisition method as well as linked information between machine information and machine data.

Currently, the only solution able to offer both these capabilities is CC-Link IE TSN. This is the first open industrial Ethernet that offers TSN functions, and it supports information modelling via CSP+ for Machine device profile technology. This provides XML format files that describe devices and pieces of equipment as well as the information they generate.

By using CC-Link IE TSN, businesses can benefit from a strong backbone for digital transformation strategies, to realise the full potential of futureproof data-driven industrial activities. They can build a competitive edge for the years to come. □

For more information visit: eu.cc-link.org

Development alliance optimising technologies

Siemens Digital Industries Software has become a charter member of the Intel Foundry Services (IFS) Accelerator – EDA Alliance, a programme committed to establishing an ecosystem for the design and fabrication of next generation System-on-Chip (SoCs) manufactured on IFS' leading-edge process technologies.

The initiative promotes collaboration between IFS and its ecosystem partners, with a focus on reducing risk and tackling design barriers while accelerating time-to-market for mutual customers' products. IFS Accelerator EDA Alliance partners receive early access to Intel process and packaging technologies, allowing them to co-optimise and enhance tools and flows to best realise Intel's technology capabilities.

"The IFS Ecosystem Alliance is a major step forward for Intel's foundry ambitions," said Rahul Goyal, Vice President and General Manager for Intel Product & Design Ecosystem Enablement. "We are pleased that Siemens EDA has joined the programme. The combination of Siemens' world-class EDA (electronic design automation) offerings and IFS' leading-edge process technologies will provide design teams across the industry with the solutions needed to deliver in today's competitive IC markets."

As part of the alliance, Siemens plans to collaborate closely with IFS to optimise best-in-class IC (integrated circuits) design tools, flows and methodologies for Intel's processes. The initial Siemens EDA product lines certified by IFS include the industry-leading Calibre® nm platform, as well as the Analogue FastSPICE (AFS) platform for leading-edge circuit verification targeting

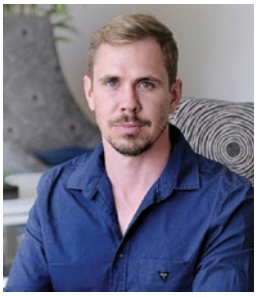
As a member of the EDA Alliance, Siemens will work with IFS to optimise IC design tools, flows and methodologies for Intel's processes.

nanometre analogue, radio frequency (RF), mixed-signal, memory and custom digital circuits.

"With the increasing importance of semiconductors in the global economy, Intel's commitment to the foundry market through IFS is an important new source of innovative capacity for advanced products," said Joe Sawicki, Executive Vice President, IC-EDA for Siemens Digital Industries Software. "Siemens is proud to collaborate with IFS to help provide software solutions that are tuned to allow mutual customers to get the most out of Intel process and packaging technologies."

For more information contact Siemens Digital Industries.
Visit: www.siemens.com/software

How containerisation can benefit a business



Benjamin Coetzer, Director, Routed.

Containerisation has become a major trend in software development as well as for any enterprise looking to scale its operations. According to Benjamin Coetzer, Director at vendor-neutral cloud infrastructure provider Routed, containerisation will redefine the cloud.

"Enterprises are embracing containers at a much faster pace than expected. This is completely changing the face of what hybrid cloud looks like and how applications are being built. Containerisation will become a key skill to possess in most if not all software development roles," Coetzer says.

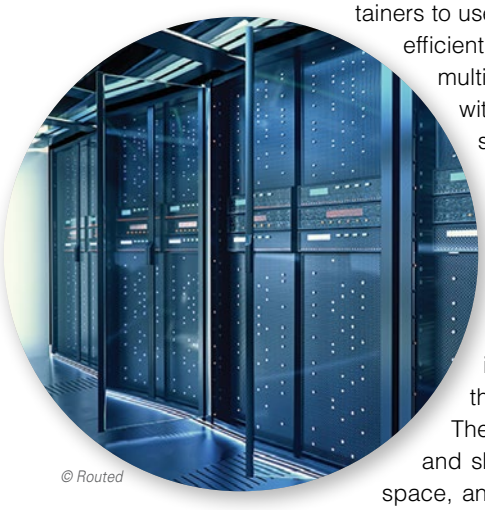
Virtualisation, containerisation and Kubernetes

Businesses typically used to run applications on physical servers. "It wasn't possible to define boundaries for the system resources these applications would use, which led to bottlenecks. The only option was to run each application on a different physical server, which quickly becomes very costly."

Enter virtualisation. Virtualisation enabled users to run many virtual machines, each with their allocated applications, on a single physical server. It allows organisations to carve physical resources into more appropriately sized virtual machines, with operating systems like Windows or Linux installed on them.

Containerisation takes it a step further, encapsulating software code that can run uniformly on any infrastructure. Traditionally, code developed in a specific computing environment would have bugs when transferred to a new location – such as from a Linux to a Windows operating system. A container packages the software away from the host operating system, making it portable and able to run on any platform.

Existing applications can also be repackaged into containers to use computing resources more efficiently. "You can effectively run multiple different applications with multiple different OS versions, on the same virtual machine or physical server without having to worry about one application affecting the other. Though similar to virtual machines, containers have relaxed isolation properties to share the OS with other applications. They are considered lightweight and share CPU, memory, process space, and more. They are also portable across clouds and offer a host of benefits – agile application creation and deployment, continuous development, observability, environmental consistency and more," says Coetzer.



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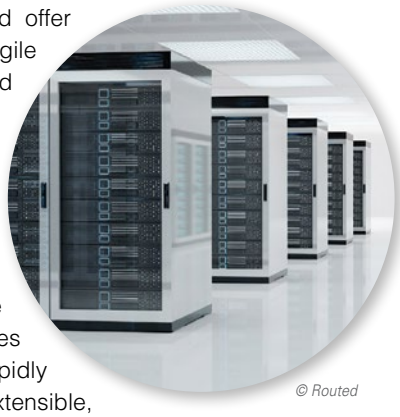


© Routed

Of course, all these containers need to be managed, and Kubernetes is the answer. "This rapidly growing, portable, extensible, open-source platform runs and manages containerised workloads and services at scale. Kubernetes provides the framework to run distributed systems resiliently, taking care of scaling and failover for the application, providing deployment patterns, and more," Coetzer explains.

Benefits for business

The benefits for developers are clear and multiple. "Containerisation enables developers to control their application runtime environment much more granularly, ensuring that applications can be built and shipped in a consistent and programmatic way. This reduces the time to deploy software into production environments significantly and enables the use of CI/CD pipelines in the software development process," Coetzer says.

"Furthermore, Kubernetes as an orchestration engine lends itself to criteria instilled in micro-services architecture. As a result, developers are thinking differently around how applications are built to scale and tolerate service failure in production. Separation of responsibilities means rethinking where stateful data resides and how stateless applications interact with one another."

When done correctly, containerisation contributes to the bottom line through reduced infrastructure costs, fewer workflow interruptions, and faster development and delivery of products, features and upgrades. Potentially it supports better employee and customer satisfaction, goals for any organisation looking to grow sustainably. □

For more information visit: https://routed.co.za/

Secure connectivity for critical applications

Jan Hnidzo, CEO, Teraco.

Teraco Data Environments, a leading provider of colocation data centres and interconnection in Africa and a member of Oracle Partner Network (OPN), now offers connectivity directly through Oracle Cloud Infrastructure (OCI) FastConnect at its Isando Campus for the Oracle Cloud Johannesburg Region. Oracle customers can harness the power of Oracle Cloud locally, including Oracle Autonomous Database, to help them unlock innovation and drive business growth.

Oracle Cloud Infrastructure FastConnect, via Teraco's Africa Cloud Exchange, could potentially provide higher bandwidth options and more reliable and consistent networking experience compared to Internet-based connections. Other potential benefits may include:

- More consistent network performance and lower latency, compared with the public Internet
- Near-seamless connectivity between the data centre and networks to OCI for demanding workloads and applications
- Increased reliability, with a dedicated and pre-established path to OCI
- Improved security because data traffic flows strictly over trusted endpoints in a secure data centre location
- A relatively easy and cost-effective way to set up hybrid and multi-cloud workloads
- Near-seamless management of physical and virtual connections through a single portal.

With OCI, customers benefit from best-in-class security, consistent high performance, simple predictable pricing, and the tools and expertise needed to bring any workload to the cloud relatively quickly and efficiently.

"Our direct connection to OCI builds on our commitment to ensure our clients have direct, secure access to the critical IT resources they need to drive business success," said Teraco CEO Jan Hnizdo. "The demand for Oracle Cloud in our market is a testament to its strength, and we are pleased to be working closely with Oracle to accelerate its service delivery."

OCI's extensive network of the currently more than 70 FastConnect global and regional partners offer customers dedicated connectivity to Oracle Cloud regions and OCI services – providing customers with one of the best options anywhere in the world.

Specifically designed to help meet the needs of the enterprise, Oracle Cloud is a next-generation cloud that delivers powerful compute and networking performance and a comprehensive portfolio of infrastructure and platform cloud services, from application development and business analytics to data management, integration, security, artificial intelligence, and blockchain. With unique architecture and capabilities, Oracle Cloud delivers unmatched security, performance, and cost savings. Oracle Cloud is the only cloud built to run Oracle Autonomous Database, the industry's first and only self-driving database.

For more information visit: www.teraco.co.za or www.oracle.com/partnernetwork

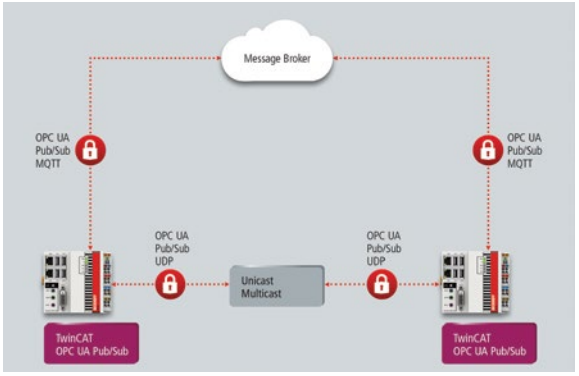
Real-time-capable data communication via OPC UA

Direct integration of OPC UA Publisher/Subscriber communication into the TwinCAT 3 runtime paves the way for straightforward realisation of machine-to-machine (M2M) and device-to-cloud (D2C) scenarios based on the OPC UA Pub/Sub specification.

With a new extension of the OPC UA specification, which Beckhoff played a prominent role in helping develop, the publisher/subscriber principle is being introduced into the established and standardised OPC UA communication protocol. Two different transport paths can be defined for data transmission: UDP and MQTT.

UDP enables efficient and real-time-capable data exchange in a local network between machines or machine components, whereas transport via an MQTT message broker primarily, but not exclusively, supports cloud scenarios.

As an early adopter, Beckhoff implemented an initial prototype of the UDP transport path back in 2016. Now, the implementation of MQTT adds a second transport path. With the new TwinCAT 3 function OPC UA Pub/Sub (TF6105), Beckhoff provides a package that can be used



With PC-based control and TwinCAT 3, Beckhoff supports the extension of OPC UA to include publisher/subscriber communication.

to configure and use both OPC UA Pub/Sub UDP and MQTT Publisher and Subscriber directly in TwinCAT 3.

For more information contact Beckhoff Automation.
Tel: +27 (0)11 795 2898, Mobile: +27 (0)79 493 2288
Email: danep@beckhoff.co.za, visit: www.beckhoff.co.za

Dispatchable renewables – the smart option

Jan Fourie, Sub-Saharan Africa GM at Scatec.

With load shedding having already cost the South African economy around an estimated R25 billion, and no early end to the power cuts in sight, government is looking for solutions. The energy shortfalls, primarily a result of poor performance in the country's ageing coal-fired stations, are addressed in the Integrated Resource Plan of 2019, which commits to a shift away from coal, with a proposed 25% of SA's total power to come from renewables by 2030. Jan Fourie, Sub-Saharan Africa GM at Scatec, describes the problem not as an "energy crisis" but as a "fossil fuel dependency crisis".

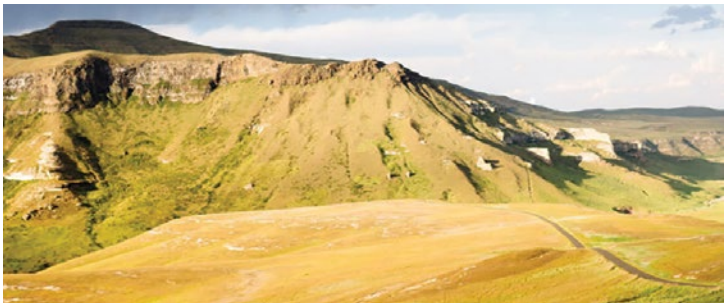
Fourie says, "The country's abundant sunlight and wind resources make renewables the obvious solution. Renewables-based projects are now relatively quick to establish and fully cost-competitive with fossil-fuel based energy generation. And with programmes like the REIPPPP and RMIPPPP in progress, there is strong support from investors and the state.

"Furthermore," he says, "innovations in battery storage technology have enabled renewable energy plants to output completely stable, consistent, dispatchable power. These large-scale long-duration storage solutions, propelled by innovations in lithium ion and other technologies, are finally dispelling the misconception that output from renewables is intermittent, or that solar power is only available when the sun shines."

Scatec, which is one of the preferred RMIPPPP bidders announced in July last year, is on track to add 150 MW of contracted capacity to the national grid through its hybrid solar and battery plants in the Northern Cape. With 1 million individual PV panels planned across an area of 1 100 ha and a CapEx of around USD1 billion, the project is one of the most ambitious of its kind globally.

Fourie says the plants' lithium-ion battery units will allow for an unprecedented level of output control and dispatchability.

"In projects like this, PV capacity is over-installed and the excess energy produced during the sunlight hours is stored in the battery packs, and released as needed, especially during the mornings and evenings when demand peaks and grid operators request power. The storage units also safeguard against prolonged periods of overcast weather and seasonal swings."



In June 2021 Scatec was awarded preferred bidder status in the RMIPPPP for three projects combining solar and battery storage at Kenhardt, Northern Cape.

These considerations are crucial as the RMIPPPP guidelines stipulate that the new energy must be available at total capacity from 05h30 to 21h00 every day, and dispatchable at the request of grid operators whenever market demand may arise.

Although liquefied natural gas (LNG) has been put forward as a viable alternative energy solution for the country, Fourie suggests that renewables represent a far better strategy for an emerging economy like South Africa's.

"The significant challenges globally around decarbonisation, affordability, and profitability in energy supply suggest that the LNG industry may not enjoy popular backing from banks and investors for much longer," he says.

With limited domestic production, the bulk of liquid gas burned in South Africa is imported, making the industry vulnerable to disruptions in international supply chains, as well as volatile exchange rates and commodity prices.

"All these risks and vulnerabilities are passed through to the government and not borne by the independent power producer." In Fourie's view, "Dispatchable renewables, which promise to deliver consistent power at a stable cost for the next 20 years, represent a far safer proposition for the state.

"Alhough LNG is less carbon-intensive than coal, it is still a fossil fuel. Its usage has a detrimental impact on the environment, incurs a carbon tax, and is not consistent with the goals to expand renewables' contribution to SA's energy mix. A greener future using renewables is possible, and is, in the longer term, a better strategy," he says.

"Renewable, dispatchable power in South Africa is not a pipe-dream. It's a reality available right now, and it makes sense as government's primary energy resilience strategy. There are already many significant projects under way that promise to offset load shedding and bring South Africans clean power for the future. Dispatchable renewables are a risk-free win for government, and are the key to future-proofing the energy sector lies in harnessing the country's abundant renewable resources," says Fourie. □

For more information visit: www.scatec.com

Managing electrical power systems

At a time when South Africa faces a continuous and uphill battle in stabilising its energy provision, many businesses are focused on alternative resources and backup supply such as UPSs, generators and inverters. However, Vladimir Milovanovic, Vice President, Power Systems, Anglophone Africa at Schneider Electric, highlights that companies still need to manage their current power infrastructure.

Vladimir Milovanovic, Schneider Electric.

This is where electrical power management systems come into play. At its core, a power management system can simplify organisational operations and provide real insights into efficiency and processes.

At Schneider Electric we are often asked: Why do I need to manage my power? The simple answer is: electrical systems are becoming more complex. Loads and processes have increased and, similarly, power systems have become more distributed and sensitive.

Facilities today depend on their electrical distribution infrastructure to keep operations running. These may range from large and critical facilities such as datacentres, hospitals and airports to industrial plants and commercial buildings or campuses.

Power management systems help ensure the safe, reliable, efficient and compliant operation of electrical distribution systems, and the assets connected to them. They offer benefits such as:

- Avoiding electrical fires and preventing shocks
- Recovering from outages more quickly and safely
- Improving uptime by avoiding unplanned outages
- Finding ways to reduce energy costs
- Optimising maintenance and extending the life cycle of electrical assets
- Simplifying the process of acquiring and maintaining compliance to standards and regulations
- And meeting legislated requirements for energy management, carbon emissions, and power quality.

How does a power management system work?

A power management system forms part of the digitalised power distribution network, including connected devices and sensors that collect data from key points across the electrical infrastructure.

Additionally, real-time power information can be acquired from standalone power metering devices or from those that have embedded metering capabilities, such as protection relays, breaker trip units, motor control units and variable speed drives (VSDs).

All organisational electrical assets can be monitored 24/7, including transformers, medium voltage (MV) and low voltage (LV) switchgear, generators, transfer switches, power control panels, distribution panels, motor control centres, UPSs, and harmonic filters.

This provides for real-time analysis of power conditions and quality as well as equipment health and, importantly, how efficiently energy is being used.

The electrical power data can be shared with building management systems, SCADA, industrial automation or enterprise energy management systems, which do not in themselves have the analytics and visualisation tools required to manage an organisation's electrical infrastructure.

Power management systems thus provide the operational intelligence required for the efficient real-time operation and maintenance of electrical assets and the power distribution network as a whole.

Further benefits

There have been significant advances in power and energy analytics tools that make them easier to use for facilities teams. Power management systems also cover applications which support a range of functionalities.

- They track electrical system health and efficiency, identifying overloads and fault finding.
- Capacity management, which includes analysing historical trends, is especially important in critical facilities with backup power systems, such as hospitals or datacentres.
- Equipment monitoring identifies power quality problems – which often lie within an organisation's internal electrical distribution system. As facilities modernise to improve energy efficiency, the addition of LED lighting, VSDs, automation systems and other equipment can produce harmonics and power distortions.
- Electrical distribution networks regularly experience power disturbances that travel quickly through the system and are short-lived. Advanced power quality monitoring devices capture these disturbances at distributed points in the system and provide important analytical information which enables plant or facilities operators to manage such power events. □

Electrical power management systems provide valuable insights into internal electrical infrastructure.

For more information visit: www.se.com

Use industrial UPSs for industrial applications

Ivor Becks, specialist in UPS systems at ABB South Africa.

Uninterrupted power supply units, or UPSs, are designed for specific applications, taking account of respective environmental conditions and performance demands. Here, Ivor Becks, Sales Specialist, UPS Systems, Southern Africa, at ABB South Africa highlights why a commercial UPS should never be used in an industrial application.

Many process industries create harsh environments. Various factors, such as mechanical vibration and chemical vapour contamination, contribute to this. The latter can cause corrosion and high levels of dust (which can be corrosive and/or conductive) and allow for vermin ingress (rodents, reptiles, insects). Other factors that play a role include temperature extremes (both high and low), condensing humidity and reciprocating tilting actions (such as on board a ship or an oil rig), and more.

For applications in harsh environments, an industrial UPS should be the automatic choice, due to higher safety levels, less risk of expensive downtime resulting from power failures, a longer lifespan and reduced servicing costs.

Industrial processes are largely controlled by automation and control systems (SCADA systems, distributed control systems, and PLCs), field instrumentation, motor control cabinets, variable speed drives, actuators and field communication systems, all of which require perfectly controlled power. To ensure continuous, safe operation of production processes in harsh environments, and emergency shutdown of potentially dangerous processes, it is critical that the power supply to these systems is continuous.

For industrial applications, UPSs can be customised to ensure technical compliance as may be required for specific operating environments.

Safety-critical systems

In situations where human life could be threatened, systems controlling rail signalling, or disaster warnings, fire warnings, evacuation warnings, or emergency lighting, for example, require absolute security of electrical power for their operation. Such safety-critical systems must not fail because of the risks that would raise of injury and/or loss of life, as well as potentially substantial financial losses due to extensive plant damage and loss of production.

Industrial UPSs incorporate the key attributes required for applications in manufacturing plants and industrial control rooms.

Expected lifespan

In a 'controlled' or 'normal' environment, a commercial UPS typically has a design life of ten years. An industrial UPS, by contrast, is designed to last a minimum of 15 years, operating at high loads and in harsh conditions.

It is important to use the correct UPS for respective applications. A commercial UPS is designed to operate in less aggressive environments – that is, temperature-controlled and free of dust, vibration, corrosion and vermin. For such applications, UPS designers can set the internal components of a commercial UPS to operate closer to their design limits. This assists in reducing the cost of manufacture.

The lifespan of internal components in a commercial UPS installed in a harsh environment is likely to be far shorter than that of a UPS designed for industrial applications. Using a commercial UPS design in an industrial process could therefore result in premature, unplanned failure of the UPS, leading to costly downtime, loss of production and possible damage to equipment, which could concurrently give rise to unsafe or unstable conditions.

Potential risk

There are a number of risks associated with using an incorrectly rated UPS that is not designed to cope with the stresses under which it is expected to function. Commercial UPSs are not expected to perform under the same environmental conditions as UPSs designed for industrial applications.

ABB has 13 different UPS families designed to meet different global standards, from 1 kVA to 5 MW (LV) and 11 kV, to 2.25 MVA UPS blocks, which can be paralleled to match capacity up to that of the utility supply. Of these, three families are specifically intended for industrial applications in the IEC market: the ABB PowerLine DPA, the ABB PCS100 UPSi and the PCS120 MV UPS.

Engaging with our customers and our partner network, ABB can assist with designing a solution to ensure technical compliance that is relevant to the environmental conditions under which the UPS is expected to operate. In addition, factory trained and certified UPS technicians at ABB enable us to service the global installed UPS base effectively.

Comparative features

- Commercial UPS units are designed for applications in data centres in banks, for example, as well as offices, airports and central train stations – environments where the interruption of ac power may disrupt data processing and telecoms, but does not present an inherent risk of injury to people or damage to property.
- They are designed to support business continuity and data protection.
- They incorporate the key attributes required for control room and data centre infrastructure: energy efficiency, power expansion capability, optimised footprint, optimised cooling system, standardised power blocks and N+1 redundancy, remote control and monitoring.
- They are manufactured and configured to order.
- Industrial UPS units are designed for applications in digital automation and control systems, instrumentation, communication and electronic devices in manufacturing, transportation and utilities – in operating environments where the interruption of ac power may result in the loss of finished products and/or the cost of hundreds of person hours to reset production equipment.
- They are designed for 24/7 operation and personnel and operational safety.
- They incorporate the key attributes required for manufacturing plants and industrial control rooms: continuous operation, parallel redundant operation, galvanic isolation, system degree of protection, short-circuit and overload capability, safety, fire protection, integration into the electrical control system.
- They are engineered and configured to order, with customisations. □

For more information visit: www.abb.com

Measurement technology for sun-tracking systems

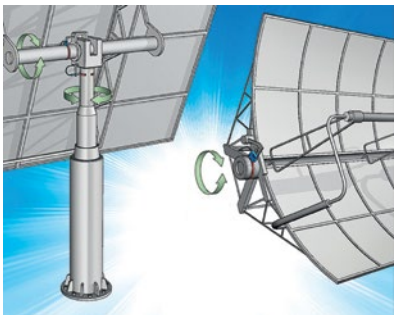
In solar-thermal power plants, sensors are used for precise measurement of the angle and position of the solar panels or mirrors to enable the system to capture the maximum amount of sunlight. The downstream control system receives the required feedback of position from the sensors and adjusts the actual value to the corresponding set point. The required angle (or set point) is stored in the controller depending on the time of day and the respective angle of solar altitude. The collectors can assume any position and consequently follow the movement of the sun ideally. Instrumentation and process control specialist, Instrotech, representing SIKO locally, offers SIKO sensors that excel in this industry due to their durable, long-lasting and climate-resistant technology.

Over many years of experience SIKO has developed reliable measurement technologies for position detection in photovoltaic modules, solar mirrors and parabolic modules. The sun-tracking measurement technology products provide the benefits of being wear-free and low-maintenance; with direct sensing, non-contact measurement they ensure no pitch errors; and provide reading distances of up to 2.0 mm. The sensors are insensitive to shock and vibration, have a high UV-resistance, and a protection rating of up to IP69K. Additional benefits include:

- Optimal efficiency due to high repeatability
- Climate resistance (resistance to UV radiation and temperatures between -40 and 125°C)
- Incremental or absolute
- Open or integrated
- Absolute accuracy up to 0.01°

SIKO's sun-tracking products include SIKO translation module ASA510H, SIKO inclinometer IK360, and SIKO Magnetic sensors MSA501 and MSK5000. They offer easy mounting with a configurable magnetic band or magnetic ring. Installation is made simple, allowing for sticking, clamping or screwing in the unit. A stainless steel cover strip provides mechanical protection to the magnetic band.

SIKO is a technology market leader with decades of experience in the fields of magnetic length, angle and rotary measurement technologies. It has been a supplier in position detection technology systems for industry applications since 1963. The company works with customers to provide customer-specific solutions, with a wide range of variants of magnetic sensors, bands and rings, and ensuring optimum efficiency at low process costs.



SIKO's reliable sun-tracking measurement technology products are designed to be wear-free and low-maintenance.

For more information contact Instrotech.
Tel: +27 (010) 595 1831
Email: sales@instrotech.co.za
Visit: www.instrotech.co.za

Harnessing the benefits of renewable energy

As a manufacturer and supplier of low-voltage electrical distribution, protection and control equipment, CBI-electric: low voltage knows about energy management. In its commitment to energy efficiency and the environment, the company recently installed a state of the art 1.1 MW solar PV (photovoltaic) system at its head office in Gauteng. It contracted Terra Firma Solutions to do the installation. Both companies are part of the JSE-listed Reunert Group which operates internationally across Africa, Asia, Australia, Europe and the USA.

CBI-electric: low voltage – previously known as Circuit Breaker Industries or CBI – specialises in the design, development and manufacturing of circuit breakers, residential current devices, surge protection, wiring accessories and metering products. It focuses on supporting its customers with electricity infrastructure and is committed to responsible energy use. The company wanted to demonstrate that it is 'walking the talk'.

Managing Director, Terry Lawrenson says, "We believe everyone needs to become more responsible about their energy choices. We should all work together and take action in order to ease the constraint on the national grid and ensure that electricity, as a scarce resource, can be shared by all. We're glad to be able to start our own renewable energy journey with Terra Firma."

Turnkey energy solutions provider Terra Firma takes an integrated, smart approach focused on holistic energy usage, management and self-generation, which made it the right partner to assist CBI-electric: low voltage in its decision to harness the power of the sun.

"Sunshine is an abundant resource in Africa, affording the opportunity for supplementary energy supply. A partnership between our companies meant solar technology was the most effective option in this step towards meeting our sustainability goals," says Lawrenson.

The installation was completed in December 2021 and is the first step in the company's drive for a more responsible energy mix and optimisation. "Going forward, using renewable energy and IoT-based dynamic load control, we will optimise our load profile, reducing costs and flattening our impact on the national grid," Lawrenson adds.

The array of solar PV panels covers 4 000 m^2 and offsets more than 2 200 tonnes of carbon dioxide.

Reducing energy consumption

Businesses interested in implementing energy-efficient solutions should take the following steps first, says Lawrenson.

- Know your numbers. Conduct an energy audit. Ascertaining how much energy a business uses is the first step in calculating potential savings and drawing up a green framework for the company. The audit can be done in house or by contracting a consultant for energy efficiency assessments, solutions and management.
- Change the lights. All fluorescent lamps can be replaced with LED lamps to improve on energy efficiency. LED lamps use around 75% less energy and can last longer, reducing power consumption. "At CBI-electric, we replaced fluorescent lamps with LED lamps a few years ago," says Lawrenson.
- Monitor, control and schedule with smart devices. Smart devices such as smart plugs, controllers and isolators allow users to schedule lights, air conditioners and items that are plugged in and not in use to be turned off. With regard to temperature management, air conditioners and heaters can be scheduled to turn on depending on the temperature. Lights can be scheduled to turn on and off at the start and end of every day.

With these measures in place, businesses can then assess whether they should invest in their own renewable energy generation or continue with energy efficiency measures.

"Efficiency and environmental responsibility are of the utmost importance to our company and are vital for the country as a whole," says Lawrenson. "Our investment in renewable energy is about more than saving money; it is about responsible use of energy, protecting the environment and lowering our carbon footprint. This is something that every individual and every business should consider implementing, and in South Africa we have many opportunities to do so," he says.

For more information contact CBI-electric: low voltage.
Tel: +27 (0)11 928 2000
Email: cbi@cbi-electric.com
Visit: www.cbi-lowvoltage.co.za

CBI-electric: low-voltage has installed a 1.1 MW solar PV plant at its head office in Gauteng.

Collaborative solutions for a carbon-neutral future

As South Africa faces a continuing shortfall in electricity generation capacity – Eskom has warned this is in the region of 4 000 MW – and the ongoing risk of load shedding, the need for solutions remains pressing. And these need to be considered in the context of transitioning to a carbon-neutral future – a goal the country shares with the world – which will see electricity becoming the backbone of the whole energy system.

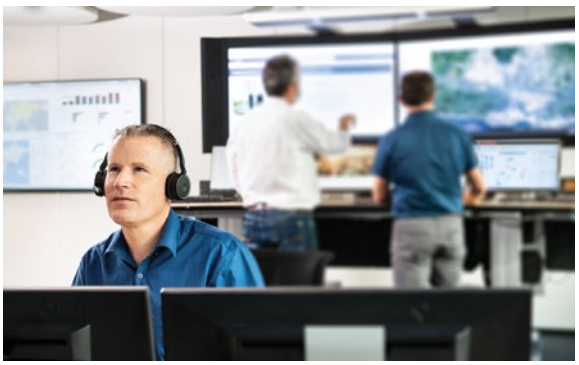
Meeting this challenge requires new technologies, business models, ways of thinking and ways of working. With its industry-leading experience, deep domain knowledge and pioneering technologies Hitachi Energy continues to support its stakeholders to accelerate the global energy transition.

Hitachi Energy has a reputation for innovation. In its Sustainability 2030 business strategy, based on the UN's Sustainable Development Goals, one of its key targets is to become carbon-neutral in its own operations by 2030. As a first step, the business has succeeded in reaching the target of 100% fossil-free electricity in its own operations. It has also announced a target to halve CO_2 emissions along the value chain by 2030 and is working closely with suppliers and multiple stakeholders to achieve this.

An example of one such partnership internationally is the work Hitachi Energy is carrying out for *Empresa de Electricidade da Madeira (EEM)*, a publicly owned utility responsible for the production, transportation, distribution and commercialisation of energy on the Madeira Islands of Madeira and Porto Santo. Hennie Nel, Industry Solution Executive at Hitachi Energy says the small island system is a testbed in learning, for example, how to integrate renewable resources with energy storage and electric vehicles. The addition of Hitachi Energy's PowerStore Battery Energy Storage (BESS) enables increased adoption of renewable energy and at the same time stabilises the system and reduces voltage fluctuation.

To manage the level of renewables required to make Porto Santo fossil fuel-free, *EEM* uses Network Manager, an integrated network operations platform that includes advanced distribution management system capabilities to extend grid control and optimisation. Network Manager provides the functionality for the safe and efficient operation of sub-transmission medium- and low-voltage distribution networks on the islands. This means *EEM* can manage its distribution assets efficiently, and prepare adequately for the changing world of distribution, improving reliability and reducing the impacts of outages.

Other practical examples of Hitachi Energy's solutions in action in South Africa include the micro-grids it commissioned at its premises in Longmeadow, Johannesburg in 2016 and on Robben Island in 2017, a UNESCO World Heritage Site. Systems that are grid-connected and need to meet grid code requirements or are over 1 MW in size can become quite complex. Randall September, Business Development Manager: Micro-grids, Grid Automation and Battery Energy Storage Systems says, "Hitachi Energy has a range of solutions to address these types of applications, from the distribution substation to the battery."



Power system control is critical to managing load shedding.

Asset Performance Management (APM) is key, especially as load shedding represents abnormal operation of a power grid. Load shedding introduces a higher potential risk of equipment failure because it is difficult to monitor the health of assets continuously to ensure potential failures can be predicted and maintenance prioritised accordingly. "APM is key to providing a more effective maintenance management environment and improving the productivity of the technical teams carrying out the work. Hitachi's Lumada APM enables this," says Francois Le Roux, Business Development Executive at Enterprise Software, Hitachi Energy.

Power system control is also critical to managing load shedding. "This is a major component because this layer of software provides for monitoring the reliability of power supply and making best use of available power sources," says Stuart Michie, Head of Sales and Marketing for Southern Africa. Hitachi Energy's BESS solutions are designed to manage the different elements of a distributed power generation system that may combine, for example, solar, wind, batteries, other generation sources and the grid. Micro-grid control and automation architecture are important to optimising such a system.

Additionally, Hitachi Energy's e-mesh™ digital ecosystem provides software management for distributed generation at local and fleet level, with built-in maintenance management for performance prediction. "If we consider solutions to load shedding, these are all elements that need to be incorporated in a wider power system to fine tune its optimal management," says Michie.

As the world of energy continues to evolve, Hitachi Energy aims to ensure the world's energy system is sustainable, flexible and secure. "We need to meet this global challenge with global solutions. That is where Hitachi Energy can play a key role," says Malvin Naicker, Managing Director, Hitachi Energy Sub-Saharan Africa.

For more information visit:
www.hitachienergy.com/africa/en

Building local manufacturing capacity in wind towers

According to the South African Renewable Energy Master Plan: Emerging Actions Discussion Document, "to implement IRP2019 would require over 14 million solar panels and 3 600 wind turbines alone. This represents a significant opportunity in employment and GDP contribution through annual production across the value chain – a potential of up to R182 billion annually and 39 000 people employed, to deliver 2 600 MW of new capacity online each year by 2030."

Stakeholders are aware that much of the anticipated investment expected to flow in from the wind power industry each year for the next 10 years, will stimulate the local value chain with associated economic benefits. Supporting this, the latest Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid window (BW5) introduced designated local content which, over and above the 40% threshold, requires bidders to procure specific components locally. The Department of Trade, Industry and Competition (DTIC) has reaffirmed this stance on local procurement and the protection of local industry, issuing a briefing note to the Department of Mineral Resources and Energy's Independent Power Producer Office (re-issued 28 January 2022).

The note addresses the DTIC's policy position with regard to designated items and the specific condition that only locally produced or manufactured goods meeting local content stipulations will be considered. The DTIC clarified that the exemption of steel and steel components for wind towers is not granted, in support of local production and content.

This represents a win-win for the country's economy as

Gouda wind farm in the Drakenstein municipality, Western Cape, has 46 wind turbines mounted on 100 m high concrete towers, locally manufactured.

wind turbine towers constitute 20% of the value of a complete wind turbine. Furthermore, as a positive multiplier of economic effects, this ruling helps to drive local investment, jobs and skills, which the country so needs.

Local OEMs (original equipment manufacturers) believe they have more than enough capacity to supply the demand for BW5 – and further procurement rounds which the industry expects to come on line during 2022. South Africa has a local steel tower manufacturing facility with significant capacity, and there are currently also two local precast concrete tower manufacturing facilities, one in the Western Cape and another in Prieska, Northern Cape, which recently produced concrete towers for the Copperton and Garob Wind Farms.

Another advantage for the local economy is that the concrete towers are 100% local, including raw materials such as cement and rebar steel, as well as aggregates and labour. Hence, this industrial strategy is aligned with the

The socio-economic gains of Africa's energy transition

Fundamental to providing reliable, affordable and sustainable electricity access to all, renewable investments at scale can contribute to supporting Africa's sustained economic growth, strengthening local value chains and promoting the creation of local jobs. In order to deepen awareness and discussion on this topic, Renewable Energy Solutions for Africa Foundation (RES4Africa Foundation), the International Renewable Energy Agency (IRENA) and the United Nations Economic Commission for Africa (UNECA) developed their first joint report: *Towards a prosperous and sustainable Africa: maximising the socio-economic gains of Africa's energy transition*, which was presented in February at the 7th European Union-Africa Business Forum (EABF22).

Renewable investments at scale can contribute to supporting Africa's sustained economic growth. [Source: IRENA]

Building on the knowledge and experience of the three organisations, the study is a comprehensive analysis of the job and socioeconomic impact of clean energy investments on the African continent. It combines the views and experiences of leading international institutions active in supporting development, sustainable economic transition and renewable energy development in emerging economies. The report opens with a review of the socio-economic gains of sustainable energy access in Africa, followed by an assessment and quantification of the socio-economic potential of Africa's energy transition in line with maintaining the global temperature increase under 1.5°C. The third chapter explores the role of private sector actors in supporting the sustainable transformation of Africa's energy systems and its socio-economic progress. The report closes with a series of recommendations at the institutional, policy, financial, and business levels to accelerate investments in clean energy technologies and maximise local value creation.

"Representing only 2% of global renewable energy capacity added in the past decade, Africa is missing the opportunity to ensure access to affordable, reliable, and clean energy for all, and the benefits from the wider positive socio-economic impact of renewable energy development," said Roberto Vigotti, RES4Africa's Secretary General. "With this joint effort, RES4Africa, IRENA and UNECA provide an

Just Energy Transition policy and is one of many significant benefits of the REIPPPP.

Compton Saunders, Managing Director of Nordex Energy South Africa says, "We are certain that South Africa has more than enough capacity to supply the demand for wind towers and meet the DTIC's requirements. This is based on the assumption that, on average, the wind turbines indicated for installation in the latest bid window have an unitary power of 5 MW, and that the local industry can manufacture more than 2 GW of towers annually, which is 30 to 40% more than the 1.6 GW of capacity set out in BW5."

As reported by GreenCape, a non-profit organisation that drives the adoption of economically viable green economy solutions, as the industry gears up to deliver the 24 GW of new renewable energy build by 2030, the need for local value creation will increase exponentially, to ensure the sector contributes to meeting the country's infrastructural needs, Just Transition objectives, job creation in transitioning sectors, and establishing a local manufacturing base.

OEMs, such as Nordex Energy South Africa, play a key role in stimulating growth in local jobs and skills. The company sees the latest BW5 as an important link in driving the local value chain, which will directly stimulate the domestic job market.

"Job creation and skills development will be a direct result of the consecutive bidding rounds, which will enable local manufacturing to be re-established," said Saunders.

For more information contact Nordex Energy South Africa.
Visit: www.nordex-online.com/en/south-africa/

overview of the future of Africa's socio-economic prosperity, identifying the opportunities that Europe and Africa have to ensure a sustainable future, leaving no one behind."

"Africa has a lot to offer to and benefit from the global energy transition as laid out by IRENA's 1.5°C Scenario. With tremendous potential of renewables and human resources, Africa's shift to clean, modern energy is set to achieve substantial gains in GDP, employment, and human welfare. IRENA is ready to stand with Africa to put actions in motion by facilitating stronger international cooperation to mobilise political and financial support," added Francesco La Camera, IRENA Director-General.

United Nations Under-Secretary-General and Executive Secretary of the ECA, Vera Songwe, said: "Our energy transition goals in Africa must be aligned with the development aspirations of member states. We must ensure investment in infrastructure that allows for manufacturing and value creation in green energy technologies, while availing de-risking instruments to member states to mitigate the cost of investment in energy projects."

For more information visit: www.irena.org or www.res4africa.org or www.uneca.org

NCPC-SA's Industrial Efficiency Conference

Pre-registration is now open for the 5th Industrial Efficiency Conference scheduled for 25 and 26 May 2022.

The Industrial Efficiency Conference, hosted every two years by the National Cleaner Production Centre South Africa (NCPC-SA), has come to be recognised as a benchmark in platforms that equip and showcase best practice in South Africa's green economy.

This year's hybrid event will take place live online and 'in the room' at the CSIR International Convention Centre in Pretoria.

It promises a programme of two days of educating and equipping businesses and policy makers to adopt and support a cleaner, more efficient model of doing business.

The event will be helpful to industrial company representatives; senior representatives of government agencies and departments; energy, water and environmental consultants; academia and post-graduate students (engineering and natural sciences); and green economy partners.

Sessions will combine technical presentations and panel discussions. Industry and policy specialists will address current issues and interactive questions will be encouraged. Topics will include:

Day 1
- Industrial energy efficiency (including the close-out of the IEE Project)
- Eco-industrial parks
- Efficiency in the metal castings sector

Day 2
- Industrial water efficiency
- Industrial symbiosis
- Circular economy in industry
- Skills development.

For more information contact NCPC-SA at the CSIR.
Visit: www.industrialefficiency.co.za

The conference will address resource efficiency in industry, eco-industrial parks, the circular economy and other issues.

R600 million investment in SA renewables firm

Norfund, the Norwegian investment fund for developing countries, and CDC Group, the UK's development finance institution, recently announced a commitment to invest ZAR 600 million in H1 Capital (Norfund R360 million and CDC R240 million) – a South African black-owned and managed renewables investment and development company.

The transaction represents a joint vision by the development finance institutions (DFIs) to mobilise climate finance to Africa and back clean infrastructure projects across the continent. The investment from Norfund and CDC, which is soon to be renamed British International Investment (BII), will help to improve access to clean and affordable energy in South Africa and increase productivity and encourage economic growth.

South Africa has tremendous economic potential. The government has set an ambitious target to increase generation capacity in renewable energy by 20 GW over the next decade to address power shortages and decarbonise the power generation fleet, where some 86% of the country's energy mix is fossil-fuel based.

This investment will support the country's clean energy goals, as it will enable H1 Capital to fund a pipeline of over 2.4 GW of new wind and solar projects, generating about 6 400 GWh per year. This will contribute to avoiding annual emissions of 6.2 million tonnes of CO_2 and help to advance South Africa's transition to clean energy.

H1 Capital was chosen as the development partner based on the expertise the company holds in several renewable power projects already completed and its deep commitment to energy sustainability. As a Broad-based Black Economic Empowerment (BBBEE) company, H1 Capital's inclusive approach provides clean energy solutions that enhance the participation of the wider communities in the economy, helping to transform the lives and livelihoods of marginalised groups in South Africa.

The investment in H1 Capital demonstrates the commitment of the UK and Norway to act on pledges made at COP26 – scaling up climate finance to Africa and deepening collaboration on solutions that will meet the continent's needs and address the climate emergency. At the summit, Norway announced the creation of a new climate investment fund to be managed by Norfund, and this capital committed to H1 Capital will be the first investment under the new fund.

The investment from the DFIs further supports the achievement of the UN's Sustainable Development Goals to deliver affordable and clean energy (SDG 7), decent jobs and economic growth (SDG 8), and climate action (SDG 13). The transaction also qualifies for the 2X challenge, which seeks to support businesses that provide women in emerging economies with access to leadership opportunities, quality employment, and products and services that enhance their economic participation and inclusion. Moreover, the investment aligns with South Africa's ambitions and steps towards securing a just transition to a low-carbon economy.

Representatives of respective countries and partners at the signing of the landmark investment for renewable energy in SA.

Tellef Thorleifsson, CEO of Norfund, commented: "At Norfund we are honoured that the Norwegian government has entrusted us with the responsibility of managing the new climate investment fund. We are delighted to be able to put the money to work quickly and effectively through what will be the first investment under the new mandate, with our existing partners in H1 and CDC, in projects in line with the energy plans of the South African government."

Anne Beathe Tvinnereim, Norwegian Minister of International Development said "I believe the new Norwegian climate investment fund managed by Norfund will be our most efficient tool to help accelerate the global clean energy transition, making it possible to base necessary development on renewable energy and limit the devastating impacts of the climate crisis on the world's poor. I am confident that this first investment under the new climate mandate will be the first of many mutually beneficial partnerships contributing to a just transition in South Africa and in the other markets Norfund aims to prioritise."

Chief Executive of CDC Group, Nick O'Donohoe said: "We are delighted to partner once again with Norfund on this investment in H1 Capital, which will help increase clean energy access for people, communities and businesses across South Africa. It marks another key step towards fulfilling our pledge to devote greater capital to fund clean infrastructure and to support markets like South Africa on their path towards a just transition."

UK Minister for Africa, Vicky Ford said: "South Africa's target to generate 20 GW of new renewable capacity over the next ten years is indicative of the country's bold steps towards securing a net-zero future. $16 million of UK investment in H1 Capital demonstrates our continued commitment to remaining a strong partner for Africa, to help address the urgent climate challenge, and promote clean and equitable growth."

For more information visit: www.cdcgroup.com or www.norfund.no

Wireless monitoring of remote reservoirs

If you were responsible for overseeing a group of water reservoirs dispersed over a large area — how would you monitor water levels at each reservoir and control the water pumps accordingly? Using a wireless telemetry system may seem like the obvious answer and, although this sounds like a simple plan, in recent years asset managers have struggled with mounting costs associated with licensed band radio frequencies. Ian Loudon, International Sales and Marketing Manager at wireless pump monitoring and control specialist Omniflex, explores what is needed to overcome these challenges.

Water reservoirs are often situated in geographically dispersed areas and can be difficult to access. This means asset managers must rely on remote monitoring and control systems to monitor water levels and turn pumps on and off at each reservoir from a centralised control station. Because installing control cables is extremely expensive, more costly than any of the equipment itself, the utilities industry relies on wireless monitoring and control systems to keep costs down.

Wireless monitoring of all reservoirs from a centralised control system allows asset managers to know what the water levels are at each site, at a glance. If combined with a pump control system, this allows them to control water levels to suit demand without the need for costly, disruptive site visits.

Wireless technology also increases operational flexibility, as it is much simpler to move a wireless device than to move a cable unit. This is because, when moving wired units, engineers have to dig up all the cables and reroute them to the new location, compared to wireless units where all they need to do is unplug them at the old location and plug them in at the new one.

Traditionally, asset managers have used radio telemetry systems, operating in licensed band frequencies, to operate all wireless equipment. However, administration costs to own and maintain licensed band radio frequencies often outweigh the cost of the equipment itself, making the networks more expensive to operate.

New globally defined licence-free ISM band radio telemetry equipment, using industrial, scientific and medical band radio frequency spectrum (***ISM***), has proven to be a game changer, helping equipment owners avoid unnecessary licensing and administration costs. Combined with plug-and-play technology, as in the telemetry devices from Omniflex, it provides a system that can be easily installed and up and running in minutes.

The wireless units can be interfaced directly to an existing supervisory control and data acquisition (SCADA) system using the on-board Ethernet ports, or function as a standalone programmable controller, independent of SCADA, using wireless networking to monitor remote I/O for control implementation. This makes installation quick and simple and enables asset managers to save on additional hardware or engineering requirements.

Monitoring remote reservoirs and controlling water pump stations can become costly using wireless telemetry relying on licensed band radio frequencies.

Using Omniflex Telemetry devices, most applications require little or no programming due to the devices' rich functionality. For example, level set points on a remote tank or reservoir can be mapped via the telemetry system to the pump controller triggering pump on and off control.

Furthermore, Omniflex's cloud-based Data2Desktop platform enables asset managers to monitor systems 24/7 using a tablet or phone, rather than having to use a fixed desktop in the plant's control room. This is especially helpful for a mobile workforce and particularly in the current circumstances, where many people are forced to work remotely because of the pandemic.

This new generation of plug-and-play wireless telemetry equipment is benefitting not only water reservoir managers. The technology also offers benefits in other industries, such as mining where mines rely on surface-level control of sub-surface water pumps to remove water from the mines. In any industry where cabling is either too expensive, or too disruptive to install, plug-and-play wireless telemetry systems offer advantageous solutions. □

For more information visit: www.omniflex.com

Next generation elemental analysis

SPECTRO Analytical Instruments has introduced its next generation, top-of-the-line SPECTRO ARCOS inductively coupled plasma optical emission spectrometer – representing industry-leading ICP-OES technology. The new SPECTRO ARCOS provides precise analysis of the elemental composition of metals, chemicals, petrochemicals, and more to deliver critically accurate measurements on which industry and academia can depend.

The next-generation enhancements in the new SPECTRO ARCOS are rooted in extensive customer input, coupled with advances in proven technologies. SPECTRO ARCOS is known for exceptional optical performance, wavelength coverage, sensitivity, and resolution, enabling users to achieve the right analytical results, performance, and productivity. The new versions are enhanced with refinements that offer greater flexibility and usability as well as addressing long-term savings and a lower cost of ownership.

- *New DSOI plasma viewing option*

The new dual side-on interface (DSOI) version featuring two optical interfaces adds sensitivity and eliminates contamination/matrix compatibility issues which can plague vertical-torch dual-view models. If the DSOI is not needed, a standard side-on plasma (SOP) version features a dedicated radial, single side-on interface for stability and precise performance.

- *MultiView plasma viewing option*

Users can select either high-sensitivity axial plasma observation to excel at trace analysis or high-precision radial plasma observation for high matrix loads and organic solutions. The latter option includes a periscope-free MultiView version that enables operators to 'turn' SPECTRO ARCOS from true radial view into true axial view, or vice-versa, in 90 seconds. With the DSOI option, MultiView becomes more versatile, offering added sensitivity for the radial mode.

- *Advanced CMOS detectors*

Line-array detectors, based on complementary metal-oxide-semiconductor (CMOS) technology, are equal to or surpass the performance of legacy CCD detectors. The technology eliminates blooming and can read low signals from trace elements even in the vicinity of intense matrix lines. Additionally, it offers a high dynamic range and eliminates on-chip cooling. Plus, single-unit costs for CMOS detectors are markedly lower than 2-D models.

- *Exceptional ORCA*

SPECTRO's innovative Optimised Rowland Circle Alignment (ORCA) polychromator optical technology escapes the shortcomings of echelle-based optical systems. SPECTRO ARCOS delivers a high resolution over a wide spectral range – 130 to 770 nm – with industry-best transparency below 180 nm. This enables simpler method development, even in line-rich metal matrices, with greater accuracy.

- *Ultra-high-speed readout*

SPECTRO ARCOS can analyse simpler matrices in as little as 30 s with its simultaneous performance and powerful generator/readout capabilities. Whatever the matrix, users can analyse more samples in less time with the assurance of solid security and full traceability.

An exclusive solid-state 2 000 W, laterally-diffused metal oxide semiconductor (LDMOS) generator provides high power. The no-purge UV-PLUS sealed gas purification technology enables fast start-up, without risk of contamination, and annual gas consumables savings up to about US$3 500. As the only totally air-cooled ICP-OES analyser, the SPECTRO ARCOS eliminates the costs and hassles of an external water-based cooling system. New intuitive software ensures unequalled ease of use, speed and traceability. In terms of usability it allows for easy operation, simplified sample introduction, and direct maintenance accessibility.

The new SPECTRO ARCOS is available in six versions, depending on choices of plasma viewing technology and elemental wavelength range. For example, the new DSOI plasma observation affords twice the sensitivity of conventional radial views – without the complexities and costs of vertical dual-view models. A MultiView option lets users switch easily between true axial or true radial observation. All versions have a sleek, ergonomic chassis that fits any standard lab bench and can accommodate a range of autosamplers/sample introduction systems. Available options include a SPECTRO Intelligent Valve System upgrade kit and a portable video camera for remote monitoring.

All SPECTRO spectrometers are supported through AMECARE services to help ensure uninterrupted performance and a maximum ROI life. AMECARE services include secure, unidirectional SPECTRO PROTEKT global remote monitoring that offers ongoing diagnostics and alerts.

The newest SPECTRO ARCOS ICP-OES delivers reliably accurate measurements to support critical elemental analysis in industry and research laboratories.

For more information contact SPECTRO.
Email: spectro.info@ametek.com
Visit: www.spectro.com

Pure products with ultrapure water

Total organic carbon (TOC) is an important quality parameter in the manufacture and use of ultrapure water. If the TOC content is too high, it can affect the performance of a water treatment system or contaminate batches of pharmaceuticals, for example. The online TOC analyser CA79 from Endress+Hauser offers continuous, precise monitoring of the TOC content in ultrapure water, providing life sciences companies with an assurance that their water for injection (WFI) is not contaminated and that product batches are safe and conform to regulations.

Real-time overview of water quality

The TOC analyser CA79 operates with the proven UV-oxidation process and differential conductivity measurements. With a response time of 50 seconds, it consistently delivers reliable, precise measurement values so users can immediately recognise if the quality of the ultrapure water has deteriorated. They can then react immediately to prevent contamination of the end product, thus reducing product loss and costs.

Pharma-compliant

The CA79 fulfils the requirements of the European and US Pharmacopoeia, enabling manufacturing activities in accordance with FDA 21 CFR Part 11. Depending on the configuration, calibration and system suitability tests (SSTs) can be initiated at the push of a button and run automatically, including data analysis. Regular SSTs ensure verification of the TOC values in line with the requirements of the Pharmacopoeia. With its compact stainless steel housing, the CA79 integrates seamlessly into ultrapure water installations, and ensures the analyser is suitable for use in applications subject to the stringent hygiene requirements of the pharmaceutical industry.

Complete measuring point management

The analyser's modular design and good accessibility to all components ensure easy maintenance and low operating costs. And the Endress+Hauser worldwide service network offers complete measuring point management, including installation qualification (IQ) and operational qualification (OQ).

TOC analyser CA79 for low measuring ranges in pure or ultrapure water.

With the introduction of the TOC analyser CA79 for low measuring ranges, Endress+Hauser extends its portfolio for liquid analysis in the life sciences sector. With the Memosens CPS61E pH sensor, the Memosens COS81E oxygen sensor and the Memosens CLS82E conductivity sensor, the company launched sensors in the past year for the most critical measurement parameters. The latest generation of the Memosens sensor – Memosens 2.0 – is characterised by especially precise and stable measurement values and adheres to the highest hygiene and regulatory requirements. The sensors enable expanded storage of the process, calibration and sensor data and offer more precise process control and documentation, especially for regulated industries. That means customers have a complete portfolio of sensors, photometers and TOC analysers available to them to equip all required measuring points from a single source.

For more information contact Endress+Hauser.
Visit: www.endress.com

Safe motion monitoring in automation systems

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Carsten Gregorius, Phoenix Contact Electronics, Germany.

Udo Tappe, Phoenix Contact Electronics, Germany.

Safe motion monitoring (Safe Motion) is becoming an integral part of safety and automation technology. Various systems are used for this, depending on the degree of automation. From simple switching devices for zero-speed and speed monitoring to configurable safety systems, safety controllers, and safe drives, these solutions have many things in common.

With Safe Motion functionality, the availability and efficiency of machines and systems can be increased. It often makes more sense to move the drive with the safety door open so that setup and maintenance work can be performed. To protect the user, the safety technology monitors the hazardous movement. Productivity can potentially be increased if the 'enable' signal is output to an electromechanical guard-locking device when actual zero-speed is detected. Compared to a time-controlled enable signal, this allows the operator to access the machine more quickly and more safely. Systems for safe movement monitoring are also used in situations where large systems need to be secured against mechanical damage due to increased speed. The use of Safe Motion functions allows the rotor speed in wind turbine generators to be monitored, for example, or the movement of supporting structures in the case of movable bridges.

Safety functions in accordance with EN 61800-5-2

The EN 61800-5-2 standard describes the demands on functional safety for power drives with adjustable speed, also known as Power Drive Systems Safety Related PDS(SR). For this purpose, standardised partial safety functions have been defined as a basis for further validation. The most important functions are listed below.

- Safe Torque Off (STO), that is, shutting down the drive by means of immediate energy disconnection (stop category 0), which prevents unexpected startup
- Safe Operating Stop (SOS) to prevent a drive from deviating from a defined position while supplying energy; SOS is used to safeguard vertical axes
- Safely Limited Speed (SLS) to stop the drive when a maximum permissible speed is exceeded; used in setup mode on machine tools in conjunction with inching mode
- Safe Speed Range (SSR) as a function that stops the drive when a permissible speed range is exceeded or not reached; SSR is used in fans and ventilators to safeguard exhaust processes in potentially explosive areas
- Safe Speed Monitor (SSM) for generating a safe signal that can be further processed if a maximum permissible speed is exceeded; one area of application is enabling a guard-locking device on a safety door until the speed is below the permissible range
- Safe Direction (SDI) to prevent the drive shaft from moving in the unintended direction; used to prevent direction reversal on power-driven rollers.

Safe motion monitoring is becoming an integral part of safety and automation technology.

Improved encoder signal diagnostics

Often, proximity switches or rotary transducers (encoders) are used to record the movement. If proximity switches are used, two sensors are to be attached to a gear wheel or a perforated disk to implement a redundant architecture. The frequency generated by the motion pulses depending on time is evaluated in the logic system in the Safe Motion module. The measured frequency can be used as a comparison value against the configured switching thresholds for overspeed or underspeed monitoring.

Movement monitoring by an encoder installed on the drive train works similarly. Although rotary

A selection of available sensor systems for zero-speed and speed monitoring.

At a glance

- Safe Motion functionality can increase the availability and efficiency of machines and systems.
- Different sensor technologies deliver different safety levels based on the structural properties.
- Standalone safety modules can be used anywhere, operate independently of the drives, and are easy to configure and operate.

transducers are offered with a variety of characteristics, single-turn encoders with HTL, TTL, or sine/cosine interfaces are often used. By analysing the signal periods, the Safe Motion module can also reliably evaluate the direction of movement in addition to the safety functions for speed monitoring. Compared to proximity switches, however, encoder signals can be diagnosed more accurately. Apart from a cross-comparison, the 2.5 V offset voltage, the 1 Vpp difference signal, or the resulting unit circle is also analysed for sine/cosine signals. These diagnostics are necessary to evaluate what are referred to as safety encoders, which can be equated with standard encoders on the signal side.

Safety levels in sensor technology

The typical structure of an encoder shows that some function parts can be designed with a single channel and other parts with two channels. Mechanical faults on the shaft, bearing, and code disk can simultaneously affect two-channel structures within the encoder. If, for example, the encoder shaft becomes detached from the motor pulley, this fault will not be detected without additional measures, since the encoder output signals are still within the permissible range. Component faults in the internal electronics also need to be controllable, because they lead to a distortion of output signals (see EN 61800-5-2).

Depending on the type of sensor technology used, different safety levels can be achieved based on the structural properties. An appropriate evaluation unit that performs the necessary plausibility checks is required. The following overview provides an outline of typical architectures with the maximum achievable SIL and PL under consideration of the following category requirements:

- 1 standard encoder: PL b (Cat. B) / SIL 1
- 2 standard encoders: PL e (Cat. 3) / SIL 3
- 1 standard encoder plus 1 proximity switch: PL e (Cat. 3) / SIL 3
- 2 proximity switches: PL e (Cat. 3) / SIL 3
- 1 proximity switch: PL b (Cat. B) / SIL 1
- 1 safety encoder: PL e / SIL 3.

Zero-speed monitoring without additional sensors

Standalone safety modules can be used anywhere, operate independently of the drives, and are easy to configure and operate. The compact standalone modules of the PSRmotion series from Phoenix Contact stand out due to a low overall width starting at 12.5 mm. This means more retrofit measures can also be implemented without problems. With the two-channel PSR-MM30 over-speed and zero-speed safety relay from the PSRmotion family, the user can monitor up to three different operating modes in addition to zero-speed mode in one machine. The PSRmotion software supports the user in configuring, programming, startup, and diagnostics of the safety module. The compact PSR-MM25 safety relay module monitors the zero speed of single- and three-phase ac and dc motors – without additional sensor technology. The residual voltage induced by the motor windings is analysed in order to detect zero speed.

Adapting the safety system to requirements

The modular safety system of the PSRmodular product family from Phoenix Contact allows applications up to PL e (EN ISO 13849) and SIL 3 (IEC 61508 and EN 62061) to be implemented. The system uses TBUS DIN rail connectors, which means users can adapt and extend it flexibly, based on requirements. Thus the solution can be used for small applications with three safety functions up to applications with 160 safe I/Os in one station. Apart from the monitoring of classical digital signals, modules for reliable motion detection that can analyse different encoder signals such as proximity switches, TTL, HTL, or SIN/COS are available. The function block library encompasses safety functions in accordance with IEC 61800-5-2, such as safe operation stop (SOS), safe limited speed (SLS), safe speed range (SSR), and safe direction (SDI).

Summary

For standalone or integrated safety concepts, with the PSR family, Phoenix Contact offers a range of solutions for a variety of uses in machine building and systems manufacturing. Combined with other safety components from the extensive product portfolio, this provides the user with added value. □

The comprehensive safety portfolio from Phoenix Contact offers the user added value.

For more information visit: www.phoenixcontact.com/safety

Installation testing that protects appliances

Concern for public safety and the increasing complexity of fixed electrical installations in industrial, commercial and domestic premises places extra responsibility on electrical test engineers who are charged with verifying conformity to South Africa's Certificate of Compliance (COC) safety standards.

Most electrical contractors in South Africa are well versed in the verification requirements of the COC and know the audit should be carried out in a clear sequence.

- Visual inspection
- Testing of the following:
  - Continuity of protective conductors
  - Insulation resistance
  - Protection by separation of circuits
  - Floor and wall resistance
  - Automatic disconnection of supply
  - Polarity
  - Functional performance.

In addition, the following tests are under consideration:

- Electric strength test
- Voltage drop.

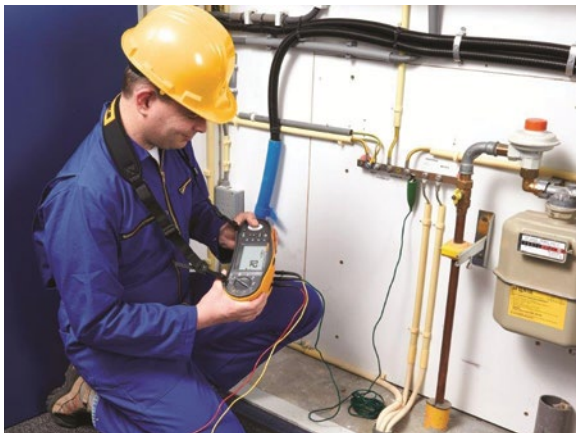
The basic requirements for test equipment used in installation testing include general requirements for test equipment, specific requirements for combined measuring equipment and the specific requirements for measuring/testing the following:

- Insulation resistance
- Loop impedance
- Resistance of the earth connection
- Resistance to earth
- RCD performance in TT and TN systems
- Phase sequence
- Insulation monitoring devices for IT systems.

The Fluke 1660 Series Multifunction Installation Testers serve all these test requirements, and the three different models in the series comply with specific aspects for the required measurements. They are specifically designed to carry out the tests required and meet all local standards and regulations in the safest and most efficient way.

It also allows the user to share test results wirelessly via smartphone directly from the field.

Comtest offers the Fluke 1660 Series Installation tester with Fluke Connect®, which includes the 1664 FC Installation Tester – the only installation tester that helps prevent damage to connected appliances during insulation tests, and allows users to send test results wirelessly via smartphone directly from the field. The testers are lightweight and are ergonomically designed with a 'curved' form that, when carried by the neck strap, makes operation in the field more comfortable.



The Fluke 1664 FC Installation Tester protects connected appliances from damage during insulation tests.

Key benefits

- Work safer, protect the installation under test, share results. The Fluke 1664 FC is the only installation tester that protects connected appliances from damage during insulation tests, and allows users to share test results wirelessly by smartphone with co-workers or customers.
- Insulation PreTest. The Fluke 1664 FC Installation Tester is also the only tester with patent pending 'Insulation PreTest'. If it detects that appliances are connected to the system during test, it will provide a visual and audible warning and stop the insulation test, avoiding potentially serious and costly mistakes and eliminating the risk of accidental appliance damage.
- Fluke Connect® ShareLive™ calling and Fluke Cloud™ storage ShareLive™ video calls. Users save time, eliminating data entry by wirelessly syncing measurements directly from the 1664 FC and sharing these with a remote team using Fluke Connect®. Having access to measurements at the inspection site and the office simultaneously, enables faster decision making and real-time collaboration among team members. Cloud storage allows users to retrieve stored results in the office or out in the field, to make urgent decisions in real time. Data can also be imported into Fluke DMS to process and generate certificates.

The Fluke 1664 FC forms part of the growing system of connected test tools and equipment maintenance software.

For more information contact Comtest.
Tel: +27 (0)10 595 1821
Email: sales@comtest.co.za
Visit: www.comtest.co.za

Virtual reality in safety training

KBC Health & Safety is introducing virtual reality technologies in its safety training programmes in 2022. This will allow learners to experience a simulated version of real-life dangerous scenarios where they can learn to mitigate the associated risks, with the benefit of being in a safe place themselves, says Innovation Manager Natalie Pitout.

KBC is a holistic provider of on-boarding solutions in Southern Africa, as well as induction and other training solutions in the mining industry.

"The benefit of simulation is that it is not a real-life situation where a possible fatality could result. Instead, any unsafe actions can be addressed safely and proactively," says Pitout.

Virtual reality is not a standalone competency module, but is being introduced by KBC as part of a blended learning approach. It has been under development for about six months and will be rolled out during this year. Blended learning entails a theoretical component designed to impart the necessary knowledge, which learners are then assessed on, followed by a virtual reality experiential component using headset goggles.

Pitout highlights that this is completely different to virtual training, which is essentially instructor-led training in a virtual environment. Here learners simply login to a virtual platform such as Micrsosoft Teams and receive training as if they were in a real-world classroom environment.

"A major benefit of virtual reality is that we can put people from different industries together in one room with the same virtual setting," says KBC Regional General Manager Coastal, Ruan Janse Van Rensburg. For example, coal and platinum miners can be engaged together to identify common hazards in their respective segments. "It means we can see how different workers react in different situations."

This is made possible by introducing analytics on the back end, an enhancement that KBC is currently refining. "We want to be able to define the risk rating that a particular employee or contractor poses to a company when on site," says Janse Van Rensburg. "That level of detail is a long-term goal, as we are still in the process of defining the measurement parameters."

Pitout adds that analytics will clearly indicate if people are making the same mistakes or whether they are identifying similar risks. It could point to another training need. For example, if a working-at-height environment is simulated and people are seen to be making the same mistakes, the hazards or risks can be identified for clients and an appropriate virtual reality simulation suggested to remedy that problem. "It may be that only a refresher course is needed rather than more intensive retraining."

Blended learning includes theoretical learning and a VR component using headset goggles.

The Covid-19 pandemic has raised an increased interest in technologies like virtual reality, says Janse Van Rensburg. "It has pushed clients to learn how to use the technology and to incorporate it into their own training programmes. This will prove to be a significant value-add for our clients."

KBC is collaborating with various business partners responsible for the technology itself, while it focuses on the training interventions. "We work hand-in-hand producing the modules, providing the guidance in what we require and how to build the simulation," he adds.

A key focus for the rollout is expected to be the Centralised Induction Training Committee (CITC) in Richards Bay, which has expressed a keen interest in the offering. "The CITC is very open to new thinking and technology. It is invaluable for us to have such a partner and it is beneficial to the mining industry as a whole," says Janse Van Rensburg.

For more information contact KBC Health & Safety.
Tel: +27 (0)11 080 0900
Email: lara@kbpassport.co.za
Visit: www.kbcsa.co.za

Inductive sensors for harsh welding applications

The inductive Kplus position sensors from ifm withstand the harsh operating conditions found in welding processes. The sensor housing and the fixing nuts have a non-stick coating to prevent sticking of weld slag. In addition, the new sensor technology is robust and immune to the strong magnetic fields that occur during welding, hence it reliably prevents incorrect switching. The quick connection with the standard M12 connector and matching cable from the ecolink range is ideal for permanent use.

The Kplus sensor offers a uniform sensing range for reliable detection of all metals. It can be used across a wide temperature range and is available with IP65 to IP69 protection ratings for greater reliability.

For more information contact ifm South Africa.
Tel: +27 012 450 0400
E-mail: info.za@ifm.com
Visit: http://www.ifm.com

ifm's robust Kplus sensors are immune to electromagnetic fields.

Certification entails more than a test report

The South African Bureau of Standards (SABS) conducts a range of tests against South African National Standards (SANS), as well as against customer-specific requirements and/or against compulsory specifications that may be issued for certain product categories.

The SABS also offers certification schemes for products and/or systems that comply with the SANS or a relevant mark scheme/systems scheme, such as the Scheme for Food Safety Management Systems (FSSC). Additionally, many products undergo more frequent testing and conformity assessments to earn their status, which allows them to use the *'SABS Approved'* mark, respectively.

The SABS' testing and certification services are offered independently. This means the SABS attains and maintains an accreditation status in order to offer its testing and certification services. In some cases, where the SABS uses third-party laboratories, the laboratories need to meet stringent requirements and are subject to assessments and inspection by the SABS.

Jodi Scholtz, Lead Administrator of the bureau says, "The SABS is aware that there are numerous manufacturers in possession of SABS test reports which they use as evidence that their products are *SABS Approved*. It is important for consumers to understand that *SABS Approved* can only be claimed by a manufacturer if the product is actually certified by the SABS. The SABS laboratory test report is a report of the performance of that product against requirements of a standard or other client-specific requirements, and this does not indicate that the product is *'SABS Approved'* in any way." Scholtz clarifies further: "A SABS permit to apply the Certification Mark is a more comprehensive statement of quality assurance of the product or system." Testing is just one of the requirements in the complete SABS certification process.

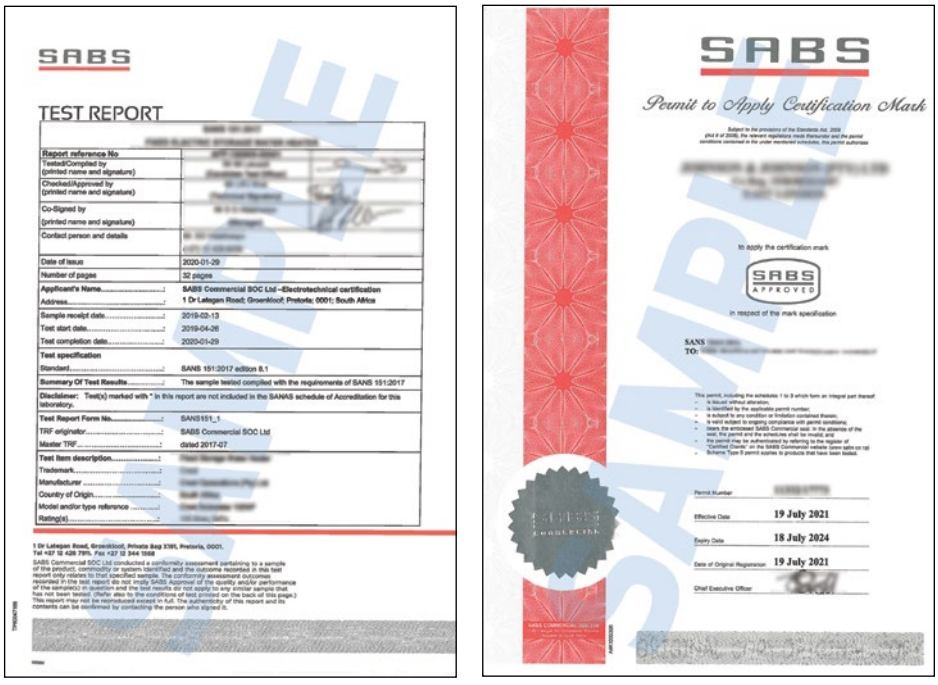
Beyond testing

The testing of products and systems is essential to determine whether performance meets specified requirements of the standard, and this is done in controlled and simulated environments. Test reports provide information about a product at the time of testing and are limited to the sample tested. Test reports do not imply that all the same or similar products also comply or would pass the testing requirements.

Conformity assessment testing assists manufacturers during the product development phases to ensure that relevant modifications or enhancements can be made to boost the quality of the product where necessary and to meet specified criteria.

Goods and services that have been tested and have successfully passed testing to SANS or specific requirements gain a level of confidence among consumers, but there are a number of reasons why testing does not provide the same assurance as certification.

- A golden sample scenario – in such cases a manufacturer produces a high-quality product with the intent of passing required testing and, once a test report is obtained, then produces inferior products or changes the ingredients of the product to make the products cheaper to manufacture.
- Poor manufacturing conditions – while a product may be tested successfully for performance, it can be produced in unhygienic conditions which could result in contamination of products or the ingredients used. There is also no assurance that the quality of future products will be the same as that of the sample submitted for testing.
- Partial testing – especially with large products or equipment, it is not feasible to subject large products, or customised products, to full performance testing. For example, with mining equipment, cars or transformers, or in instances where the manufacturer is developing a product and is interested in a specific parameter, the manufacturer would normally approach the SABS laboratories for testing of only the parameters of interest.
- Insufficient testing – with fast-moving consumer goods, for instance, given the nature of the industry, products are manufactured in batches and once-off testing is insufficient to provide the relevant assurance that all the products in a batch or subsequent batches are made to the same quality as the samples that successfully passed a test.


SABS

TEST REPORT

Report reference No	
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Address	1 Dr Lategan Road; Groenkloof; Pretoria; 0001; South Africa
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Standard	SANS 151:2017 edition 8.1
Summary Of Test Results	The sample tested complied with the requirements of SANS 151:2017
Disclaimer: Test(s) marked with * in this report are not included in the SANAS schedule of Accreditation for this laboratory.	
Test Report Form No	SANS151_1
TRF originator	SABS Commercial SOC Ltd
Master TRF	dated 2017-07
Test item description	
Trademark	
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SABS

Permit to Apply Certification Mark

SABS APPROVED

Effective Date	19 July 2021
Expiry Date	18 July 2024
Date of Original Registration	19 July 2021
Chief Executive Officer	

Consumers and end users should be aware of the distinction between SABS test reports (left) and the permit to use the certification mark (right).

"A SABS test report reflects the results of specific conditions for a particular sample only and it is irresponsible for a manufacturer to claim that a SABS test report is an endorsement of the quality of the product. In cases where retailers only require test reports in order to sell products, this is usually accompanied by frequent testing and surveillance requests. Testing is required, but certification of products and management systems is a more reliable and comprehensive measure of quality," Scholtz explains.

"The SABS Mark Scheme, commonly referred to as *SABS Approved*, is a certification scheme that provides confidence in the quality of the products and the production processes to manufacture the product. Samples are collected from the production facility, and retail outlets (where relevant), over different periods in a three-year cycle to ensure that products are produced to the approved quality all the time. Samples are collected independently and unscheduled inspections are done at facilities to add to the assurance of quality products being produced," says Scholtz.

Clients need to apply specifically for certification at the SABS. Should a client be successful in obtaining a permit to apply the *SABS Approved* trademark to its products, the assessment of the production facilities will be done in accordance with the requirements of SANS/ISO 9001: quality management systems.

In cases where products are considered high risk, for example where raw materials used in the production process are unstable or where there is a high consumer danger, the SABS works with the customer and regulatory authorities to impose and implement additional consumer safety measures.

A preferred partner

Manufacturers looking to test their products or to have their products or systems certified should consult the SABS. As the custodian for the development and maintenance of all South African National Standards, it is a logical place to start to conduct a self-assessment for quality requirements. Should products and/or the implementation of systems be at an advanced level, the SABS can offer quotations for independent assessments and for consideration for certification.

"For seven decades the SABS has been working with industries, regulators, consumer bodies, academics, manufacturers and consumers to develop standards and certification schemes that improve the overall quality of life for all communities. *SABS Approved* is a trusted brand and the SABS is committed to ensure that only clients – and products – that merit the SABS certification mark have the privilege and permit to apply it," says Scholtz.

All clients and products that are permitted to use the *SABS Approved* trademark are published on the SABS website and the listing is regularly updated. This enables consumers to verify the certification status of products.

For more information contact SABS.
Visit: www.sabs.co.za

Prioritising people in PDS installations

As the uptake of proximity detection systems (PDS) at surface mining operations continues to pick up pace ahead of the yet-to-be announced compliance deadline, leading PDS and CPS developer Booyco Electronics has cautioned against an apparent exclusive focus on vehicle-to-vehicle detection and is encouraging mining companies to focus equally on vehicle-to-people detection solutions.

Anton Lourens, CEO of Booyco Electronics says traffic management planning has come under the spotlight recently in surface mining as requirements for PDS and effective risk management interventions are set to become enforceable under the provisions of the Mine Health and Safety Chapter 8 MHSA Act 29 of 1996.

Although the compliance deadline is not yet set, surface mines have, in recent years, advanced their risk assessments and installation of PDS technology where significant risk exists. However, Lourens is concerned about the focus on vehicle-to-vehicle installations to the exclusion of equally important vehicle-to-people installations.

"In the enquiries we receive, we have observed limited assumed risk on people detection," he says. "We see a big focus on vehicle-to-vehicle risk, with fewer requests for the people protection aspect of PDS installations. We are not sure if the approach is informed by internal risk assessments or the fact that mines have put in place measures to separate people from machines."

As part of their risk assessment and mitigation, several operations have, for example, implemented pedestrian walkways as a means of separating people from moving machinery. While Lourens acknowledges that PDS technology is not a silver bullet in the quest for Zero Harm, he believes that, as an engineering control system, the technology has proven its mettle in mitigating risk at mines.

"We have seen operations opting for fixed barriers as part of their traffic management plans to separate people from machinery," says Lourens. "Separating people from moving machinery only mitigates part of the risk, whereas the PDS can warn against possible collisions (Level 7), identify corrective paths (Level 8), or implement a 'slow-down and stop' intervention together with 'motion inhibit' (Level 9), which makes it a better solution than a physical barrier."

For more information contact Booyco Electronics.
Visit: www.booyco-electronics.com

Fit-for-purpose proximity detection technology brings new levels of safety to mining operations.

Exclusive distribution for safety switches in SADC

ElectroMechanica (EM) has been appointed the exclusive authorised distributor of IDEM Safety Switches in the SADC region. IDEM is the UK's leading designer and manufacturer of machine safety devices for the global market, including the popular Guardian Line range. IDEM manufactures safety products designed specifically for use in the food and beverage, materials handling and mining industries.

IDEM's extensive range of safety switches provide cost-effective solutions for machine safety. The plug-and-play solutions enable a safer working environment and help to reduce the downtime caused by mishaps on the production or processing line.

EM stocks the following products from IDEM's range: the Guardian Line series of heavy duty rope pull safety switches and standard duty safety rope switches, emergency stop stations, interlock switches, conveyor belt alignment switches, and the Python Line series of conveyor belt alignment switches.

"The food and beverage, mining and materials handling industries are under constant pressure to meet rising consumer demand. This means delivering increased production at lower prices, as well as improving on quality and variety. IDEM's products are tailored for use in these industries, ensuring enhanced safety and hygiene, and reducing downtime for optimised and efficient operations," says Siphelele Mlotshwa, Product Marketing Specialist at EM. "IDEM's products are designed and manufactured to the highest standards and can accommodate simple to complex systems." Robust, stainless steel versions of the products, tested to IP67 and IP69K safety and hygienic standards, are available.

For long conveyors, IDEM offers a unique, double-headed, heavy duty safety rope pull switch that can protect up to 125 m on each side. "This is especially advantageous when trying to reduce installation time, cost and wiring," Mlotshwa highlights. "With the class-leading IDEM safety products in our portfolio, we can offer our customers solutions that enhance safety and productivity."

ElectroMechanica is the exclusive authorised distributor of IDEM safety products for the SADC region.

In its commitment to excellent customer service, EM has established a large stock holding, ensuring it can fulfil customers' orders and supply spare parts promptly, as required. It has 16 distribution hubs and multiple channel partners that ensure easy access to its customers in the SADC region.

For more information contact Electro Mechanica (EM).
Tel: 011 249 5000
Email: info@em.co.za
Visit: www.em.co.za

Inductive safety sensors with OSSD outputs

Inductive safety sensors with two OSSD (output switching signal device) outputs form part of Turck's portfolio for safety technology. The proximity switches enable users to exploit the benefits of contactless and thus wear-free position and range monitoring in safety-related applications – on presses, cranes, machine covers or other equipment.

Turck's threaded-barrel safety sensors with output switching signals support plant safety.

The sensors use the OSSD outputs to send switching signals to safety systems. They serve to detect short circuits, overload, or cross-circuits and for testing switch-off capability at the same time. With SIL 2 (IEC 61508) and performance level d (EN ISO 13849), the devices meet demanding requirements in terms of functional safety.

Turck's new product series comprises the flush mountable M12, M18 and M30 threaded-barrel devices, each with a large assured switch-on distance, robust metal housing and usable across a wide temperature range from -25 to 70°C. Unaffected by dust and humidity, the inductive proximity switches help to reduce the risk of plant failures.

They are ideal for users wanting to implement a cost-efficient safety solution with a metal target instead of with a specially mounted actuator.

For more information contact Brandon Topham at Turck Banner.
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Visit: www.turckbanner.co.za

EPC practitioner skills training

The Energy Performance Certificate (EPC) Practitioner Skills Programme is driven by a partnership between SANEDI (South African National Energy Development Initiative) and the IEPA (Institute of Energy Professionals Africa), supported by German Cooperation, GIZ, the South African Department of Higher Education and Training, the South African Department of Mineral Resources and Energy, and the EWSETA. The training programme is focused on building sustainability in the energy industry.

As the motto for the College of Cape Town reads: 'Inspiring minds', a group of 25 students, together with five lecturers, mentors and three of the IEPA's leading industry experts, who lead the training and on-site audits, are inspiring the energy industry.

The group completed its training and practical sessions over a period of three weeks, and the trainees now need to complete their assignments at their host sites to become qualified EPC Practitioners.

For anyone interested in becoming a mentor or participating in the training programme and offering this service to their clients, the IEPA offers a stipend funded programme.

Towards the end of February, another group of 25 young electricians finished the three-week training programme and practical sessions at the Ekurhuleni East TVET College on the East Rand. They then joined their host companies where they will work with their mentors to shape the EPC landscape around Gauteng.

The training programme is being rolled out in preparation for the deadline of December 2022 for all buildings in specific categories to display an Energy Performance Certificate in line with regulations under the National Energy Act.

As part of the programme the students have to complete their assignments and deliver a mock EPC for at least one client site.

CBRE Excellerate was one of the first hosting companies to sign up for the EPC Practitioner Skills Programme and is currently hosting four students. Athough it is still early days, Yannick Mvudi of CBRE Excellerate commented on the opportunity. "This workplace programme is a great opportunity for interns and companies. Sustainability is becoming an important focus area for our clients and there is a huge skills gap in this field."

He added that the workplace programme offered by SANEDI in partnership with the IEPA is an effective response to address the skills shortage in the sustainability sector as well as the unemployment challenge in South Africa. "The interns are young, curious and enthusiastic and it feels good to be surrounded by that energy. So far, we are really enjoying this journey."

Dumaliwe is another host company and Sicelo Mthombeni from the company participated with the students on campus. He said, "The material given has been progressive as it tests the students' ability to grasp electrical principles which are important when one is dealing with energy on site. The lecturers have done a good job in presenting the modules, particularly given the challenges of not interacting with a physical audience.

"At Dumaliwe, we regard ourselves as fortunate to be part of the programme. We operate primarily in the renewable energy field and we offer a range of services, including design and installation of solar PV, remote and rural electrification solar home systems, and maintenance support services for independent power producers (IPPs)," Mthombeni added.

Above: 25 students finished their EPC training at Ekurhuleni East TVET College at the end of February.

Right: Dumaliwe is one of the host companies participating in the programme; Sicelo Mthombeni from the company joined the students on campus.

Dumaliwe also offers Compliance Audits in terms of the Occupational Health & Safety Act and technical regulations. "Energy Performance Certificates will allow us to broaden our offering in electrical and energy audits as we are aiming to be SANAS accredited as an inspection body for EPCs. More importantly, on completion of this programme, we are hoping to take on board the mentees to be part of our team on a short-term or permanent basis, depending on the demand for EPCs," Mthombeni said.

Empowering women in the energy industry

Green Building Design Group, a Level 1 B-BBEE and 100% Black Women-Owned and Controlled sustainability advisory firm, has committed itself to bridging the skills and knowledge gap in the real estate industry by offering internship opportunities for young graduates looking to become accredited EPC Practitioners.

It has also already welcomed its first cohort of women engineers who are being trained through the EPC Practitioner Skills Programme offered by the IEPA. The interns will be required to work with Green BDG's diverse team of technical assessors and energy auditors in preparing landlords for EPCs in commercial buildings.

Alliance Energy, which provides Energy Performance Certificate services, recognises that a large part of the energy market needs education and hand-holding to understand and navigate the requirements of energy audits and performance certificates and to achieve the best possible energy performance level. The company's Green Code, Empowerment Code and Customer Experience Code are internal focus areas that align the team to exceptional performance and responsibility. Its participation in the EPC Practitioner Skills Programme naturally followed. The company sees the empowerment of the country's youth as paramount to its success and it has taken on the responsibility of mentoring one talented young student.

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

Bridging the divide between OT and IT security

Paul Lowings, Security Executive, +OneX

Most enterprises know that cyberattacks in the information security realm are growing in sophistication, severity and number. However, until more recently, many organisations that run plants, factories, pipelines and other infrastructure have paid less attention to the threats they face in the realm of operational technology (OT).

Recent, global, OT-focused cyberattacks highlight why South African utilities, manufacturers, oil and gas companies and other organisations that run industrial infrastructure would be wise to take note of the growing range of cyber threats targeting OT systems and infrastructures.

In one reported example, an intruder breached a water treatment plant in Florida in the US and briefly increased the quantity of the corrosive chemical sodium hydroxide in the water from 100 parts per million to 11 100 parts per million, before an operator intervened. In another more widely reported example, cybercriminals launched a ransomware attack on the Colonial Pipeline, disrupting this major fuel supply line to the east coast of the US for a week.

As these examples show, OT attacks can be even more serious than information security breaches because of the level of economic upheaval, supply chain disruption and human harm they can cause.

Defining OT and OT security

OT is the hardware, software and other technology used to monitor and control physical processes, devices and infrastructure. Examples include the Supervisory Control and Data Acquisition (SCADA) systems used to manage processes such as water treatment and distribution, wastewater collection and treatment, oil and gas pipelines, and electric power transmission and distribution, or to monitor and control manufacturing processes on a production line.

By the Gartner definition, OT security is “Practices and technologies used to: protect people, assets, and information; monitor and/or control physical devices, processes and events; and initiate state changes to enterprise OT systems.” There is a maturing toolbox of specialised OT security solutions, including firewalls, security information and event management (SIEM) systems, identity access and management tools, and early-stage threat detection and asset identification solutions which companies can implement to enhance their cybersecurity standing.

Yet, OT security remains neglected in many organisations because the engineers in the OT environment usually don’t have much background in cybersecurity, and IT teams tend to regard OT as outside their responsibility and core competence. On a technical level, OT uses vendors, technologies, platforms and protocols that are unfamiliar to IT professionals. Plus, OT networks were, in the past, run independently of IT networks and were usually not connected to the internet.

Threats to OT

Paul Lowings, +OneX.

For a long time, the only way a hacker could access OT systems was via a physical terminal that controlled them or if a misconfigured network allowed access between the IT and OT environments. That started to change 10 to 15 years ago as more OT systems were connected to the internet, with the goal of gathering data to drive analytics and create new business efficiencies. Along with the benefits of converging IT and OT networks, and connecting OT to the internet, this has exposed OT to a growing range of cyber threats.

Even as OT and IT networks converge, the two disciplines tend to run as separate functions with little sharing of information. This is understandable to a degree, given how different IT and OT security are in practice: IT cyberattacks are more frequent, OT attacks are more destructive; and IT systems tend to be upgraded and patched more often than OT systems.

In the world of the Fourth Industrial Revolution, it is clear that OT will become more digital in the years ahead and although there are many differences in the risks, objectives and operating models for OT and IT, there are clear benefits to getting the teams responsible for each into closer alignment. This would provide the C-suite with a better sense of the overall risk and threats the business faces and who should be accountable for managing them.

Gartner recommends that enterprises align their standards, policies, tools, processes, and staff between the IT and the changing OT systems of the business. IT/OT alignment is about crafting a strategy that spans the security lifecycle, from the production floor up through the enterprise processes.

Getting started

The place to start for a coherent OT strategy is with a risk and vulnerability assessment. There are powerful tools to help enterprises identify assets that could be affected by cyber risks, so they can prioritise controls and responses. As most companies lack in-house skills that straddle IT and OT, they can often benefit from the skills of a systems integration partner that knows both worlds.

+OneX is a new-age solutions and systems integrator that helps enterprises to excel in a dual-speed technology world. As an end-to-end digital transformation partner, +OneX collaborates with clients to use cloud, data, security, and unified communications technologies to solve their business problems. +OneX is part of the Reunert Group.

For more information visit: https://www.plusonex.com.

Solar power for clean water in remote areas

David L Chandler, MIT News Office, Massachusetts Institute of Technology

An estimated two-thirds of the world's population is affected by shortages of water; many in areas in the developing world that also face a lack of dependable electricity. Widespread research efforts have therefore focused on ways to desalinate seawater or brackish water using just solar heat. However, many such efforts have run into problems with fouling of equipment caused by salt build-up, which often adds to systems' complexity and expense.

A team of researchers at MIT and in China has come up with a solution to the problem of salt accumulation – and has developed a solar-powered desalination system that is more efficient and less expensive than previous research models. The process could also be used to treat contaminated wastewater, or to generate steam for sterilising medical instruments, all requiring only sunlight as a power source.

The findings are described in a paper by MIT graduate student Lenan Zhang, postdoctoral student Xiangyu Li, professor of mechanical engineering Evelyn Wang, and four others, and published in the journal *Nature Communications* in February 2022.

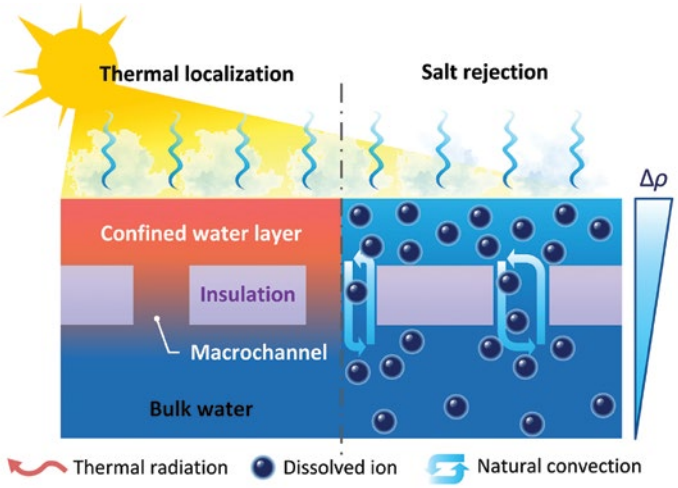
"There have been a lot of demonstrations of various designs of high-performing, salt-rejecting, solar-based evaporation devices," Wang says. "The challenge has been the salt fouling issue, which has not really been addressed. So, we see these very attractive performance numbers, but they're often limited by longevity. Over time, things will foul."

Many attempts at solar desalination systems rely on some kind of wick to draw the saline water through the device, but the wicks are vulnerable to salt accumulation and relatively difficult to clean. The team focused instead on developing a wick-free system. The result is a layered system, with dark material at the top to absorb the sun's heat, then a thin layer of water above a perforated layer of material, sitting atop a deep reservoir of the salty water such as a tank or a pond. After careful calculations and experiments, the researchers determined the optimal size for the holes drilled through the perforated material, which in their tests was made of polyurethane. At 2.5 millimetres across, the holes can be made easily using commonly available waterjets.

The holes are large enough to allow for a natural convective circulation between the warmer upper layer of water and the colder reservoir below. That circulation naturally draws the salt from the thin layer above down into the larger body of water below, where it becomes well-diluted and no longer a problem. "It allows us to achieve high performance and to prevent salt accumulation," says Wang, who is the Ford Professor of Engineering and Head of the Department of Mechanical Engineering.

Li says the advantages of the system are "high performance and reliable operation, especially under extreme conditions where we can work with near-saturation saline water. That means it's also very useful for wastewater treatment."

He adds that much work on such solar-powered desalination has focused on novel materials. "But we use really low-cost, almost household materials." The key was analysing and understanding the convective flow that drives this entirely passive system, he says.



The system is entirely passive with the desalination process driven by natural convection.

Just as hot air rises and cold air falls, Zhang explains, natural convection drives the desalination process in this device. In the confined water layer near the top, "the evaporation happens at the very top interface. Because of the salt, the density of water at the very top interface is higher, and it is lower at the bottom. The higher density at the top drives the salty liquid to go down." The water evaporated from the top of the system can then be collected on a condensing surface, providing pure, fresh water.

The rejection of salt to the water below could also cause heat to be lost in the process, so preventing that required careful engineering, including making the perforated layer out of highly insulating material to keep the heat concentrated above. The solar heating at the top is accomplished through a simple layer of black paint.

So far, the team has proven the concept using small benchtop devices. The next step will be to scale up to devices that could have practical applications. Based on their calculations, a system with just one square metre of collecting area should be sufficient to provide a family's daily needs for drinking water. Zhang says they calculated that the materials needed for a one-square-metre device would cost only about $4.

The test apparatus was operated for a week without any signs of salt accumulation, Li says.

Looking towards commercialisation, Zhang says the first applications could be to provide safe water in remote off-grid locations, or for disaster relief where normal water supplies are disrupted.

Wang says, "I think the real opportunity is in the developing world, because of the simplicity of the design." But, she adds, "If we really want to get it there, we need to work with the end users, to adapt the design so they're willing to use it."

For more information visit: https://news.mit.edu/

A pioneering biodiversity offset

EIMS Africa and its portfolio company, Umoya Energy Wind Farm, and SANParks are celebrating a pioneering Biodiversity Offset Agreement that was formalised almost a decade ago. This public-private partnership was the first of its kind and entailed an agreement with Umoya Energy Wind Farm and SANParks, which extends the West Coast National Park (WCNP), as part of a broader biodiversity expansion programme. A recently published report, released Q4/2021, funded by the Global Environment Fund (GEF) and the United Nations Development Programme (UNDP) South Africa Country Office, showcases the agreement and its successes.

Ryan Hammond, CEO of EIMS Africa and the Umoya Energy Wind Farm said: "At the time this public-private partnership was a first of its kind in the renewable energy sector in South Africa. A decade later, we are proud that it remains intact and has resulted in a measurable positive environmental impact on the land as well as in the local community."

Umoya Energy Wind Farm was the first REIPPPP wind farm to reach its stipulated commercial operation date in February 2014. During the development phase, extensive consultation was undertaken to ensure the impact on the environment, as a result of the construction of the wind farm, was minimised. The recommendation proposed was that Umoya Energy, in partnership with SANParks, would manage the land as a conservation area.

Since signing the original memorandum of understanding, in August 2012, EIMS Africa has actively engaged and collaborated with SANParks to ensure the conservation area has been managed effectively, to eradicate alien vegetation and restore the land to its original natural biodiverse state.

The development of Umoya Energy Wind Farm introduced a biodiversity offset agreement which extends the conservation area of SANParks' West Coast National Park.

"The agreement focuses on the environmental management of the conservation area and makes provision for a number of economic development opportunities for local contractors. This innovative thinking has resulted in tangible wins, including the restoration of the natural biodiversity, a reduction in the risk of veld fires and a number of direct benefits to the local community including skills development, local employment and local enterprise development," Hammond added.

The agreement between Umoya Energy and SANParks was the result of more than a year of extensive consultation and negotiation between the parties and their advisors. The agreement will endure for the full operating life of the project – through to February 2034.

Umoya Energy owns three adjoining farms with a combined area of about 2 400 hectares. Roughly half of this land was designated as a conservation area and is managed by SANParks. The offset area of 1 183.3995 ha was declared and gazetted in February 2017, in terms of Section 20 of the National Environmental Management Act.

As noted by SANParks, the GEF-UNDP report regards this biodiversity offset agreement, signed in 2014, as a good example for biodiversity offsetting and considers it to be one of the few successful offset investments in South Africa, addressing a number of biodiversity challenges. It notes that the Agreement Manager, appointed by the parties to the agreement, facilitates, coordinates and drives the projects' deliverables. Additionally, the agreement addresses financial arrangements with a clear project implementation plan and budget.

For more information visit: https://eimsafrica.com/

The International Union for Conservation of Nature (IUCN) brief on biodiversity offsets recognises that public and private sector investments in projects are among the current drivers of economic growth, but biodiversity is not well accounted for under the present economic system and such projects can have significant impacts on species and on ecosystems more generally. Measures to compensate for negative impacts, known as biodiversity offsets, are increasingly being used by governments and the private sector. Biodiversity offsets are described as: measurable conservation outcomes designed to compensate for adverse and unavoidable impacts of projects, in addition to prevention and mitigation measures.

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