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- Industry 4.0 + the IIoT
- Energy management + the industrial environment
- Sensors + switches
- Plant maintenance, test + measurement

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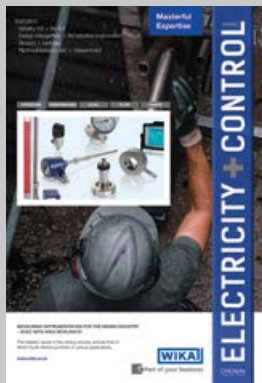
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(Read more on page 3.)

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## We need to stem the neglect and take care of our assets

I suppose for many of you, your homes, like mine, bristle with inverters and batteries – so at least we can continue to live a relatively normal life while much of the country assumes we can do no better. As long as we can follow the most critical sporting moments, we do tend to focus, at least temporarily, on a crisis of another kind.

But such an extended period of load shedding (and yes, we understand that this is the only way to manage a system that is creaking for a variety of clearly avoidable reasons...) does tend to make one reflect on the consequences of utter neglect.

I use the word thoughtfully.

We are all custodians of the spaces we occupy and the roles we play. I imagine we want things to be as best managed as possible.

But with the load shedding, one does tend to notice so many things, doesn't one?

I watch vehicles break every rule of the road (often in the full sight of law enforcement officers, and usually putting multiple lives at risk) with nothing being done about it; and yet almost every time I take a particular off-ramp after 19.30 in the evening, I am stopped in a queue of cars (generally occupied by the kind of folk who stay late to complete their tasks) to be asked to dig a licence out of my wallet and prove that I have not been drinking in the office. I approve of this – but do harbour a cynical view.

And I suppose it also places into sharp focus the fact that many of us have businesses and homes where our security is not provided by the police, but by private

security personnel (an industry that, without a doubt, employs far more people than the SAPS).

Many of us rely on private education, as it is generally understood now that education is simply far too important (like so much else) to be left in the hands of the state.

And I suspect that, of late, we are beginning to see it is not competence alone that can ensure success – but so many other things can also go wrong and, frankly, be allowed to go wrong.

It is tragic.

Seemingly a simple question: Why can we not find a road line paint that lasts? I laugh whenever I drive with foreign guests who ask me where the white lines are. I tell them that they are there, and I can see them! Usually that makes them nervous... But it is an embarrassment.

I cannot say much more – but I have worked in project environments where things literally just get stuck. No action can be taken. And in environments where one needs to provide one's own energy (a lot of it), one's own security (even in areas outside of one's own perimeter just to keep folk safe), and even fill potholes out of absolute frustration.

It is tough – we accept that – but we need to work towards resolving issues rapidly. And one does wonder, cynically, why there are always delays.

We should never allow the areas under our own control to fall into this state of disrepair. It simply shows a lack of care for the assets of which we are the custodians.

Ian

Ian Jandrell

PrEng IntPE(SA), BSc(Eng) GDE PhD,  
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# Measurement instrumentation for the mining industry

With so many uncertainties in these trying times, it has been remarkable to watch the increasing value delivered from the mining sector. The pandemic caused a knock on supply and demand, but demand and prices have bounced back with record pricing on gold, iron ore, platinum group metals, and coal. This growth is expected to continue with the increasing demand for resources for the transition to net-zero carbon emissions solutions. The infrastructure necessary for this transition is immense.

If we hope to benefit from the growing demand within the South African mining industry, we will need to remain quality providers among our competition. The best way to do this is with the right skills, energy and water and, robust and reliable equipment.

The resilient nature of the mining industry echoes that of WIKA South Africa's portfolio of products.

## The WIKA portfolio

The process chain in the basic materials industry, from the extraction of the raw materials to processing basic materials, can mean working under extreme and varying conditions. This environment places high demands on the production safety and service life of the associated plant, machinery and measurement technology.

The extensive portfolio of pressure, temperature, level, and flow measurement products from WIKA has been proven in all areas of the basic materials industry. WIKA's robust and reliable measuring instruments are individually customised, based on many years of application experience, and can withstand the most extreme process conditions.

## Pressure

WIKA has a long tradition in the manufacture of pressure measuring instruments. The company has been proudly producing mechanical pressure gauges for over 60 years. Today, it is recognised in the market as a leader worldwide in the fields of temperature measurement, pressure measurement and calibration technology. Globally, about 600 million WIKA measuring instruments are in use, and trusted.

## Temperature

As a worldwide leading manufacturer of instruments for tempera-

ture measurement, WIKA offers a wide range of products. As well as standard products, it offers customer-specific solutions. Its certified measuring instruments meet the highest standards of quality and safety, offer worldwide approvals, and comply with almost all international directives.

## Level

WIKA's level portfolio encompasses both continuous level measurement and level switches. The company has a comprehensive range of level measuring instruments available, for temperatures up to 450°C, densities from 400 kg/m<sup>3</sup> and pressure ranges up to 500 bar. Customer-specific special designs complete the offering.

## Flow

WIKA's portfolio for primary flow elements includes orifice plates, meter runs, flow nozzles, Venturi tubes, pitot tubes and restriction orifices. With its extensive product range, it can cover almost all industrial applications. Here, customised solutions can also be developed to meet customers' specific needs.

## Force

WIKA offers the world's largest in-house developed and manufactured force measurement product portfolio – from force transducers with strain gauges, through hydraulic measurement, to force measurement with thin-film technology, in all geometrical forms, in nominal load sizes from 0.5 N to over 10 000 kN. □



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Built with WIKA resilience, WIKA provides an extensive portfolio of pressure, temperature, level, and flow measurement products.

# Connected industries optimise productivity

*In data-driven smart factories, knowledge is power – and true business knowledge means having a holistic understanding of what is happening across the enterprise to enable more dynamic and agile operations. This can be achieved by merging information technology (IT) and operational technology (OT) using network infrastructures that support Time-Sensitive Networking (TSN). John Browett, General Manager at the CC-Link Partner Association (CLPA), looks at the benefits of digitalisation strategies based on TSN-driven IT/OT convergence.*

To thrive and prosper in an environment where competition continues to become fiercer, forward-looking companies need to make their operations highly responsive and flexible. This can be achieved by leveraging TSN as an enabling technology for advanced communications. This allows companies to increase collaboration across machines, facilities and enterprises to better address customer requests and fluctuating demand.

TSN-driven agile manufacturing strategies are a key part of Industry 4.0 applications, which rely on data-driven actionable insights. These insights come from better process visibility, enabled by converging multiple deterministic streams of manufacturing data into a single, cohesive network architecture.

## Better, faster, stronger

Moreover, TSN promotes the integration of supervisory IT system data, with operational data used on the OT

level. The OT data includes information used to control physical devices and processes, as well as the results generated, which are the source of the insights noted. This opens the door to a range of benefits. Firstly, it supports process transparency and advanced management, as the convergence offered by TSN strengthens data transfer across the enterprise, providing end users with unprecedented access to data. As a result, they gain insights that can help to improve decision-making.

Secondly, by enabling the optimum management of machines, processes and plants, companies can drive up performance, productivity and efficiency. In particular, a single network that allows the handling of all types of data traffic removes the complexity caused by multiple data types across multiple systems. This typically hampers the ability of operators to identify potential issues. Hence, convergence streamlines troubleshooting, which in turn reduces the downtime associated with maintenance or repair activities, and supports maximised equipment and process availability.

## Leaner designs

As only a single network is required to transfer all data, another substantial advantage is that less equipment is needed to create an interconnected architecture. In addition, any engineering work for the design, configuration and installation of network systems is minimised, shortening the time required to complete factory automation projects.

Further, any subsequent installation of additional network devices or modifications to the existing setup are simplified. As a result, the flexibility and scalability of production lines and assets can be improved.

While TSN is a recent innovation, companies can already take advantage of this technology, as more industry players are adopting it in their digital transformation strategies. CC-Link IE TSN, the first open industrial Ethernet that combines gigabit bandwidth with TSN functions, and the broad range of compatible automation products available, can help companies realise this journey to improved productivity. □



*By applying TSN technology to realise network convergence, businesses can create smart Connected Industries and boost productivity.*

For more information visit: [eu.cc-link.org](http://eu.cc-link.org)

## Advancing industry-wide TSN conformance

The CC-Link Partner Association (CLPA) recently announced that it is actively engaged with the Avnu Alliance, ODVA, OPC Foundation (OPCF) and PROFIBUS & PROFINET International (PI) as part of the TSN Industrial Automation Conformance Collaboration (TIACC). The organisations will work together to develop a unified conformance test plan for automation devices that leverage Time-Sensitive Networking (TSN), driving standardisation, interoperability and interconnectivity.

Bringing together key global industrial network and communications specialists, the TIACC is an industry-wide initiative aimed at developing a solution for TSN conformance. The CLPA, together with other leading organisations, will develop and agree a single common conformance test plan to certify TSN-compatible products, in line with the IEC/IEEE 60802 TSN profile for Industrial Automation.

The resulting methodology and practices will be released for use to the industrial automation ecosystem. In this way, the TIACC partners aim to promote the alignment of TSN-compatible solutions from different vendors, which is essential for the development of converged industrial automation networks.

The CLPA's commitment to TIACC is in line with the organisation's overarching strategy to drive the easy integration and openness of networks and devices from multiple vendors. The CLPA has a history of successful collaborations with other

TIACC members, such as OPCF and PI, delivering interoperability and companion specifications aimed at maximising transparency between the different protocols available.

To further support interoperability, the CLPA invests in its standardised, global network of conformance testing facilities. These are engaged in the evaluation of devices that use CC-Link IE TSN. Using this real-world experience, and as part of TIACC, the association can contribute to the creation of robust practices to ensure TSN conformance.

John Browett, General Manager at CLPA Europe, comments: "Connected Industries of the future will require different systems and devices to communicate in order to deliver process transparency. This principle is deeply rooted in the CLPA's ethos and core to the organisation's founding. Within the TIACC we look forward to supporting the creation of a unified, common test plan for TSN-compatible products. In this way, we can help further boost the adoption of futureproof technologies for smart manufacturing." □



*The CLPA is engaged with other leading network organisations as part of the TSN Industrial Automation Conformance Collaboration (TIACC).*

## INDUSTRY 4.0 + IIOT : PRODUCTS + SERVICES

### Compact, high-resolution multi-barcode reader

Expanding its MicroHAWK range, OMRON has launched the V440-F, an ultra-compact high-resolution fixed-mount code reader which is ideal for reading multiple, minuscule barcodes in a wide area, or over longer distances.

The V440-F barcode reader will help manufacturers achieve high-volume, high-speed reading of the tiniest codes, achieve traceability goals such as securing the supply chain, and maximise overall equipment effectiveness (OEE).

The new barcode reader provides high accuracy and configuration flexibility, combining advanced code reader technology from OMRON MICROSCAN SYSTEMS and image capture technology from OMRON SENTECH; both joined the OMRON group in 2017.

It is field-configurable and can read dozens of tiny barcodes simultaneously for applications in which multiple barcoded products are within the field of view. It can also be configured to read at a long distance and to find multiple codes in a wide area, or on parts moving at high speed. These configuration options make the V440-F suitable for reading one or many codes during product packaging or in an assembly operation where the code reader is located outside the operator's working area.

The intuitive and proven WebLink user interface provides for easy out-of-box configuration and

application tuning, and the advanced decoding algorithms help ensure robust reading performance no matter the surface type (including transparent and reflective surfaces). Power over Ethernet (PoE), and connectivity to automation systems via EtherNet/IP and PROFINET enable reliable connectivity to automation networks.

Key features of the new barcode reader include a 5 MP resolution global shutter sensor, a dual core processor supporting an image capture rate of 35 fps (frames per second), and C-mount lens options enabling the use of wide area, long distance, macro and telecentric lenses. Coaxial spot and ring light kits plus a variety of cables and bracketing make it easy to install a complete code reading system.

Manufacturing, logistics, packaging, or assembly applications where a wide field of view is needed will benefit from using the MicroHAWK V440-F.

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*The compact V440 F can read dozens of tiny barcodes simultaneously.*



Andrew Cruise,  
Managing Director  
of VMware Cloud  
provider Routed.

# The case for colocation

*Colocation facilities (colo), where individual businesses can rent space and power for servers and other computing hardware from ISPs and cloud providers, are growing in South Africa.*

*With the increase in fibre connectivity and the shift to work from home, facilities like Teraco, Vantage, NTT, and ADC have opened and have grown in recent years due to the further demand from enterprises contending with continued load shedding. Andrew Cruise, MD of VMWare Cloud provider Routed, sets out the pros and cons of colocation.*

## The benefits

The biggest drawback of colo facilities worldwide is the specialised services they offer. The providers have expert facilities managers who have skills in security, power, and cooling – which few enterprises will have in their own data centres. This division of labour lowers risk and addresses many of the concerns enterprises have in running their own data centres.

The second reason for the growth in colo is connectivity. The better colo facilities have free peering points as well as private exchanges that serve as onramps into local and hyperscale cloud providers. The prevalence of good value, fast and reliable connectivity into the data centre makes colocation an acceptable option.

In South Africa, of course, there's a third – and very important – reason: colo offers reliable power during rolling power cuts.

Enterprises using cloud gain these same benefits, reducing and segregating the operational risk by not having to rely on employees to manage the infrastructure. VMware Cloud, for example, offers migration tools as part and parcel of the solution.

## The pitfalls

Enterprises using owned hardware in colocation facilities benefit from the reduced risk, flexible connectivity, and reliability – and they pay for it. This means it is not for everyone, but for those who do go the colo route, the pricing is generally predictable.

There have been several examples in developed countries of unexpected overspending running wild following a move of traditional IT operations-based infrastructure into hyperscale cloud. This has led to the repatriation onto owned infrastructure or private cloud offered by local cloud operators with predictable price models. In South Africa, we have the benefit of learning from such mistakes.

Without going the overspending route, we already know the next step is migration onto the cloud, with a combination

of hyperscalers such as AWS or Azure, and private cloud solutions such as VMware. And, for those currently running their own data centres, there is the colo option. This means more predictable pricing, a cloud solution suited to each particular workload, as well as reduced risk and improved connectivity and reliability.

## Finding the right balance

The most important condition for colo and cloud to be viable is fast, reliable, cheap internet – typically provided by fibre optic cable. Fibre has finally penetrated almost all South African metro areas, making colo and cloud sustainable solutions. Realistically, most enterprises will benefit from choosing not between colo and cloud, but a combination of both – and using multiple cloud providers.

International examples have made people understandably sceptical of cloud hyperscalers. There are numerous cases reported on the internet of enterprises failing to complete the migration to hyperscale cloud due to operational difficulties after re-platforming traditional workloads. Again, we get to learn from their mistakes: moving everything onto a hyperscale cloud seems like a straightforward solution, but the reality is that every cloud provider is not fit-for-purpose for every app.

Picking a single platform with a view to keeping things simple can present performance or commercial problems. Using multiple providers introduces complexity to the final solution, but it means each set of workloads will be in an ideal place. It is important to choose the right environment for the right app.

Security considerations should be overarching when looking at any kind of hybrid or multi-cloud solution. Combining colo and cloud in a well-connected data centre should facilitate fast, secure, private extension between owned hardware and private and public cloud.

There is no single solution for every enterprise. For security and compliance reasons, many enterprises need to be responsible for their own hardware. The key is for businesses to do an audit of their workloads and find the ideal solution for each – whether that's colo, cloud, running their own data centre, or a combination of these options in different measures. □



Colo facilities offer the advantage of specialist in-house expertise, which few enterprises will have in their own data centres.

For more information visit: [www.routed.co.za](http://www.routed.co.za)

## Accelerating digital transformation

Siemens AG recently launched its open digital business platform, Siemens Xcelerator, to accelerate digital transformation and value creation for customers in industry, buildings, grids and mobility. The business platform is designed to make digital transformation easier, faster and scalable.

Siemens Xcelerator includes a portfolio of internet of things- (IoT-) enabled hardware, software and digital services from across Siemens and certified third parties; a growing ecosystem of partners; and an evolving marketplace to facilitate interactions and transactions between customers, partners and developers.

Speaking at the launch Roland Busch, President and CEO of Siemens AG, said: "Siemens Xcelerator will make it easier than before for companies to navigate digital transformation – faster and at scale. By combining the real and digital worlds across operational and information technology, we empower customers and partners to boost productivity, competitiveness and scale up innovations.

"Our leading portfolio is transformed towards more open applications, with more cloud-based and as-a-service solutions and IoT-enabled hardware that can be continually upgraded. Additionally, collaboration will reach a new level with a growing ecosystem of partners.

"Today's launch of Siemens Xcelerator, our newly announced acquisition of Brightly Software, and our expanded partnership with NVIDIA are major milestones in implementing our strategy to accelerate high-value growth," Busch said.

### **Easier, faster and at scale**

The open digital business platform creates value for participants by facilitating interactions and fostering innovation between multiple parties – customers, partners, developers and others. With the launch of Siemens Xcelerator, Siemens will progressively transform its entire portfolio of hardware and software to become modular, cloud-connected and built on standard application programming interfaces (APIs). Strong technical and commercial governance principles will ensure the highest standards and value for all parties. Siemens and third-party offerings will work to the design principles of interoperability, flexibility, openness and as-a-service.

### **New SaaS**

Building X, the first new SaaS offering as part of Siemens Xcelerator, is a smart building suite to create a 'single source of truth' (SSOT) that takes complexity out of digitalisation and supports customers to achieve their net zero goals. It is an end-to-end data and analytics suite breaking down data silos across domains such as energy management, security and building maintenance. Building X is a modular, fully cloud-based open software suite, with AI enabled applications, strong connectivity and built-in cybersecurity.



*Siemens Xcelerator is an open digital business platform designed to make digital transformation easier, faster and scalable.*

Siemens also plans to integrate its industrial internet of things (IIoT) solutions for industry as Industrial Operations X, which will bring together solutions and applications from sensor to edge to cloud, IoT as-a-service and low code development capabilities, as well as a wide range of ready-to-use-apps. It will enable the fusion of data from the real world of automation with the digital world of information technology, enriched by Siemens' comprehensive vertical IT/ OT integration knowledge and capabilities. Breaking down data silos will help companies to increase their performance, productivity, flexibility and sustainability.

### **New partnerships build a strong ecosystem**

Siemens is committed to growing a strong partner ecosystem, building on existing strategic partnerships with Accenture, Atos, AWS, Bentley, Microsoft and SAP. The intention is to expand the partnership ecosystem with small, medium and large companies.

The first major partnership agreement under the Siemens Xcelerator umbrella is with NVIDIA. This will expand their existing partnership to enable the industrial metaverse and increase use of AI-driven digital twin technology that will help take industrial automation to a new level. As a first step in this collaboration, the two companies plan to connect Siemens Xcelerator, the open digital business platform, and NVIDIA Omniverse, a platform for 3D-design and collaboration. This will enable an industrial metaverse with physics-based digital models from Siemens and AI-enabled, physically accurate, real-time simulation from NVIDIA where companies can make decisions faster and with more confidence.

The Siemens Xcelerator platform responds to the increasing complexity of the global economic and geopolitical environment which demands the rapid transformation of organisations. It marks the next step in Siemens' digital strategy and will unlock value for existing and new customers, especially in smaller and mid-sized businesses.

**For more information visit: [www.siemens.com](http://www.siemens.com)**

## A compact multi-axis system for robotics



With ATRO, a robot solution can be adapted precisely to the task, and can be scaled, modified and expanded.

With Automation Technology for Robotics (ATRO), Beckhoff is presenting a new concept for robotics applications. ATRO is a modular system from which the right robot kinematics can be put together flexibly for any application. A highlight of the system is the internal media feed for data, power and fluids. This has been implemented in such a way that all axes are designed to rotate endlessly.

With ATRO, users can create almost any robot design for a particular application from the modules provided – from a simple one-axis rotary indexing table application and delta kinematics, through to multi-axis articulated robots. Beckhoff's holistic perspective provides for simple commissioning and handling, because only the direct integration of the robot system into PC-based control enables a complete, optimised solution for the machine or plant. This reduces the number of controls needed on one industrial PC, even with multiple robots.

ATRO kinematics are made up of active joints – the motor modules. The motor modules are available in different designs: straight modules in I-shape or angled modules in L-shape, and are designed in five power sizes. Each motor module forms a complete drive system for one axis of the robot. The only external components required are a power supply and a control, which significantly reduces the space required in the control cabinet. In addition to the active modules, there are connection modules without their own drives:

- base modules as a base including the media feed
- link modules with I-, L- and Y-shapes to implement individual robot configurations
- system modules that can be used to integrate additional functions such as a camera.

### Advantages of the internal media feed

All modules are interconnected via the ATRO interface,

which guarantees a rigid connection and passes through the media that is fed in. Data, power and fluids (compressed air, vacuum or water) are thus guided internally through the modules in the ATRO kinematics. This is in contrast to conventional robotic solutions which route them externally and are therefore limited in rotation and use of the workspace. The Beckhoff solution eliminates this limitation completely as each axis can be rotated endlessly, which enables better Cartesian accessibility as well as short positioning paths. Furthermore, interfering contours, due to externally located cables for example, and, especially in the case of cobots, interfering torques, are avoided by means of external media feed. In addition, the media are supplied again for a customer application via the ATRO interfaces, and almost any robotic tools, such as sophisticated gripper systems, can be easily integrated.

### System integration

With ATRO, Beckhoff offers a highly flexible robot system that has all essential machine functionalities due to its deep integration into the TwinCAT automation software. These include, for example, image processing for sophisticated applications ('bin picking'), improvement of motion performance through machine learning, or direct cloud integration for analysis and maintenance. The use of open interfaces and universal standards enables plug-and-play of the created robot configuration and simple engineering. The variety of functions concentrated in one control minimises hardware costs and ensures synchronisation of all components as well as low delays in data communication. This also includes the direct combination with intelligent transport solutions such as XTS and XPlanar. Other areas such as communication, functional safety and the actual application can be created with little effort. This enables the configuration of a powerful overall solution with maximised system output, plus a previously unattainable reduction in machine footprint.

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Anders Hansson,  
Chief Marketing  
Officer, HMS  
Networks.

## Industrial networks keep growing

Every year, HMS Networks analyses the industrial network market to estimate the distribution of new connected nodes in factory automation. The 2022 study, released earlier this year, indicates

8% growth in the industrial network market. Industrial Ethernet still shows the highest growth and now accounts for 66% of all new installed nodes (65% last year). Fieldbuses are at 27% (28% in 2021) and wireless remains at 7% market share.

HMS Networks' annual analysis of the industrial net-

work market focuses on new installed nodes within factory automation globally. As an independent supplier of solutions within Industrial ICT (information and communication technology), HMS has valuable insight into the industrial network market. The 2022 study includes estimated market shares and growth rates for fieldbuses, industrial Ethernet and wireless technologies.

In the study, HMS notes that the industrial network market continues to grow, confirming the continued importance of network connectivity in factories.

Growing at 10%, Industrial Ethernet continues to take

*Continued on page 9*

*Continued from page 8*

market share and now makes up for 66% of the global market of new installed nodes in factory automation (65% last year). EtherNet/IP and PROFINET hold first place in the network rankings with 17% market share, and EtherCAT is gaining ground, now with 11% market share. Modbus-TCP is also growing, to a 6% market share.

Fieldbuses are at 27% market share compared to 28% last year. However, HMS notes that despite losing one percent market share, the actual number of installed fieldbus nodes is expected to grow by 4% in 2022 compared to last year, following several years of decline. The reason for this calculated estimate is that factories tend to favour established industrial network solutions in uncertain times such as these, following from the impact of the pandemic and the challenging component situation.

PROFIBUS remains the most installed fieldbus with 7% market share, followed by Modbus-RTU at 5% and CC-Link at 4%. Interestingly, the Modbus technologies TCP and RTU continue to be widely used in modern factories, together accounting for 11% of the market in 2022.

Wireless grows by 8%, which is on par with the overall growth rate of the network market, and thus retains a 7% market share. Typical use cases include cable re-

placement applications, wireless machine access and connectivity to mobile industrial equipment. The market is still awaiting the deployment and impact of 5G in next generation factory automation installations.

Anders Hansson, Chief Marketing Officer at HMS Networks, says, "Industrial network connectivity is absolutely key to reaching productivity and sustainability objectives in modern manufacturing, and this is the main driver for the growth we see in the industrial network market. Factories are constantly working to optimise productivity and sustainability, as well as quality, flexibility and cybersecurity, and we know that sound industrial networking is key to achieving this too. While we see growth across all network areas, it is particularly interesting to see that the established fieldbus technologies are getting back to growth again."

Note: The study includes HMS' estimation for 2022 based on the number of new installed nodes in factory automation. A node is defined as a machine or device connected to an industrial field network. The presented figures represent HMS' consolidated view, considering insights from colleagues in the industry, its own sales statistics and overall perception of the market.

**For more information visit: [www.hms-networks.com](http://www.hms-networks.com)**



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Godfrey Marema, Eaton, Southern Africa.

# Inspired to seek hope and plan action

Godfrey Marema, Managing Director and Plant Manager, Eaton, Southern Africa

***Times of turmoil inspire us to seek hope and plan action. The rollercoaster of current global and local events – from military action in Eastern Europe to political turmoil in Western Europe, natural disasters and persistent slow economic growth here in South Africa – surges on as the world slowly recovers from the devastating Covid-19 pandemic of the past two years.***

While the news is daunting, we need to look beyond the immediate turmoil and seek hope, identify opportunities, and plan action. The last two pandemic years have shown us what is possible if we put our minds to it: commerce and trade carried on in a work-from-home environment and innovations such as telemedicine were adopted without hesitation. With lockdowns largely over, the world rebounded, having learned lessons in efficiency, on-demand retail, and how to

work together to survive a global nightmare.

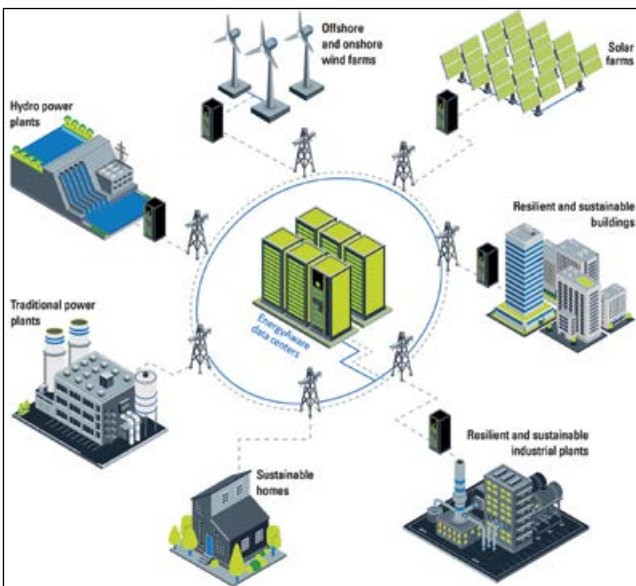
As the pandemic subsides, new challenges have emerged. The conflict in Eastern Europe has sent energy prices soaring – which has in turn compelled countries that are the world's highest energy users to re-evaluate their source markets, and indeed their whole approach to energy.

In time, this is likely to accelerate innovation in renewable energy installations in each country, as they seek to limit

## Grid-interactive UPS technology

Eaton, as a power management company, and Microsoft are working together on grid-interactive UPS technology to help electricity grids in the transition to renewable energy.

The collaboration aims to accelerate applications of Eaton's EnergyAware uninterruptible power system (UPS) technology in key sectors worldwide. It is part of a new strategic framework agreement between Eaton and Microsoft designed to address major industry developments, including digital transformation, sustainability and the energy transition.



EnergyAware UPS technology can be used as a distributed energy resource to support grids with high levels of variable renewable energy generation.

A key element of the strategic framework agreement is the inclusion of Eaton's proprietary EnergyAware UPS technology in Microsoft projects. The primary function of a UPS is to provide backup power protection for mission-critical applications and facilities and to protect them from grid outages or power quality issues. Through close collaboration over several years, Eaton and Microsoft have added digital capabilities to the UPS, which enables it to be used as a distributed energy resource (DER) to support grids with high levels of variable renewable energy generation.

This will allow for a new generation of 'grid-interactive' data centres, including those operated by Microsoft, to support grid operators with the provision of critical flexibility services. Selling flexibility into the grid is an opportunity for data centres to monetise underused assets, by providing energy storage, for example, and supplying the fast frequency response services which grid operators will increasingly need as renewable energy capacity increases and the grid loses the inertia associated with fossil-fuel power generation.

Craig McDonnell, Senior Vice President and General Manager of the Energy Transition and Digital Division at Eaton, highlights that: "A grid-interactive UPS can help decarbonise energy at grid level, which means its sustainability benefit extends beyond the data centre. This changes the game in terms of energy management within the data centre's overall environmental impact profile."

Sean James, Director of Data Centre Research at Microsoft said: "A grid-interactive data centre is one where its extensive electrical system functions not only to protect customer IT data and applications but also to provide valuable electrical services back to the transmission system operator and the grid. These auxiliary services will be increasingly critical to help grids cope with high levels of variable renewable energy." □

their dependence on other nations for such key resources, as well as reduce costs and support moves to limit their adverse impact on climate change.

The vulnerability of South Africa's energy resources has again been highlighted through emergency load shedding schedules implemented.

Along with significant increases in energy costs agreed to by the energy regulator, it is likely that Eskom's cost base will rise further as coal prices surge due to scarcity in Europe and demand for coal exports grows to meet the rest of the world's hunger for energy.

It is clear that the transition to renewable energy needs to speed up, and the disruptions currently experienced around the world should be seen as a catalyst for the rapid technological and behavioural change we need, to shift away from an unsustainable energy system that's centred on non-renewable fossil-fuel resources.

Eaton welcomes the recently announced opening of Bid Window 6 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP), and we are

looking forward to more such opportunities for the South African market to become a global leader in alternative energy sources, from solar to hydrogen, and more.

A collaborative effort from both the private and public sectors can help provide solutions and technologies that respond to the social issues around us. This could be through bringing innovative solutions like microgrids to suburbs and communities, or through investing in skills development among the people who work for us so they can grow and become leaders in their own right.

There really is no time like the present to approach these challenges as opportunities – to change our business models, taking action to change the way we source energy, the way we harness and store it, and to limit the climatic consequences of our actions, for the benefit and survival of future generations. □

For more information visit: [www.eaton.com/za/](http://www.eaton.com/za/)

## ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT : PRODUCTS + SERVICES

### SA's largest solar PV carport comes online in Pretoria

Marking another milestone in the development of South Africa's solar energy market, pioneering domestic energy firm SolarAfrica has successfully commissioned the country's largest solar carport system – for the Ford South Africa Silverton assembly plant, in Pretoria.

The 13.5 MW solar project uses the sun's energy to produce 35% of the Ford plant's electricity requirements, averting emissions of more than 20 000 tonnes of CO<sub>2</sub> a year. It will support Ford in achieving its global sustainability target of using 100% carbon-free electricity across all its manufacturing operations by 2035.

In terms of the power purchase agreement governing the project, Ford will only pay for the electricity it uses. This is in line with the standard framework agreement developed by SolarAfrica. Additionally, the PPA did not require upfront capital expenditure from the client but was co-funded by Commercial Energy SA (CESA). The CESA investment facility is based on a long-term joint venture between the Evolution II Fund and SolarAfrica.

Steven Faure, Partner at Inspired Evolution, the advisor to the Evolution II Fund, said, "This project, bringing clean energy to Ford's Silverton operations, marks a key milestone in the rollout of solar PV solutions for commercial and industrial consumers in South Africa. We will continue to work with SolarAfrica to deliver world-class solar solutions, contributing to a reduction of GHGs and improving energy security across the country."

SolarAfrica CEO, David McDonald says the project, which required over 35 000 man-hours and created over 120 jobs among subcontractors, represents a significant step-change in the progression of large-scale solar PV energy projects in South Africa.



The 13.5 MW solar photovoltaic carport installation at the Ford assembly plant in Silverton.

"We applaud Ford South Africa for taking the lead and committing to a sustainability project of this scale. As well as the environmental and cost benefits, the Ford solar project has had a big impact on job creation in the Tshwane area, which is fully aligned with the City of Tshwane's focus to grow the automotive industry as a key driver of employment," he says.

The bespoke, large-scale cantilevered solar carport structure provides parking bays for more than 3 600 vehicles and comprises over 30 000 solar panels. Designed and constructed by SolarAfrica, the carport provides an efficient way to deploy solar power as the solution protects parked vehicles from poor weather conditions and, at the same time, produces cheaper, cleaner power.

"We are pleased to contribute to the sustainability of this sector and to assist Ford SA in realising its vision for job creation – with the aim of building further industry growth and indirect employment," McDonald adds.

For more information visit: [www.solarafrica.co.za](http://www.solarafrica.co.za)



Dwibin Thomas,  
Schneider Electric.

# Digitalisation – the gateway to improved grid performance

Dwibin Thomas, Cluster Automation Leader at Schneider Electric

***The generation, transmission and distribution of electricity is fraught with challenges, particularly in South Africa where stability of supply remains a prevalent and contentious issue. The South African grid, like others internationally, is affected by changing trends such as decentralisation, decarbonisation and the need to incorporate alternative energy supply into already aging infrastructure.***

To address these challenges, utilities need to move towards a software architecture that leverages connected products to deliver insights, efficiencies and intelligence which can take them one step closer towards harnessing the benefits of the smart grid. And central to it all, is digitalisation.

## Addressing immediate challenges

It is estimated that South Africa's current fleet of power stations runs on average at 65% availability (or less by current measures); that means 35% (or more) is not available at all due to maintenance and outages. It is a significant proportion, which explains why the grid is volatile and so severely affected by additional generating units going offline.

Digitalisation can go a long way in preventing downtime, by providing valuable visibility into power and equipment conditions. The reality is that many facilities still use a rudimentary level of technology to prevent power system failures and to minimise operational costs. This means faults

are addressed in a reactive rather than a predictive and proactive manner.

With digitalisation the return on investment (ROI) from a fault finding, and operational cost perspective, will be quicker than many would expect. With digitalisation, utilities can uncover opportunities to:

- Optimise energy use and cut costs
- Be warned of potential risks
- Recover faster from problems
- Streamline maintenance and reporting
- Boost the performance and lifespan of equipment.

## Progressive steps

With significant advances and innovation in technology, digitalising the grid infrastructure becomes less daunting. Some utilities are already moving towards digitalisation – using smart devices such as digital power meters and smart circuit breakers on their infrastructure.

Connecting these devices and integrating them with an-

## Energy leaders collaborate to advance the energy transition

Hitachi Energy, a market and technology leader in transmission, distribution and grid automation solutions, and Schneider Electric, a leader in the digital transformation of energy management and automation, have entered into a collaborative agreement to provide greater customer value and accelerate the energy transition.

The non-exclusive collaboration will support customers' sustainability efforts and the decarbonisation of the energy and industrial sectors. Hitachi Energy will leverage Schneider Electric's medium voltage portfolio, and Schneider Electric will be able to use Hitachi Energy's high voltage portfolio to provide more comprehensive offerings.

This new collaboration builds on the trusted track record,



Hitachi Energy and Schneider Electric have formed a non-exclusive collaboration to advance energy transformation.

global footprint, and extensive experience of both companies, both leaders in sustainable energy technology, and in delivering projects for renewables, data centres, mining and other industry sectors. The two companies expect the new collaborative ecosystem to ensure benefits for customers across the life cycle of their operations, including a more holistic offering, strengthened supply chain and enhanced efficiencies.

Claudio Facchin, CEO of Hitachi Energy, said: "We continue to innovate with technology and business models to advance a more sustainable, flexible and secure energy system. We have chosen to collaborate with Schneider Electric to enhance our complementary portfolios and address the need for faster deployment of grid solutions for our customers."

Jean-Pascal Tricoire, Chairman and CEO, Schneider Electric, said: "We are launching this collaboration to help our customers deploy the green electricity solutions instrumental in the fight against climate change. With Hitachi Energy, we're committed to leveraging our respective strengths to solve our customers' most pressing energy challenges."

For more information visit: [www.hitachienergy.com](http://www.hitachienergy.com)  
or: [www.se.com](http://www.se.com)

analytics applications, enables utilities to obtain insight into actionable information that can assist them in managing and optimising energy usage throughout the grid.

The good news is that legacy equipment can also be retrofitted with smart devices and sensors. The upgrades are still cost-effective when the extensive benefits of digitalisation and the ROI are taken into account.

The Internet of Things (IoT) is enabling more connectivity and intelligence in various devices: from breakers and transformers to power quality monitors and busbar temperature sensors, to equipment with embedded sensors like protection relays, to automation equipment such as RTUs (remote terminal units).

Smart devices running on a power network can perform metering, logging, and analysis. The IoT allows for this data to be shared with cloud-based storage and applications, and mobile apps can be used to access each device's on-board data and functions.

Overall, this means a utility's operations and maintenance

personnel gain easy, fast access to important information and alarms from wherever they are, and the ability to collaborate across teams.

Smart devices and functions can be optimised by powerful software applications which are aggregating and analysing data from across many facilities. This is where the full potential of digitalisation is realised: providing utilities with visibility into every aspect of the electrical system, be it supervising electrical processes, or early warning of risks, or capturing opportunities to improve power, energy, and equipment performance.

A digitally connected power distribution system can provide utilities with the tools to maximise energy and life cycle efficiency as well as implementing condition-based maintenance. Additionally, it can prepare the grid to switch over to renewable energy sources in a seamless and less disruptive way. □

For more information visit: [www.se.com](http://www.se.com)

## ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT : PRODUCTS + SERVICES

### Local wind energy team gains global experience

The core local construction operations team from Nordex Energy South Africa (NESA) headed to Spain in June, to start their training at Nordex's Tajonar and Barasoain facilities, close to Pamplona. Including site managers, specialist technicians and other personnel with key skills, the cohort of ten is being trained on Nordex's updated wind turbine technology, in preparation for significant growth in South Africa's wind sector, which will require sound construction expertise.

Innes Louw, Head of Operations at NESA said, "We are a proudly South African team and we are pleased to receive this global exposure and to be able to bring additional skills back home, in preparation for the expected period of intense construction as our country's wind sector begins building the much-needed new wind farms." Louw also highlighted that one of the team members will go on to Australia, to gain experience at the Mortlake South Wind Farm.

Some of the team will remain in Spain or travel on to Finland for about six months, to receive intensive training on the Nordex Delta 4000 platform. This is the standardised technology that is to be implemented by Nordex across its new wind farms going forward.

As the industry in South Africa gears up to meet the 24 GW of new renewable energy build by 2030, the need for skills will increase. This will support the sector's contribution to the country's energy and infrastructural needs as well as job creation and a well capacitated workforce.

Local OEMs (original equipment manufacturers), such as Nordex, play a key role in stimulating local jobs and skills. The company sees Bid Windows 5 and 6 of the REIPPP Programme as an important link in driving the local value chain, which will directly stimulate the domestic job market.



The Nordex SA team visiting the Nordex Acciona wind turbine assembly facility in Barasoain, Spain.

Compton Saunders, Managing Director of Nordex Energy South Africa, noted that due to the intermittent nature of past construction periods in the renewable energy sector, the industry had lost talent and skills to other construction projects in the country, or to the global wind industry. "The more consistent awarding of projects and financial closure in the bidding rounds, will result directly in job creation and skills development as it will enable local manufacturing to be re-established," Saunders said.

Nordex Energy South Africa has a total installed capacity of more than 1 GW, giving it a leading 32% share of the total installed wind capacity in South Africa. The company has built and currently operates nine wind farms (1.1 GW) in the country, under the REIPPP Programme. NESA is part of the Nordex Group which focuses on development, manufacturing, project management and servicing of onshore wind turbines. With the acquisition of Acciona Windpower in 2016, the Nordex Group has become a global player and one of the world's largest manufacturers of wind turbines.

For more information visit: [www.nordex-online.com](http://www.nordex-online.com)

# Upgrading ESPs to meet new emissions regulations

*Babcock has come full circle at a major power station where it will be upgrading electrostatic precipitators (ESPs) on six boiler units that it designed and built in the 1980s. Using technology not available at the time of the original construction, Babcock will bring the boiler units into the 2020s, enabling the power station to comply with current emissions regulations. These limit dust to below 50 mg per normal cubic metre (Nm<sup>3</sup>) of flue gas, essentially halving the impurities.*

This power station has provided reliable power to the utility for more than four decades, ranking as the best-performing and lowest-cost generating station in the utility's fleet. The boiler was designed to burn coal with a low calorific value and an ash content above 40%. Producing fly-ash with a low carbon content proved beneficial for the cement industry, which relies on this product property to improve water resistance in cement.

Looking to the latest emissions regulations, the upgrade of the precipitators' capability required to achieve dust levels of below 50 mg/Nm<sup>3</sup> will entail a three-part programme:

- The upgrade and refurbishment of the SO<sub>3</sub> conditioning plant
- Changing the technology on the ESPs' transformers to convert them into high-frequency sets
- The upgrade and refurbishment of the ESPs to maximise dust collection efficiency to comply with new legislation.

Babcock has been awarded the third portion of the programme and will refurbish four precipitator cases in each boiler, starting in 2023.

Dave Brook, Technical Director at Babcock, explains that ESPs use an electric charge to remove impurities from air or gases through a series of collector and discharge electrodes.

"Fly ash is a very fine dust found in hot flue gases from coal combustion. It travels through the heat transfer surfaces of the boiler and the air heater, and emerges through the ducting and through electrostatic precipitators. After it is removed and deposited in the

hoppers below, the fly ash is either removed from site or sold to the cement industry," Brook says.

"The fine dust in the gas travels a tortuous route in the boiler, resulting in areas where there is more dust, and others with less dust. For the ESPs to function optimally, the gas distribution should be as homogenous as possible," he adds.

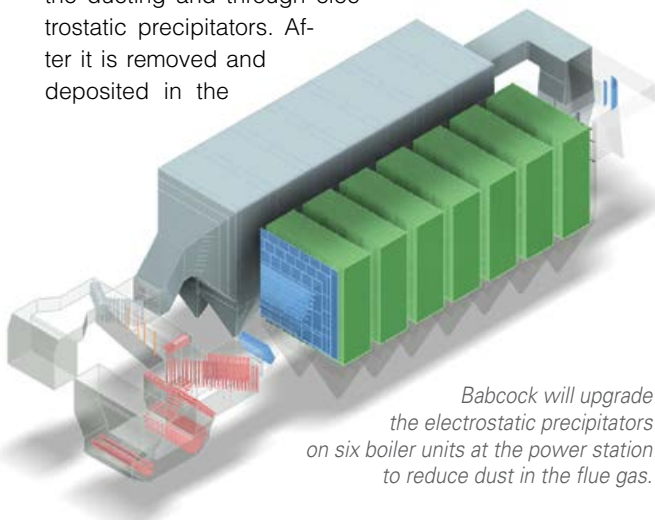
Brook describes an ESP as a box with a series of electrodes or plates strung vertically inside it. The dust particles are charged, creating a flow to the collector electrodes on which the dust is deposited and collected. When these plates get full, they are rapped (struck), and all the dust slides down into the hopper.

Babcock will use computational fluid dynamics modelling, which was not available in the 1980s, to model the gases from the outlet of the boiler into the precipitator cases, to better understand and manage what is happening with the gases under different load conditions and improve dust distribution. This, in turn, will improve dust collection and removal.

Babcock's scope of work also includes the replacement of the current wire-type discharge electrodes with modern and more reliable rigid discharge electrodes. Over time, the 12-metre long weighted discharge electrode wires have started to perish, diminishing the electric, or corona field which means the collector electrodes lose efficiency and collect less dust. The new rigid discharge electrodes, which will be manufactured in South Africa, cannot break and will create a more stable corona field, maximising the efficiency of the ESPs.

Babcock is the lead contractor responsible for all project management, integration, delivery and construction for the project, and will be working in partnership with USA-based Babcock & Wilcox (B&W). B&W owns the technology of the original design of the precipitators and will be undertaking the process and detailed engineering.

As one of the most established and experienced steam generator and industrial plant suppliers in Africa, Babcock has delivered solutions to many of the power stations in the country. It is currently working at several sites undertaking projects that include high-pressure piping, coal burner overhauls and mill maintenance. □



*Babcock will upgrade the electrostatic precipitators on six boiler units at the power station to reduce dust in the flue gas.*

For more information visit: [www.babcock.co.za](http://www.babcock.co.za)

## Soetwater adds another 147 MW to the grid

Following fast on the recently announced connection to the grid of its 147 MW Karusa wind farm in the Laingsburg Municipality of the Western Cape, Enel Green Power South Africa has, in addition, connected the 147 MW Soetwater wind farm, which is located in the Karoo Hoogland Local Municipality in the Northern Cape.

The Soetwater plant has the capacity to generate 585 GWh per year, potentially averting the emission of some 600 000 tonnes of CO<sub>2</sub> into the atmosphere annually. Like the Karusa wind farm, the Soetwater facility features Vestas V136-4.2 MW wind turbines, the largest on the African continent to date.

The project was awarded to Enel Green Power in April 2013 as part of round four of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and is supported by a 20-year power purchase agreement with the national energy utility, Eskom.

Soetwater brings the number of EGP RSA wind farms in operation up to seven. This includes Nojoli (88 MW), Oyster Bay (140 MW), Nxuba (140 MW), Gibson Bay (111 MW) Garob (140 MW) and Karusa (147 MW).

Collectively, the company now has 12 operational wind and solar projects in South Africa. With all projects

now in operation, it has an overall installed capacity of 1.2 GW of renewable energy.

Manuele Battisti, the newly appointed Country Manager of EGP RSA, says construction of the Soetwater facility, which involves a 200-million-euro investment in South Africa, began in September 2019.

"The construction process was hampered at times by stop/start delays in response to Covid-19 lockdowns and restrictions. The hard lockdown in 2020, in particular, resulted in difficulties relating to the movement of people between provinces, as well as travel for experts and commissioning teams from other parts of the world. This highlights, all the more, what a significant achievement this project completion is – for the project team and for the country," he adds.

EGP RSA is committed to playing a key role in helping the country solve its energy crisis using renewable energy solutions. The company also supports local employment, among its own staff as well as in hiring local contractors during project construction, with the aim of promoting socio-economic and enterprise development.

**For more information visit: [www.enelgreenpower.com](http://www.enelgreenpower.com)**



*The 147 MW Soetwater wind farm in the Northern Cape is now connected to the electricity grid.*

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## Changing energy into solutions

After a decade-long expansion of its manufacturing capabilities in South Africa, Zest WEG, the South African subsidiary of Brazil's WEG Group, is well placed to expand its already extensive footprint in the African market.

Most of Zest WEG's product range will be on display at the upcoming Electra Mining Africa 2022 exhibition, under the company's theme of how to change energy into solutions. In addition it will showcase its high-tech solutions demonstrating how far WEG has progressed on its digital journey.

Juliano Vargas, outgoing CEO of Zest WEG in South Africa, says, "We now have six manufacturing facilities in Gauteng and Cape Town, producing a wide range of equipment, including gensets, transformers, electrical panels, E-Houses, MCCs and mini substations. This ability to manufacture locally gives us a huge advantage in the African market, as we can produce economically and deliver promptly to countries throughout the sub-Saharan region."

According to Vargas, who is taking up an appointment at another operation of WEG Group, Zest WEG's drive on local manufacture and local sourcing is consistent with WEG's global approach of maximising local content and procurement wherever possible. Importantly too, this has contributed to Zest WEG earning Level 1 B-BBEE status.

"WEG now manufactures in 12 countries outside of Brazil with these facilities accounting for more than a third of the group's global production," he says. He adds that Zest WEG is among the largest WEG operations outside of Brazil, including those in the USA, Germany, and China.

Vargas's successor as CEO at Zest WEG is Eduardo Werninghaus, who has been with WEG for more than 15 years and who comes to South Africa from WEG's USA subsidiary. "I've been briefed to build on the firm base created by Juliano and his predecessors," says Werninghaus. "WEG is not a company that is fixated on next quarter results only. It thinks and acts long-term and considers Zest WEG as being crucial to its future, given Africa's enormous growth prospects, which include a need for massive investments in energy infrastructure."

Zest WEG is responsible for the entire sub-Saharan region and works through an extensive network of branches and Value-Added Resellers (VARs) across the continent.

"Being local in Africa is a key part of our strategy," says Werninghaus. "We need to be close to the countries and communities we serve. There is a perception that all African countries are the same. This is not so. Each has its own unique culture, its own challenges and its own strengths. Having a presence on the ground in so many countries across the continent allows us to address this diversity."

Regarding the Electra Mining Africa 2022 exhibition, Werninghaus says, "Our theme, as always, will be how



*Zest WEG manufactures motor control centres at its Robertsham facility.*

to change energy into solutions. There will, however, be a particular emphasis on efficiency and sustainability. One of the products we will highlight is our range of WEG IE4-rated super-premium efficiency electric motors, which were launched locally last year. They cost no more than the IE3 motors and are the most energy efficient motors in the market – offering substantial operating cost advantages to users."

Werninghaus says the WEG IE4 motors have already been well received by the mining industry, which is struggling with constantly rising electricity costs. "A medium-sized mine typically has between 2 000 and 3 000 electric motors on site – powering everything from fans and pumps to conveyor belts and screens – so the potential for very significant energy and cost savings is huge."

He points out that electric motors account for about 40% of all industrial electricity consumption and around two-thirds of these motors are on mines.

Werninghaus adds that Zest WEG will also showcase its high-tech products and systems at Electra Mining Africa 2022. These include the already available WEG Motor Scan, which provides for continuous monitoring of electric motors and other rotating machines; and Pump Genius, a software package that enables a standard VSD to be dedicated to specific pumping systems with various motor and pump combinations, thus providing improved control and monitoring capability.

Also on show will be WEG's new Motion Fleet Management system, which uses artificial intelligence and machine learning to diagnose and monitor rotating equipment such as motors, VSDs, gearboxes and compressors. Based on cloud computing technology, the performance of assets can be monitored at any time from anywhere in the world. This enables a reduction in unplanned downtime and optimised repair actions.

According to Werninghaus, WEG has fully embraced the world of Industry 4.0 and the Internet of Things. "Keeping abreast of digital developments is a priority for us and Electra Mining Africa will give us an opportunity to show how far we've come on our digital journey," he says.

**For more information contact Zest WEG.**

**Visit: [www.zestweg.com](http://www.zestweg.com)**

## Customised dry-type transformers at Electra Mining Africa

Considering the varying nature of operating conditions from one mine to another, Trafo Power Solutions, a specialist in the design and supply of dry-type transformers, will demonstrate at the upcoming Electra Mining Africa 2022 its flexibility and ability to tailor its solutions to meet specific site and customer needs.

“Through many years of experience in the mining industry, pretty much across all commodities, we have recognised that each mine is different and has its own set of challenges,” says David Claassen, Managing Director of Trafo Power Solutions. “A one-size-fits-all approach is not appropriate, and this is why most of our products are custom-designed and -manufactured to suit specific site conditions.”

Because they use air as a cooling medium, dry-type transformers are typically installed in indoor environments. However, Trafo Power Solutions has a wealth of experience in supplying dry-type transformers for outdoor applications as well. The design of the enclosure is critical to withstand the commonly harsh conditions associated with high dust and moisture levels. Despite the restrictive nature of enclosures, the company’s custom design capability guarantees adequate ventilation, while allowing for the necessary levels of ingress protection to

keep dust and moisture at bay.

“With our in-house design capability, we are able to custom engineer solutions particularly for challenging underground applications. We can tailor the dimensions, weight and other factors to match the space constraints presented by vertical shafts or decline shafts which are used to take the transformer underground,” Claassen adds.

In the context of a renewed focus on environmental, social and governance (ESG) principles in the mining industry, Claassen says Electra Mining Africa presents an opportunity for the company to showcase how its solutions – dry-type transformers, modular-type and miniature substations, among others – meet the growing requirement for environmentally friendly solutions.

As well as sustainability, mines are continually pushing for progress in safety. The safety imperative is one of the key drivers for using dry-type transformer technology in the mining sector, Claassen says.



*Custom-designed and -manufactured cast resin transformers in a specialised IP55 enclosure installed outdoors in a mining application.*

**For more information visit: [www.trafo.co.za](http://www.trafo.co.za)**



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## Modular drives for power generation

To meet urgent local needs with substantially improved lead times, SEW-EURODRIVE is developing its modular drive concept to serve a range of industrial drive applications. National and Africa Manager for Business Development, Jonathan McKey, highlights some of the advantages this presents for the power generation sector.

SEW-EURODRIVE's expanded local capability at its new Aeroton facility will include the assembly of its latest X.e Series industrial gear units (IGs), its modular air-cooled condenser units (MACCs), standard, VSD- and servo-driven gearmotors, as well as customer-specific drive-train packages. For the power generation industry, these include drives for conveyors, cooling towers and ash handling; girth-gear solutions; fans, pump drives and other purpose-built modern and modular solutions.

### *X.e Series gear units*

Modular X.e Series units, the latest evolution in SEW-EURODRIVE's IG range, are more robust, reliable, efficient and easier to maintain than previous models. With a significantly increased number of possible torque/speed combinations and fine size graduations, solutions can be custom-built to suit clients' specifications.

Additional modular features and options include: motor adapters, integral and load-sharing backstops, various sealing and shaft systems, and more, all of which support the ease of use and reliability of X.e Series drive solutions.

"In the power industry, conveyor drives are often required to operate in extremely dusty and very hot or cold conditions. With new thermally optimised housings and the contact-free taconite sealing system, the X.e Series drives offer excellent reliability under these conditions," McKey notes.

The series offers an optimised choice of gear unit sizes, reduced gear unit weight and sufficient centre distances.

The new X.e range is also ideal for girth gear applications, where the new units have become the global standard for use with SEW-EURODRIVE's segmented mill drive solution.

### *MACC Series drives*

The company's MACC drives are purpose designed to drive the modern fan-based air-cooled condenser (ACC) systems used in steam-driven power generation plants. ACCs need to generate huge air flows to cool and condense the exhaust steam from turbines. "Our Modular Air Cooled Condenser (MACC) drives are design-optimised to suit these applications," McKey says.

Features include: a stiffer case with built-in cooling veins for improved cooling, and SEW-EURODRIVE's internal extended bearing distance (EBD) system, which better enables the gearbox bearings to accommodate the high axial and radial forces transferred through the fan and the drive shaft.

"We have also built in a maintenance brake so that, when servicing is required, wind from outside can be prevented from turning the fan and the main shaft, making the boxes easier to maintain in-situ," says McKey.



Jonathan McKey,  
SEW-EURODRIVE.

Where power stations need to replace faulty ACCs, SEW-EURODRIVE's MACCs provide valuable advantages. "And to make this easier for plant operators, we build customised adapter plates so the new drives can be easily retrofitted as a direct replacement for any older generation boxes currently in use. We also customise the output shaft length to match the ACC infrastructure on site and to establish the ideal fan position for maximum efficiency," McKey adds.

He says the typical lead time for imported large industrial gearboxes from most gearbox OEMs can range from 18 to 24 weeks or more. Once SEW-EURODRIVE's assembly plant is complete and operational, it will be able to assemble most common modular designs locally to produce three to five or more per week.

### *Electric motors, gearmotors and VSDs*

Supporting the modular approach to drive packages for the power generation and other industrial sectors, SEW electric motors are available in the power range from 0.09 kW to 375 kW, and in efficiency classes IE1, IE3 and IE4.

McKey adds that all these motors can be used compatibly in drive packages, either in combination with an industrial gear unit – directly coupled to a helical or bevel-helical gear unit or as part of a complete drive package on a base-plate – or fully incorporated into a gearmotor unit.

In its new Johannesburg factory, SEW-EURODRIVE will also be assembling its inverters, controllers and other electronic systems including AGVs. These are tailored to control the speed, torque and application-specific functions of drive systems – to optimise performance of the company's modular drive trains and gearmotors, in terms of energy efficiency and functionality.

"Our move to increase local assembly demonstrates SEW-EURODRIVE's commitment to being part of solving South Africa's long lead supply problems, and helping businesses overcome long delays in meeting urgent needs," McKey concludes.

**For more information contact SEW-EURODRIVE.**

**Visit: [www.sew-eurodrive.co.za](http://www.sew-eurodrive.co.za)**

# Improved capabilities in infrared line scanners

*Infrared line scanning has been used for decades and today, the technology is used across the process and discrete manufacturing industries. IR line scanners offer an effective online monitoring solution to obtain a complete temperature profile or image of a moving product. The scanners can be integrated easily into process equipment for continuous temperature monitoring and trend analysis. R&C Instrumentation here presents some of the advances made in infrared line scanning technology.*

Used in a production plant, an infrared line scanner provides a 'picture' of the surface temperatures across a moving product, such as metal slabs, glass, textiles, coiled metal or plastics. The scanner includes a lens, a rotating mirror that scans across the lens' field of view, a detector that takes readings as the mirror rotates, and a microprocessor to interpret the data.

As the mirror rotates, the line scanner takes multiple measurements across the surface, obtaining a full-width temperature profile of the product. As the product moves forward under the sensor, successive scans provide a profile of the product, from edge-to-edge and from beginning to end. This data may be processed within the line scanner itself, to create alarms or other outputs, or it may be transferred to a PC for higher level processing.

The computer converts the temperature profile into a thermographic image of the product, with various colours representing temperatures, or it can produce a 'map' of the product. The measurement points across the width can be arranged in zones, averaged, and used to control upstream devices, such as cooling systems, injectors or coating systems.

The wide field of view of a line scanner allows a 1:2 ratio of distance to product, which enables continuous fixed scanning of very wide objects, such as cement kilns, or close proximity processes, such as float glass lines. Unlike lightweight handheld portable IR scanners, fixed-head process line scanners are usually robust instruments with built-in features, such as air purging, water-cooling, and protective windows. They are often incorporated into monitoring or alarming and control systems with factory-floor interfaces.

## Advances in technology

In recent years, instrumentation manufacturers have introduced a new generation of infrared line scanners specifically designed for automated, high-speed discrete and continuous manufacturing processes. These systems feature the latest electronics, optics, communications and mirror mechanisms.

Rugged line scanners designed with cast aluminium housings and integrated water-cooling can be used in highly demanding industrial environments. These scanners also incorporate an integral air-purge collar producing laminar airflow across the scanner window to prevent contamination build-up.

To speed up alignment, some line scanners employ an internal line laser, which indicates the exact line-of-sight of the unit. The laser, protected by the line scanner housing, projects a vis-



*Infrared line scanners have seen many advances in recent years – offering users robust new capabilities.*

ible laser line onto the target while the line scanner is collecting data at full speed.

The most advanced infrared line scanners have achieved scan speeds up to 150 Hz – well above those of earlier scanner technology—and can deliver over 1 000 measurement data points. Increased scan speed allows the IR system to gather high-resolution data from even the fastest manufacturing processes. It also provides for quick detection of temperature variations and hot spots, such as those commonly found in food drying and plastics processing applications.

In addition, thermal images from multiple line scanners can be combined with related process measurements on a single PC-based system. The scanners' display formats typically include thermal image, thermal profile, 3D waterfall and sector trending. Facilities can include rolling buffer snapshots, zone/sector alarms, configuration recipes and a history review.

Infrared line scanner technology has further benefited from the development of real-time, Windows-based thermal imaging software, contour graphs, and thermograms in multiple windows. Users can select a portion of the thermal image and zoom in for a more detailed view, or compare a stored reference image with the current image to ensure consistency. The software automatically triggers an alarm when the temperature falls outside the desired range and produces a report showing the location and time of occurrence.

## Industrial Ethernet networks

The demand for digital communications challenges instrument manufacturers to offer cost-effective products that do not restrict



*Rugged line scanners with robust housing and integrated water-cooling can be used in tough industrial environments.*

interface choices. Often, the proliferation of disparate bus structures, dissimilar hardware and different software precludes general connectivity or interoperability.

The use of Ethernet in industrial automation networking has increased steadily and the range of Ethernet-ready products for device-level networks continues to grow. Most plant engineers have become familiar with the technology.

The big advantage with industrial Ethernet is the ability to standardise an entire enterprise – from the plant floor to the corporate boardroom – on one network, providing access to data from anywhere around the world. Ethernet networks provide an infrastructure to acquire, view, process, and transmit files, graphics and information over a company's intranet or the Internet. The increased use of industrial PCs on the factory floor reinforces this trend – and this, in turn, influences trends in industrial software.

Ethernet reduces installation costs by eliminating the need to run wires to connect various field devices and computers to a PLC or DCS. The user simply connects an Ethernet-compatible device to the nearest Ethernet hub. This technology also removes the constraints of proprietary network protocols, offering greater openness and accessibility to the network architecture.

Industrial Ethernet is well recognised as a universal networking systems interface for all types of measurement and control devices, including non-contact IR temperature measurement equipment. Unlike the RS-485 protocol, Ethernet supports the increased data flow rates of modern IR line scanners. It also offers the prioritisation and robustness essential for industrial automation networks.

Today's IR line scanners offer an on-board Ethernet TCP/IP communication capability. Within an existing industrial Ethernet infrastructure, users can connect directly to the scanners without the need to go through manufacturer-specific software or run wiring to proprietary controllers or connection boxes. Just like a network printer, the line scanner can be assigned a unique IP address and accessed from any computer in the factory. This offers the advantages of reducing the total installed cost, eliminating additional wiring,

conduit, and associated requirements, and at the same time providing unprecedented access to process data.

### Open protocols

Traditionally, large process control manufacturers built a lot of interconnected technologies, all communicating using common communication protocols. With equipment (instruments and/or software) provided by any single supplier, the user was assured that communication would be easy to set up and robust in operation. Picking the best of each sensor type on the market was not possible. Further, smaller niche manufacturers could not provide their technology in a useful format without creating multiple versions – one for each protocol – a process which resulted in very high licence fees and product complexity.

Industrial end users, who need to run software on their process control systems, are generally strong advocates for the move to open systems. Object-oriented technology, object linking and OLE for Process Control (OPC) are at the forefront of this trend. OPC provides increased interoperability and facilitates the exchange of information among different sensors, automation devices, control systems, and production applications running across a manufacturing enterprise. With open-network protocols, a user can modify one part of the system without affecting communications to other areas.

For example, plants using thermal imaging software with OPC server functionality can integrate infrared line scanners with an OPC-compliant Distributed Control Interface (DCI) or Human Machine Interface (HMI) system. OPC makes it easier to integrate measurement devices into different plant information systems by standardising the interfaces between dissimilar software and hardware. Further, OPC software drivers allow full interoperability with instruments using third-party OPC-compliant software. The creation of these drivers by instrument manufacturers will help minimise their involvement in software development (at least at the application level), allowing them to focus on sensor and measurement technology.

### Conclusion

Like other process measurement technologies, non-contact infrared line scanning has seen many advances in recent years – offering users robust new capabilities to control fast-moving production processes and eliminating a host of temperature-related problems. Instrumentation manufacturers are responding to industry demands by designing IR scanners that provide better online performance, greater simplicity and ease of use. □

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For more information visit: [www.randci.co.za](http://www.randci.co.za)

## Managed and unmanaged IP67 switches

Turck Banner is expanding its switch portfolio, adding three new IP67 switches – two unmanaged variants and one managed switch – to the line-up.

The two TBEN-Lx-SE-U1 feature eight 100 Mbit ports for the efficient networking of cells that do not require managed functions. For users simply requiring basic switch functions inside a cell, the TBEN-Lx-SE-U1 offers a solution that is also attractively priced for high volume purchases – for example for networking stations inside an automation cell. Its fully potted design and protection types up to IP69K allow for it to be used in the harshest environments without the need for protective enclosures. Short commissioning times are ensured as no configuration is required and the power supply is easily implemented with M12 or 7/8 inch connectors.

In its managed IP67 switches, Turck Banner is offering the TBEN-LL-SE-M2 variant with an M12 L-coded power supply. As well as providing eight 100 Mbit ports, the device comes with two Gigabit backbone ports. However, unlike the familiar managed switch, the new variant is supplied with M12-L coded power supply connectors. These can carry up to 16 A per voltage group.

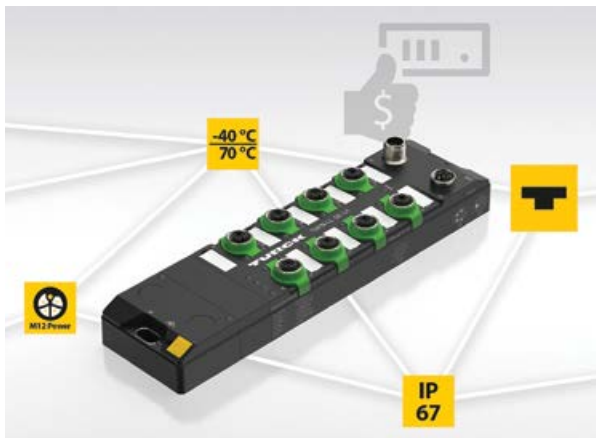
Its enhanced set of features with NAT routing, NTP and firewall, enables the logical encapsulation of automation cells. Users can, for example, use the same IP addresses locally without any address conflicts. The firewall protects the automation network from external factors.

**For more information contact Turck Banner.**

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*Turck Banner has introduced three robust new managed and unmanaged switches to its portfolio.*

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## Pressure matters in making good coffee

Coffee is one of the world's favourite drinks, so it is no surprise that coffee machines can be found in many places where people live and work. Coffee from bean-to-cup machines is enjoyed most often.

Bean-to-cup coffee machines can produce a range of coffee options completely automatically. A fully automatic machine includes a grinder, an instant water heater, a pump and a brewing assembly. In addition to making coffee, some bean-to-cup machines are equipped with extra modules which use steam to heat and foam milk.

The grinder has the task of producing freshly ground coffee from whole coffee beans. A mobile piston then transports the ground coffee to the brewing chamber, which is part of the brewing assembly and the heart of the machine. The instant water heater is responsible for heating the water that is to be used. A pump is connected to the water heater to transport the hot water.

The coffee grounds and the hot water are combined within the brewing assembly. In order to produce the coffee, the coffee grounds are first pre-brewed, where they are moistened with a small amount of water at low pressure and swell up, allowing the flavours to be released. Then, the chosen quantity of hot water is forced at high pressure through the layer of swollen coffee grounds and a highly concentrated coffee is produced. The light cream foam on the surface of the coffee comes from the coffee oils released through this process.

Pressure is essential for an aromatic coffee. Within the brewing assembly and in producing the coffee, specific pressure is used in most bean-to-cup machines. To create this pressure, it is essential that the built-in pump carrying the hot water into the brewing chamber itself produces a high pressure. This is because the pressure reduces over the course of the process. Sensors are needed to monitor and guarantee the performance



*Pressure transducers from Keller's 21C series, as used in Rex-Royal S300 coffee-making machines, suit many food & beverage applications.*

of the system. The sensors do more than measure the steam pressure – they also regulate the temperature of the water. A sensor is also required to prevent overpressure. If overpressure occurs, a valve is switched to allow the steam to escape.

Swiss manufacturer, Rex-Royal AG makes bean-to-cup coffee machines and develops new products and technologies to produce perfect coffee. For its S300 range of coffee machines, Rex-Royal sources pressure transducers from KELLER's 21C series. As well as monitoring the pressures as described above, these pressure transducers measure and control the temperature of the milk heated to make latte macchiato and cappuccino coffees. Rex-Royal's coffee machines put the perfectly brewed coffee within reach.

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## Ethernet switches for field installation

Phoenix Contact has extended its range of Ethernet switches with additional managed and unmanaged switches for field installation.

The FL Switch 2600 and 2700 managed switches with IP65/IP66/IP67 degrees of protection extend the range of the FL Switch 2000 product family and simplify the integration of distributed sensors, actuators, cameras, and I/O stations into the network.

The narrow design means the FL Switch 2600 and 2700 managed switches can be installed in diverse mounting locations. The flexible M12 connection technology allows users to select between using the classic M12 connector with screw connection and the M12 Push-Pull fast-locking system from Phoenix Contact. The range of functions and versatile configuration options, for example via mode button or micro SD card, round out the range of new versions.

The additional unmanaged switches – the 1608 and 1708 variants of the FL Switch 1000 product family – also offer IP65/IP66/IP67 degrees of protection and make it easier to integrate distributed sensors and other devices, including I/O stations into the network.

The rugged housing allows for wide ranging options in mounting position. As with the managed switches, users can choose the classic M12 screw connection or Phoenix Contact's M12 Push-Pull fast-locking system. The unmanaged switches support the Quality of Service (QoS) functionalities of the FL Switch 1000 product series for customary use of automation protocol prioritisation.

**For more information contact Phoenix Contact SA.**

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## Smart sensors inform predictive maintenance

Sensor specialist, SICK collaborated with packaging giant, Tetra Pak, when it sought a solution that would prevent unscheduled downtime in its packaging plants and support maximised productivity and lower operating costs. The solution enables Tetra Pak to carry out condition monitoring and predictive maintenance in its plant more efficiently.

To address Tetra Pak's requirements, SICK recommended its smart sHub sensors with EDS/EDM35 feedback system. This motor feedback system incorporates an acceleration sensor and enables comprehensive condition monitoring of electrical drives on a machine. It monitors position and speed as well as measuring vibrations, for example. Equipped with HIPERFACE DSL® infrastructure, the sHub sensors can be easily integrated into automation systems.

The sensors enable a self-optimised process that detects acute issues, allowing for early intervention and preventive maintenance. It is possible to forecast component failure with a high degree of accuracy. Through its connected devices and machines, this increases the reliability of drive systems in any packaging processing plant for efficient functioning. For instance, SICK can predict failure of ball bearings, which are critical components in a servomotor and statistically the leading cause of motor failure.

"Packaging processing plants can maximise their return on investment through optimised technology like this, which enables early intervention to prevent unscheduled downtime," says Grant Joyce, Managing Director, SICK Automation.

**For more information contact SICK Automation Southern Africa.**  
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## High performance in a small housing

ifm's long sensing range of M8 inductive sensors offers more than conventional M8 sensors. In 3 mm (flush) and 6 mm (non-flush) versions, the sensors are ideal for demanding position detection applications where space is limited. And with a standard M8 connector they provide for easy installation and replacement.

Process reliability is guaranteed by switch point monitoring for detection of wear and a high switching frequency of 600 Hz.

In addition to the switching output, the sensors have an IO-Link interface. This allows for convenient remote parameter setting. The high precision sensors enable users to monitor the switch point to the nearest millimetre and detect mechanical deviations that may be caused by wear, at an early stage. Extensive diagnostic functions, such as integrated unit temperature monitoring, provide additional safety in the installation, sending early warnings in critical applications.



*ifm's high-precision position detection sensors with standard M8 connector.*

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# Moving a production line

*This maintenance note on moving a production line is presented by Comtest, local representative for Fluke, a leading supplier of a wide range of electrical and electronic test and measurement tools. Here, Fluke highlights key considerations in planning a production line move, implementing it efficiently, and seeing to the start-up and testing once the move is complete, with particular attention given to the electrical systems.*

**M**oving or reconfiguring a production line can disrupt a complex and finely tuned system. When a line is moved, electrical distribution systems, variable frequency drives (VFDs), programmable logic controllers (PLCs), lighting, communication circuitry, controls, emergency stop systems, and more are susceptible to unanticipated changes ranging from glitches to outright failures. Glitches and failures at the unit level can, in turn, cause failures at the system level, such as unexpected tripping of conveyor drive systems, failures of the plant floor communication system, equipment overheating, unsafe electrical systems – and potentially a lot of headaches and downtime.

Problems caused by a move may not be immediately visible when a line is returned to service. Some symptoms of potentially serious problems may appear only long after installation and setup are complete. These may crop up in:

- Motors that become noisy or burn out prematurely
- Equipment shutting down for unclear reasons
- Sensors and detectors not functioning properly
- Operators complaining of ergonomic problems.

## Outsourcing electrical work is not always the answer

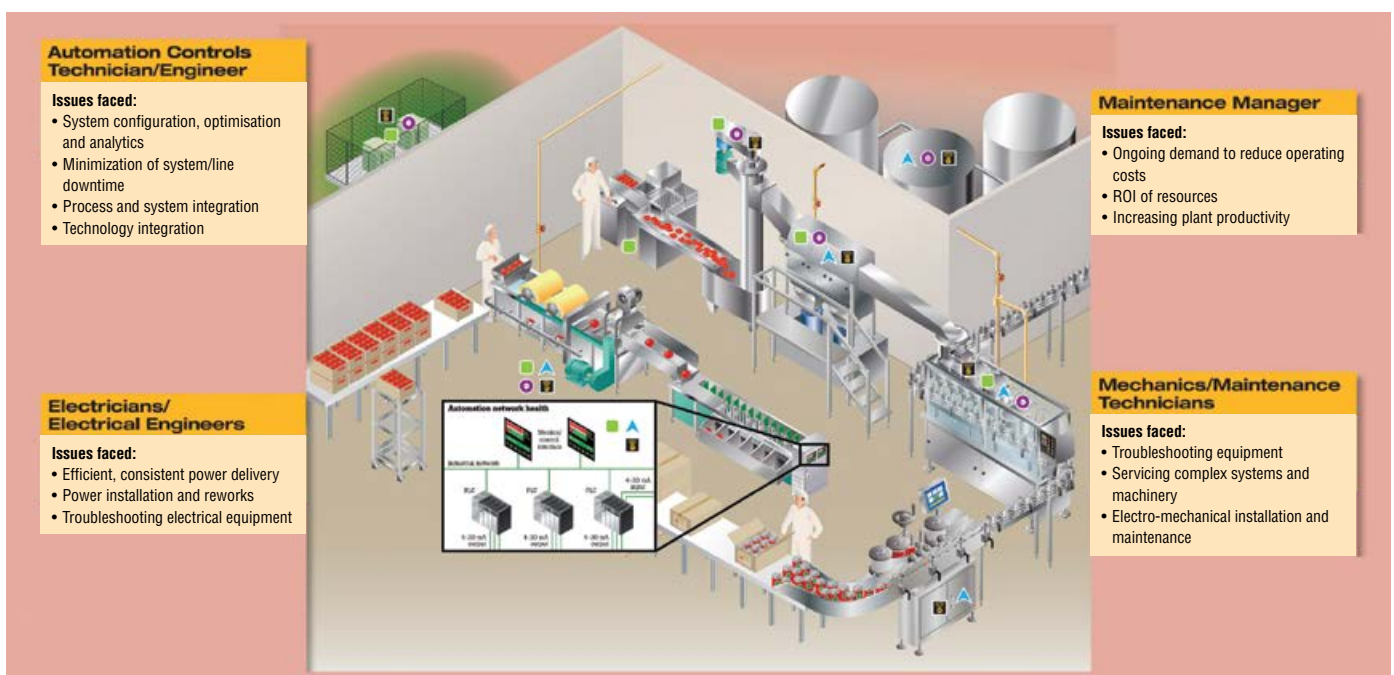
During a production line move, in-house electricians and

plant maintenance personnel are often fully occupied in just keeping the facility operating and, as a result, electrical work for the move is often outsourced. Although electrical contractors can usually be relied on to follow the requirements of the National Electrical Code (USA) for all the electrical work they do, it is important to keep in mind that the code does not require a contractor to address many of the less obvious and frequently overlooked problems, such as voltage drops, harmonics, and EMI (electromagnetic interference).

The contractor's job is to provide an electrical installation "essentially free from hazards but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use," according to Article 90 of the National Electrical Code. Unless particular contractual provisions have been made to upsize conductors, use cable specifically designed for VFDs where needed, and the like, the plant owner should not rely on the electrical contractor to anticipate and solve many of the subtler issues that may arise, or to plan for future control and equipment concerns or enhancement.

## What needs to be done?

Many of the things that need to happen when moving or reconfiguring a production line are obvious.



*Moving a production line can disrupt a complex and finely-tuned system. (Diagram not to scale, for illustration purposes only)*

- Design the new layout
- Schedule and coordinate each step of the process
- Calculate costs
- Disconnect, move, and re-rig equipment
- Reroute wiring
- Reinstall and reconnect equipment
- Start up, test, and troubleshoot the reconfigured line.

Some of the less obvious requirements for a new or re-configured setup include:

- Finding and correcting any EMI problems
- Replacing worn-out and outdated equipment and upgrading equipment where it makes sense to do so
- Ensuring motor drive systems are delivering clean power, free of harmonics and at the right voltage after the move.

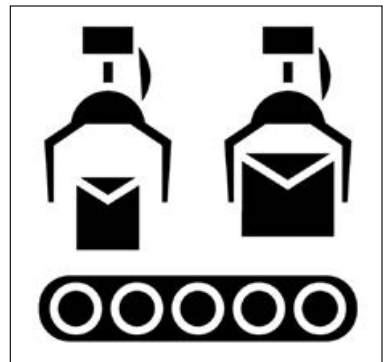
### An electrical system checklist

When engineering is occupied with getting the production line laid out and operating, the project manager is focused on staying on schedule, and maintenance is tied up keeping the rest of the plant's equipment running, how does one ensure the new electrical installation will work safely and correctly when it is brought back online? How can one ensure upgrade and replacement opportunities are realised? Try using a checklist. It can serve as a map, an agreement

about what is to be done – and when and how – and as a memory aid to make sure everything gets done.

At a minimum, a checklist should address:

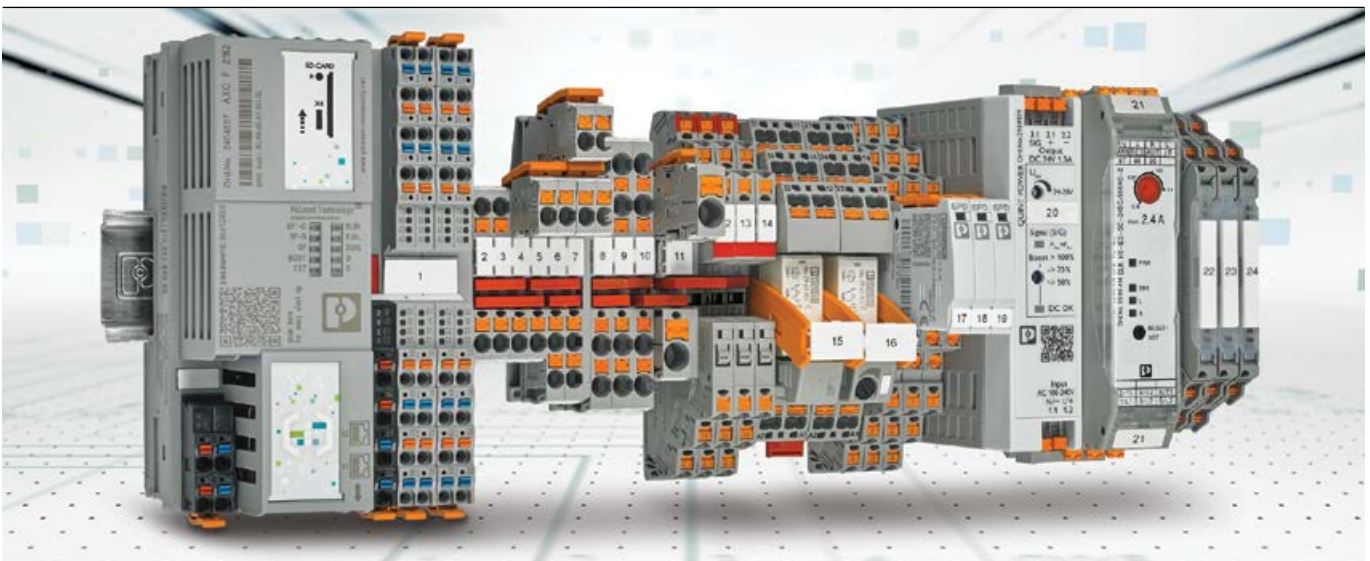
- Safety
- Power quality
- Voltage drop and voltage unbalance
- VFD-related concerns
- Grounding
- Power and control wiring
- Additional items specific to the industry, processes, goals, and requirements.



Fluke's nine-step checklist can be used as a starting point to help plan the production line move.

Fluke provides a nine-step checklist, which is available from Comtest and can be used as a starting point to help plan a production line move, to keep it on track, to realise the opportunities for replacements and upgrades, and to help troubleshoot when the move is done. □

For more information visit: [www.comtest.co.za](http://www.comtest.co.za)



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John Evans,  
Diagnostics Manager  
at WearCheck.

# Don't mess with diesel

*In response to an article that appeared in Fin 24 on June 15<sup>th</sup> this year, Gwede Mantashe, Minister of Mineral Resources and Energy, warned of the use of illuminating paraffin (IP) to doctor diesel in an attempt to defraud the revenue services and increase profits. WearCheck Diagnostics Manager, John Evans, provides some background on this practice, the deleterious effects it can have and the various methods for testing diesel for the presence of illuminating paraffin.*

**D**iesel can be subjected to a range of chemical and physical tests in the fuels laboratory. One of the most common and important things to look for is contaminants, and the most common of these are dirt and water.

Diesel can also be contaminated with other fuels and solvents, in particular illuminating paraffin, or IP as it is known. IP is a readily available power source for domestic lighting, heating and cooking. Chemically, it is very similar to diesel, but because it is used as a domestic power source, it is not subject to the taxes and levies that diesel is; in other words, it is cheaper than diesel.

Some less-than-honest members of our society have taken to doping diesel with IP and, because it is so similar (but not exactly the same) to diesel, a diesel engine will run without a problem on a diesel/IP mixture at less than the cost of diesel – over the short term. However, in the long term the IP will be quite damaging to the engine.

IP has a lower viscosity and less lubricity than diesel and will cause damage in terms of increased wear to the components of the fuel system.

Although the price difference may not be huge (about R25 per litre for diesel and about R20 per litre for paraffin) if we think of the thousands of litres of diesel used every day, doping diesel with ten or twenty per cent paraffin represents a large cost saving for nefarious operators – and a significant loss of income for the South African Revenue Service (SARS).

## IP contamination of diesel

The effects of IP contamination on diesel are seen in decreased viscosity, density and a lower flashpoint, and an increase in the sulphur concentration. IP also has a lower lubricity than diesel. Low viscosity and lubricity mean increased wear of fuel system components. Low density means the user gets 'less bang for their buck' – more litres of fuel are required for the same number of kilometres travelled. A low flashpoint could become a safety issue and elevated sulphur could impact the emissions controls of modern engines and increase combustion by-products being introduced into the lubricating oil, in turn reducing its ability to lubricate the engine adequately.

Interestingly, small amounts of IP may not affect the properties of diesel enough for it to fail the SA Bureau of Standards specification SANS 342; so, IP can be present, yet the fuel will still pass the specifications of SANS 342. In fact, IP is often legally added to diesel in small amounts by the refineries as it helps prevent the diesel from waxing (freezing) during the cold winter months inland. Nonetheless, doping diesel with IP, in the long term, is not a good idea, and it is illegal.

## Testing diesel

Because this type of doping represents a loss of income for SARS, the authorities have introduced a chemical marker into illuminating paraffin sold in South Africa. The marker comes from a company in the United States called Authentix, which specialises in brand protection and anti-counterfeiting. This marker is added to IP at a precise concentration once the product leaves the refinery.

It is possible to test for this marker. The test kit is a lateral flow test kit, similar to those used for testing for Covid or even pregnancy. The answer is a simple yes or no: the marker either was or was not detected. The test kit is easy to use and takes very little time. What it cannot tell the user is how much IP is present. It is important to mention here that if the IP came from a source that was not marked, for



WearCheck's diesel test kit. Testing for illuminating paraffin in diesel is just one of many assessments offered by the company.

example, from across our borders, where markers are not used, then no marker will be detected. Yet, the sample could be contaminated, but not by enough IP to fail the other physical tests carried out, for example, on viscosity, density and flashpoint.

Further testing is possible, however. The diesel sample can be sent to a SARS-approved laboratory, where analysis is conducted using a GC-MS (gas chromatography – mass spectroscopy) instrument. This measures the amount of the marker in the fuel and, from that, it is possible to calculate the amount of IP in the fuel.

The reason for there being two levels of testing is that (at the time of publishing), the lateral flow test kits cost about R500, while the actual percentage test costs around R5 500 – more than ten times the cost of the lateral flow test, and has to be outsourced.

Although it is possible to use gas chromatography to analyse the suspect diesel sample and look for IP, because of the very similar physical and chemical characteristics of the two fuels and the large number of compounds in each, the process is slow, expensive and not particularly accurate.

**Other contaminants in diesel**

On the topic of contaminants in diesel, it is important to take a quick look at the other contaminants that can be found in diesel and that also have a deleterious effect on the fuel's performance.

The two most common contaminants are dirt and water. Contamination from these two sources is usually a matter of poor hygiene practice, and enters the diesel through the supply chain. Diesel leaving the refinery will be clean and dry, but transport, storage, dispensing and use all introduce sources of contamination.

Dirty diesel can cause increased abrasive wear of injectors and fuel pumps, and water can cause corrosion of

fuel system components. There are a number of companies that can remediate or clean up contaminated diesel and it would be hoped that an engine's on-board fuel filtration system would go some way to keeping harmful contaminants away from sensitive mechanical components.

The other 'contaminant' that needs to be considered is sulphur. Sulphur-containing compounds are naturally occurring in diesel but are removed during the refining process as sulphur can poison catalytic converters found on most modern diesel engines. High sulphur content can also have an effect on combustion by-products entering the engine oil and reducing its ability to lubricate the engine adequately. The testing for the IP marker is fairly straightforward, easy and cheap to carry out, but sulphur testing requires sophisticated laboratory instrumentation.

South Africa produces three grades of diesel containing less than 10 ppm, or 50 ppm or 500 ppm of sulphur. Diesel (and other fuels) coming into the country from over-border sources may not be subject to the same laws restricting the amount of sulphur present in the diesel and represent a hazard to both the lubrication of the engine and the operation of emission control components.

In the end, the basic steps are to keep your diesel clean and dry and do not pollute it with foreign compounds that may cause engine damage and may also be illegal.

For diesel users who think their diesel is dirty or has been doctored, they can consult a WearCheck laboratory to learn more about the comprehensive fuel testing solutions the company offers. □

For more information visit: [www.wearcheck.co.za](http://www.wearcheck.co.za)

PLANT MAINTENANCE, TEST + MEASUREMENT : PRODUCTS + SERVICES

**16-bit arbitrary waveform generator**

The ARB Rider AWG-5000 is claimed to be the world's fastest 16-bit arbitrary waveform generator: 6.16 GS/s (Giga samples per second) real-time update rate (12.32 GS/s in RF mode) and 16-bit vertical resolution. Available in 2, 4 or 8 channel models, ARB Rider AWG-5000 is a super-fast AFG (arbitrary function generator), reaching up to 2 GHz sine wave. With Simple Rider software, the AWG-5000 offers best-in-class performances and an easy to use interface.

Features such as the 2 GHz bandwidth, up to 5 Vpp (voltage peak-to-peak) output range and up to 4 Gsample memory depth, make the AWG-5000 an ideal choice for physics experiments, quantum computers, and aerospace and defence applications. With the integrated up-conversion functionality (RF mode) it is possible to generate signals up to 6 GHz.

And there is no compromise on analogue perfor-

mances: the fast rise time of 110 ps can be achieved at maximum amplitude of 5 Vpp.

The option of up to 32 digital channels, combined with 2, 4 or 8 analogue channels make the AWG-5000 a full-featured mixed signal generator. It is now possible to generate up to 8 analogue signals fully synchronised with 32 digital lines (LVTTTL or LVDS).

A dedicated intra-chassis synchronisation bus allows multi-instrument synchronisation of up to 4 units: 32 analogue channels and 128 digital channels, for a powerful mixed signal generator.

**For more information contact Vepac Electronics.  
Tel: +27 (0)11 454 8053  
Email: [info@vepac.co.za](mailto:info@vepac.co.za)**



*The AWG-5000 is a powerful mixed signal generator.*

## Real-time condition monitoring in energy chains

The new i.Sense EC.W sensor from igus enables cost-effective real-time condition monitoring for gliding e-chain systems.

Machine failures and downtime are among the biggest cost drivers in industry, so it is important for maintenance personnel to prevent unplanned downtime. With the new low-cost service life sensor from igus, users can make existing e-chains smart. Real-time condition monitoring makes maintenance over the entire service life more predictable, easier and cheaper. This brings decisive advantages in the area of e-chains and offers new possibilities for condition monitoring in other wear applications.

The Internet of Things, Big Data, and autonomous robots: the transition to Industry 4.0 is in full swing. It applies also to components that work in machines and have become smart by providing data on their condition, for example. However, the integration of smart technologies is often complex for companies and involves external installation work.

"We have found that while online services may be popular in everyday private life, the sensitivity to external data connections is very high in the business environment. An IoT connection is often not wanted for a machine. Yet, the customer does not want to do without smart functionalities and the integration into existing control systems," says Richard Habering, Head of the igus smart plastics Business Unit.

This is where the new i.Sense EC.W service life sensor for gliding e-chain systems takes its place. The



The new service life sensor from igus enables real-time wear detection on energy chains.

low-cost sensor provides for cost-effective real-time wear detection and, with its integrated potential-free contacts, it can be connected directly to the PLC machine control system without an internet connection. The sensor, cable and evaluation electronics are included. Users also have the option of connecting the sensor to various networks and IoT systems via the i.Cee module and thus integrating it into a predictive maintenance programme. The service life sensor is available for the E4.32, E4.42, E4.56 and E4.80 igus e-chains – more sizes for the E4Q, E2.1, and E2/000 series are being planned.

**For more information contact igus.**

**Tel: +27 (0)11 312 1848**

**E-Mail: [ihewat@igus.de](mailto:ihewat@igus.de)**

**Visit: [www.igus.com/contact/general/za](http://www.igus.com/contact/general/za)**

## Emergency shutdown valve controller

Emerson has introduced the TopWorx™ DX PST with HART® 7 which provides valuable valve data and diagnostic information, supporting the digital transformation of process applications. The new DX PST integrates seamlessly with existing valves and control systems and gives operators access to critical valve data, trends, and diagnostics that can be used to inform predictive and scheduled maintenance.

The DX PST's partial stroke test ensures the system's reliable function without shutting down the process. This safety feature confirms the valve will fully close and stop the process if an emergency is detected, and is activated simply by pressing the local PST button – no additional equipment is required. To prevent critical failure in disrupted conditions, the unit will override testing to perform an emergency shutdown (ESD).

Certified for operation in harsh and hazardous applications, the adaptive DX PST is designed to ensure the integrity of valves, improving overall safety and facility uptime in oil and gas, refinery, chemical, industrial energy and mining applications.

Prayag Vatsraj, Global Product Manager of

Emerson's Switchbox, said: "The digital transformation of the process industry continues to make operations safer and more productive. The DX PST with HART 7 supports digital transformation by providing reliable data that delivers valuable insight into the condition of valve assemblies to ensure the integrity of the system without shutting down the process."

The HART® protocol, for which the FieldComm Group owns the specifications, builds another layer of information that ensures data, trends and diagnostics are monitored and tied into the Industrial Internet of Things. This information can be used to predict and schedule maintenance.

Capable of Safety Integrity Level 3 (SIL 3), the DX PST is available with an integrated 2oo2 or 2oo3 solenoid valve redundancy when paired with ASCO™ Series Advanced Redundant Control System (ARCS) to further enhance safety, and open terminals that allow an additional pressure transmitter along with two pressure switches. The discrete valve controller offers simple local and remote calibration.

**For more information contact Emerson.**

**Visit: [www.emerson.com](http://www.emerson.com)**

*The TopWorx DX PST with HART 7, a new emergency shutdown valve controller, improves safety and uptime in process applications.*



## Why become an electrician?

*Johan Basson (FSAIEE), Managing Director of JB Switchgear Solutions, says while the focus in the field of electrical engineering is often on graduates, it's important to remember the valuable role of industrial electricians: they are a vital resource in the industry.*

“One of our greatest challenges is to establish a viable and sustainable base of technical skills in the country. For some years it became less fashionable to work with your hands, own a toolbox, or wear a set of overalls. But the reality is that artisans and technicians are essential to our industry, and the economy in general.”

Basson highlights some of the main factors that young people looking at becoming industrial electricians should consider.

“To become an industrial electrician takes commitment to education and an apprenticeship or learnership programme before you are trained to master the trade, and then to find a job. When you do, you are on the path to what can become a rewarding career.

“Industrial electricians need to know the rules and regulations to work with different types of industries and have the experience to work with diverse industrial systems and machinery. In some ways, they ensure that businesses continue to receive power to function productively. Take that in for a moment ...”

### Key considerations

#### ■ Responsibility

As an electrician at an industrial site your employer or client trusts you with installing electrical power and systems, as well as telecommunications, fire and security systems and electronic controls. Additionally, your job involves wiring and cabling work, servicing electrical equipment or components. The electrical work you will perform could include work on new installations or switchgear systems, additions or modifications to work already done. It could also include maintenance or repair work on some faulty equipment or faulty conditions in the operation of circuitry or process control.

#### ■ Opportunity

You may not always realise it, but in the industrial sector your job as an electrician is critical to support the growth and sustainability of the manufacturing and construction industries. Mining, water treatment, materials handling, food, paper and pulp, cement, automotive, power generation – in all these sectors of our industrial economy your contribution adds huge value.

Through your apprenticeship or learnership programme, you develop skills to read and interpret the various types of electrical drawings and schedules. You learn to understand electrical codes, standards and specifications. You acquire the skills to select, install, wire and test many types of electrical equipment, from simple lighting to complex drive systems and automation products.

#### ■ Outlook

So as a qualified industrial electrician, what are your prospects? Your role as an electrician is important in all the sectors noted above. Statistics indicate that the manufacturing sector holds the



*In training, industrial electricians acquire the skills to select, install, wire and test different types of electrical equipment, from the simple to more complex.*

greatest leverage for job creation and this means that in order to address the challenges around unemployment, much greater focus should be directed towards manufacturing.

Of course, existing infrastructure, plants and equipment also need to be maintained, upgraded or replaced, and here too, industrial electricians play a key role.

In South Africa our infrastructure is in a very poor state, and there are many opportunities in areas such as renewable energy, typically solar and wind power generation. In addition, water storage, pumping and water treatment plants, are examples of critically important areas, which in turn will generate stable employment opportunities in the manufacturing sector, and hence for electricians too. Acquiring as wide a range of skills as possible will create more opportunities for you in various industries.

#### ■ Education

To become an industrial electrician, after completing your high school diploma, there are two main options to consider.

Option 1 is the route of the artisan. This is well recognised here in SA as well as internationally. You would need a minimum of a matric certificate with maths and science, and to complete an official apprenticeship, after which you need to pass a formal trade test at an accredited testing facility. If you have an N3 or higher qualification, this enables you to pursue a National Diploma in Electrical Engineering.

Option 2 is the route of the ARPL (artisan's recognition of prior learning) process. This gives credit to learners who have no formal qualifications but have the required workplace experience, gained over a number of years, and subject to compliance with the formalised qualifying criteria. In this case too, aspiring electricians have to pass a formal trade test at an accredited testing facility.

*For more information visit: [www.jbswitchgear.co.za](http://www.jbswitchgear.co.za)*



Gur Geva, Co-Founder and CEO at iiDENTIFii.

## Opt-in biometrics is about security, not surveillance

When the Independent Communications Authority of South Africa (ICASA) recently proposed linking biometric data to SIM cards, privacy concerns quickly surfaced. Would this mean constant surveillance or an increased potential for identity theft?

A resounding no, according to Gur Geva, Co-Founder and CEO of iiDENTIFii, a leader in remote biometric digital facial authentication and automated onboarding technology. “Because biometric technology

only started making its way into the mainstream relatively recently, consumers are still unsure of what the technology entails and how it can be used. This, naturally, leads to some misconceptions and fears. The reality is that opt-in biometrics are the most secure way to identify someone – and keep their information and identity safe from misuse – and these differ a great deal from biometrics used for surveillance,” says Geva.

[While Geva’s comment here relates primarily to the use of biometrics for personal mobile phones, the advantages of the technology would support security similarly in protecting access to mobile and networked communications devices used in industry.]

### Increased privacy and security

“When biometrics are mentioned, many people imagine dystopian scenarios – surveillance cameras on streets, capturing faces to keep track of civilians. But ICASA’s proposal, and the type of biometrics currently becoming more mainstream, is called remote biometric onboarding. It is about opt-in verification and account authentication, as opposed to surveillance. Remote biometric onboarding links a person’s biometric data, whether their face or fingerprint, to their account so that they, and only they, can access the account safely and securely,” Geva explains.

Biometrics come in many different forms. While there is a place for biometric surveillance, such as for security at airports or building entrances, opt-in biometric onboarding with ‘liveness’ detection protects institutions and their clients from fraud. “Fraudsters have made face-matching on its own almost obsolete by employing ‘spoofs’ that exhibit human traits, such as photos or puppets. Furthermore, even authentication processes with gesture/motion requirements to overcome this problem can still be spoofed. Leading biometrics AI uses liveness detection to determine that it is interfacing with a real, physically present human being,” says Geva.

This makes it much safer than passwords or PIN numbers, which can be hacked or stolen by fraudsters. With stolen passwords, fraudsters can potentially access thousands of accounts in a matter of seconds. Where biometric liveness detection is required, it becomes exponentially harder for thieves to impersonate other people or hack accounts.

And, from a privacy perspective, it is not that different

from current identification methods. “When someone has a copy of your ID, they already have your biometric data – an image of your face. How biometric data is managed by mobile operators would still be subject to strict privacy laws laid out in the Protection of Personal Information (POPI) Act and the General Data Protection Regulation (GDPR) guidelines,” Geva adds.

### Safety and convenience

Because biometrics and liveness detection can prove that you are really you when logging into an account, they support convenience and security for consumers. Says Geva: “According to some estimates, the average person has around 80 passwords. Passwords they forget, passwords that are compromised, and passwords that don’t transfer between devices. Biometrics, on the other hand, provide a seamless experience where onboarding no longer requires account details, an ID book, fingerprints, and more. Now, you can add your ID number, hold your phone up to your face for liveness detection, and link your SIM. And yet, it’s safer, because no-one except you will be able to perform a SIM swap or take out an additional line without this direct biometric link.”

Geva anticipates that this safety and convenience mean the identification method will become increasingly mainstream, and soon. Two-factor authentication could be replaced by proof of liveness and a fingerprint, for example, and even social media could become more secure.

There are indications that the world is ready for biometrics. A Visa study shows that 86% of consumers are interested in using biometrics to verify identity or to make payments, and 70% believe biometrics are easier.

Geva expects the possibilities will scale significantly. “Technology is not static, it evolves all the time. Some laptops, for example, can detect your liveness through infrared and switch on when you sit in front of them. Tying that to biometric facial mapping could log you in to your devices in future in a far more secure manner. Facial biometrics with liveness detection will likely become the predominant biometric authentication method simply because it is more accurate than voice, easier than fingerprint, requires no contact, and can be compared to an identity document face image. It offers convenience and security.”

For more information visit: <https://iidentifii.com/>

## Global trade in hydrogen – most will be used locally

As the move to accelerate green hydrogen technologies and applications intensifies globally, the International Renewable Energy Agency (IRENA) says some 75% of hydrogen will be produced and used locally.

To make hydrogen trade cost-effective, the costs of producing and trading green hydrogen must be lower than domestic production, in order to offset higher transport costs. A series of reports released by IRENA sees hydrogen trade contributing significantly to a more diversified and resilient energy system.

In its latest report titled *Global hydrogen trade to meet the 1.5°C climate goal*, the agency points to the importance of the future hydrogen trade. It says: “By increasing the distance over which it is cost-effective to transport energy, green hydrogen can unlock new possibilities for the energy trade, giving rise to new players and providing opportunities for energy exporters to pivot towards a net zero system.”

Trade will allow countries to tap into affordable hydrogen as the scale of projects progresses and technology matures. In the report IRENA indicates that one quarter of the global hydrogen demand could be satisfied by international trade through pipelines and ships.

It estimates that with falling costs of renewables and the hydrogen potential exceeding global energy demand by 20-fold, three-quarters – that is 75% – of global hydrogen would still be produced and used locally in 2050. This is a significant change from today’s oil market where most of the fuel is traded internationally.

“Having access to abundant renewables will not be enough to win the hydrogen race, it’s also necessary to develop the hydrogen trade,” said Francesco La Camera, Director-General of IRENA. “It is true that hydrogen trade will offer multiple opportunities – from decarbonising industry to diversifying supplies and improving energy security. Energy importers can become the exporters of the future.

“However, governments must make significant efforts to turn their trade aspirations into reality,” La Camera added. “A mix of innovation, policy support and scale can

bring the necessary cost reduction and create a global hydrogen market. Whether trade potentials can be realised will depend strongly on countries’ policies and investment priorities and the ability to decarbonise their own energy systems.”

IRENA’s *World Energy Transitions Outlook* sees hydrogen covering 12% of global energy demand and cutting 10% of CO<sub>2</sub> emissions by 2050. Yet, hydrogen can only be a viable climate solution if the power needed to produce it is additional to the electrification of the energy system; this places an even greater uptake of renewable power at the heart of the transition.

The latest report sees half of the hydrogen being traded through largely existing, repurposed gas pipelines, significantly reducing the costs of transport. Shipping of green ammonia would account for most of the other half, largely in intercontinental hydrogen trade.

As hydrogen becomes increasingly an internationally traded commodity, the hydrogen sector will attract growing sums of investment. According to IRENA, satisfying the global demand will require investment of almost USD 4 trillion by 2050. Net zero-aligned finance instruments will have to leverage the investment needed.

The agency’s new modelling framework, which forms part of the report released in early July, can be used to assess critical parameters that will affect future trade flows. The report completes a series with two earlier reports: Part I titled: *Trade Outlook for 2050 and the Way Forward*, which includes green hydrogen supply cost and potential, and Part II: *Technology review of hydrogen carriers*.

IRENA has been pioneering the work on hydrogen within the wider energy transition in line with a climate-safe 1.5°C pathway. A number of other reports, including *Green Hydrogen: A guide to policy making*, and *Geopolitics of the energy transformation: the hydrogen factor*, and more are available on the IRENA website.

For more information visit: [www.irena.org](http://www.irena.org)



Hydrogen trade will contribute significantly to a more diversified, resilient energy system.

## Progress in the Just Energy Transition Partnership

On a recent visit to South Africa COP President, Alok Sharma met with Head of the Presidential Climate Finance Task Team, Daniel Mminele, and subsequently with a delegation of government ministers, to review progress made to date in advancing the Just Energy Transition Partnership (JETP).

Following this meeting with Minister in the Presidency, Mondli Gungubele, and Ministers of International Relations and Cooperation, Dr Naledi Pandor; Finance, Enoch Godongwana; Forestry, Fisheries and the Environment, Barbara Creecy; Public Enterprises, Pravin Gordhan; Mineral Resources and Energy, Gwede Mantashe; and Trade, Industry and Competition, Ebrahim Patel; Sharma and the ministers issued a joint statement.

The JETP is recognised as a ground-breaking initiative that will support South Africa's transition to a low carbon economy and a climate resilient society. The partnership was established through the Political Declaration issued following COP26 in November 2021, and sets out the joint undertaking by the United Kingdom, the European Union, France, Germany, and the United States to mobilise an initial amount of \$8.5 billion over the next three to five years to support the achievement of South Africa's ambitious Nationally Determined Contribution (NDC).

"The COP President and the ministers welcomed the progress made thus far in advancing this long-term partnership. They continued discussions on the financing instruments to be provided, with a view to ensuring the partnership meets the country's investment needs and aligns with its fiscal framework. They discussed ongoing work on a South African-led Investment Plan, which will guide the use of funds. In this context, they noted that as momentum grows and enabling conditions are created, there will be considerable interest from wider sources of finance," the statement read.

The meeting also underlined their shared commitment to a just transition that protects affected workers and communities as a key priority of the partnership, and to supporting opportunities for innovation and quality jobs, including in the green hydrogen and electric vehicle sectors.

The South African government has taken steps towards creating an enabling policy environment to support the country in achieving its NDC. These include the tabling of a Climate

Change Bill in Parliament, reforms under way in the electricity sector, the finalisation of the Hydrogen Economy Roadmap and the Renewable Energy Masterplan, and the development of a Just Transition Framework through the Presidential Climate Commission.

Additionally, steps are being taken to establish governance and implementation structures for the partnership. These include the appointment of an independent technical secretariat led by Joanne Yawitch and the imminent formation of working groups focusing on the electricity, green hydrogen and transport sectors as well as finance and implementation modalities.

The statement further confirms the commitment of the partners to finalise a comprehensive Investment Plan and to continue discussions regarding the financing packages to enable meaningful progress by COP27, due to take place in November, in Egypt.

The South African Presidential Climate Finance Task Team (PCFTT) and the International Partners Group (IPG) prepared the detailed six-month update on progress made, as presented at the meeting, in line with the requirements stipulated in the Political Declaration. As well as reviewing work under way the update sets out key interim milestones leading up to COP27.

Mminele, together with the UK's COP26 Envoy and Chair of the International Partners Group, John Murton, confirmed in a separate media briefing that government, with its international partners, is focusing on developing a South African-led investment plan.

"In the engagements we have had with the international partners thus far, there is a shared recognition of the need to ensure that the financing packages approved are appropriately structured to support South Africa's climate ambitions and priorities.

"We have made it clear that the financing instruments should reflect South Africa's unique needs and fiscal challenges, and incorporate appropriate and equitable risk sharing arrangements," Mminele said. "This includes ensuring the terms of any loan finance should be significantly more attractive than could be secured in the capital markets.

"It is also crucial that we prioritise job creation and ensure that no person is left behind in this process. The investment plan will identify critical projects that will be initiated before COP27 as well as a longer-term portfolio of projects, all of which will foreground the need for a just transition and support for affected workers and communities," Mminele said.

"We confirmed that we are fully committed to the partnership and determined to see its success," he said. Mminele noted that the partnership provides the country with the opportunities to create jobs, boost the economy and to address the threat of climate change.

For more information visit: [www.sanews.gov.za](http://www.sanews.gov.za)



*The PCFTT and the international partners are mapping out an investment plan to achieve a just energy transition and guide the use of funds.*

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# Hand in Hand to the Cloud

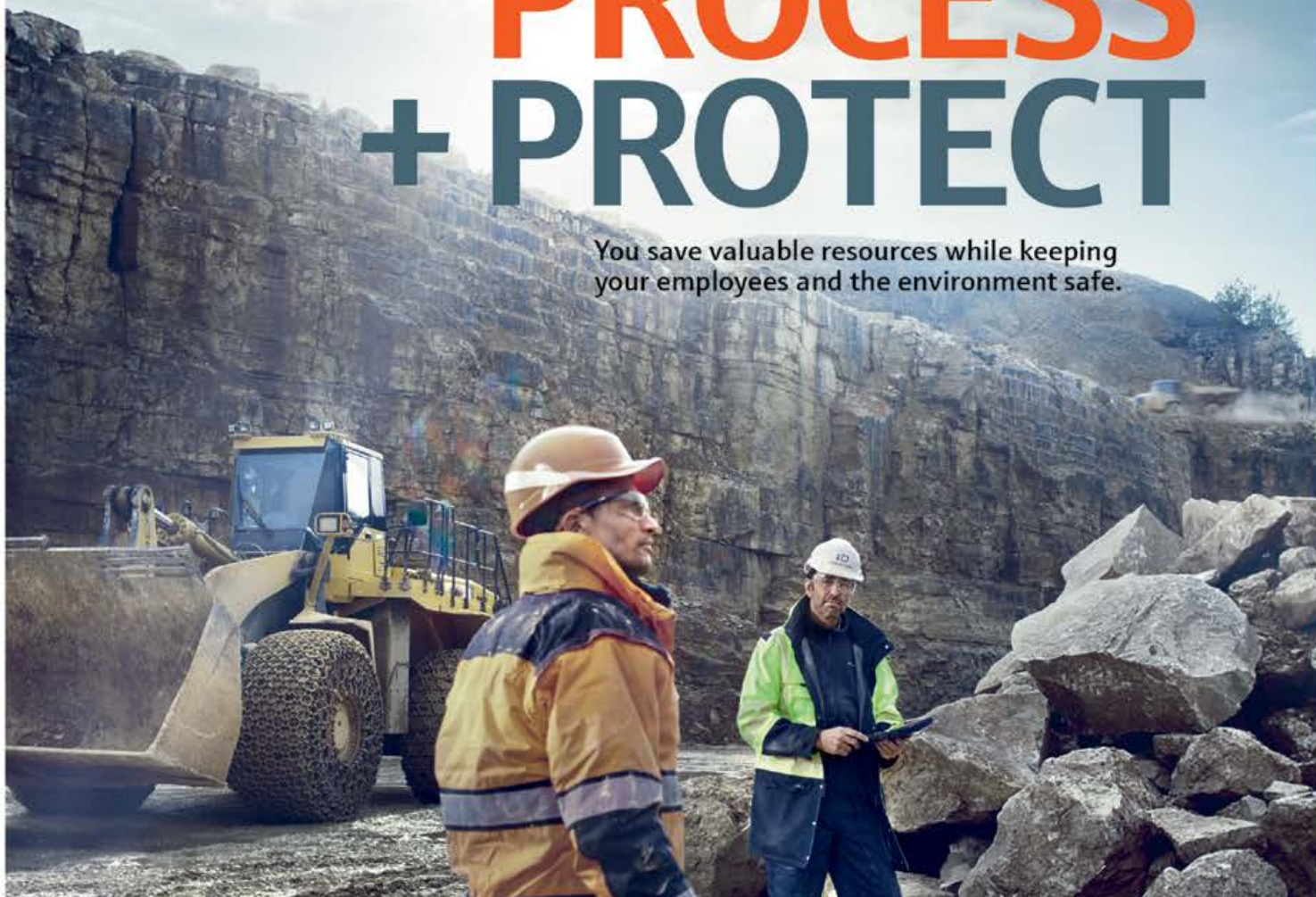
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