

FEATURES:

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



02/2021



***ecomatPanel robust, multifunctional
input module***



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The AEE's International Awards recognize achievements in energy around the world. "Energy Project of the Year: International" covers energy management projects developed and implemented outside the United States.

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6.5 TWh
energy saved



6.4 million tCO₂e
GHG mitigated



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cumulative cost savings

For more information about the IEE Project visit: www.ncpc.co.za

Email ncpc@csir.co.za to find out how to get help to transform your company's energy use.

The IEE Project is a national partnership initiative with international implementing and funding partners:





ifm's ecomatPanel has been designed for use in drivers' cabins on mobile machinery operating in harsh environments, such as construction equipment, agricultural machines or municipal vehicles. (Read more on page 3.)

Editor: Leigh Darroll

Design & Layout: Darryl James

Advertising Manager:

Heidi Jandrell

Circulation: Karen Smith

Editorial Technical Director: Ian Jandrell

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If you fail to plan...

I recall starting a comment in a similar vein some years back, outlining some topics I try to avoid in any comment – in what is essentially a technical magazine.

But this time I felt it inappropriate to explain the issue – so I'd rather just consider whether we are learning anything, as an industry, from the experience of the Covid pandemic.

Let me start by reminding you all how you keep your systems running – be these in the manufacturing industry, a large commercial enterprise, a mine, or even a utility: you plan well in advance, and you maintain your plant.

None of this just happens. You spend time with your professional, technical and administrative staff to ensure you operate the systems optimally.

If your plant is not operating optimally, you will look for the weaknesses, you will identify the problems, and you will set about solving them.

You will also be very conscious of the various constraints within which you have to work. The pandemic could well be one!

Some of these constraints seem significant – but I am pretty sure you do not simply sit back and say, given the pandemic, there is nothing that can be done.

In fact, as a reader of this magazine, you will fully appreciate that energy and information are the key commodities of modern industry – and you will explore these in the context of better control, better efficiency, better production, and more.

Fundamentally, you will plan everything you do. Your plan is no doubt informed by information (sometimes just data) that is meticulously collected (usually automatically, but sometimes still manually) – and you will set about establishing goals, investigating cost-benefits, and so on.

You will, without doubt, try very hard to be realistic in what you set out to achieve. Stretch targets are wonderful and can see sparkling results achieved if they are

resourced. But sometimes you are too ambitious, and sometimes too conservative: we learn.

Now, looking at the way we have been handling the pandemic – and in particular how we are rolling out a vaccine programme, I must say we will need to look at the process quite carefully – as something to learn from, perhaps.

The standout observation I can make after engaging folk who work at the coalface in that space and reading much of what has been written, is that if you fail to plan, you plan to fail. Pretty much without doubt!

One does not want to be unkind to the many people who have dedicated themselves to solving this problem – but I am staggered by the ambitions of the project. It seems that if we are to do the work properly and meet our own stated targets, we will be by far the most effective nation on the planet at rolling out the vaccine.

The problem is, I very much doubt this will be the case. One imagines, just by critically reviewing what is being said, that not all aspects of this challenge have been fully explored, and that there is much water yet to flow beneath the bridge.

But I do think that when we look back on this effort, we will recognise the remarkable contributions being made in dealing with the pandemic – as well as what will potentially emerge as some very significant failings. Proper planning, I fear, will be one of them.

For many years I have said that education is far too important to be left in the hands of the state; equally so is healthcare.

Always remember to plan. Make sure you access the information you need, in good time, to set up a realistic work schedule that will improve your process. And, hopefully, with that good plan in place, you will achieve your objectives – and perhaps even exceed them!

Ian

Ian Jandrell

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



CONTENTS

FEATURES

INDUSTRY 4.0 + IIOT

- 4 Data centres could become a critical utility service
Vertiv
- 6 The Industrial Ethernet protocol for I/O networks
Darrell Halterman, Emerson Automation Solutions
- 8 Products + services

ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT

- 10 The future of energy for independent power producers
Aytek Yuksel, Cummins
- 12 REDZ in South Africa's Just Energy Transition
Mercia Grimbeek, South African Wind Energy Association
- 13 Gas-to-power options emerge in SA
Nicola Rump, Principal Environmental Scientist, SRK Consulting
- 14 Products + services

SENSORS + SWITCHES

- 18 Sensors support traditional crispbread production in Sweden
An ifm application report
- 20 Hygiene under high pressure
Claudia Homburg, VEGA Grieshaber
- 21 Products + services

PLANT MAINTENANCE, TEST + MEASUREMENT

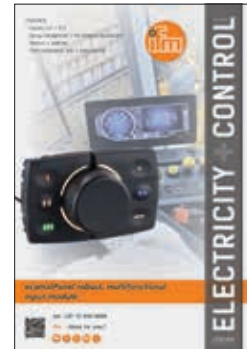
- 23 Monitoring mission-critical electrical equipment at Natref
Ian Loudon, Omniflex
- 24 Products + services

REGULARS

- 1 Comment
If you fail to plan...
- 3 Cover article
ecomatPanel robust, multifunctional input module
- 29 Reskilling, upskilling + training
Graduating wind turbine service technicians
- 30 Engineering the future
A new collaboration for hydrogen-fuelled trucking
- 31 Cybersecurity
Securing IoT devices and networked machinery
- 32 Write @ the back
The 'Terra Carta' – mainstreaming sustainability in business



ecomatPanel robust, multifunctional input module



- Rotary button with integrated 4-way button and push function
- 6 RGB backlit function keys and one segmented LED ring
- All lighting elements can be controlled individually in any colour
- Communication via CAN interface
- For 12 and 24 V on-board power supplies

Safe operation in rough environments

The ecomatPanel has been designed for use in the harsh environment in drivers' cabins. The rotary button and the function keys are large enough to ensure easy handling even when wearing gloves. The rotary button is also equipped with a 4-way button (up/down/left/right). This makes it possible to quickly navigate through setting menus. Another switching function can be triggered by pushing the rotary button (push function).

Colour feedback

The illuminated ring around the rotary button, consisting of four segments, as well as the illuminated keys provide a clear overview of the set functions. All LED lighting elements can be set separately and assigned individual colours.

Easy integration into panels – CAN interface

Communication is effected via the integrated CAN interface. Via this interface, the individual LED segments are controlled and the status of the keys and the operating head is queried.

Plug and play with ifm displays

The ecomatPanel has been designed for direct communication with the ifm dialogue modules for mobile applications (ecomatdisplays). Once the dialogue module has been connected via CAN bus, the keys and LEDs of the ecomatPanel can be evaluated directly in the application program and used for the operating functions of the display. The innovation: no programming of the communication interface is required.

Designed for robust applications

The ecomatPanel can be used in 12 V and 24 V on-board networks. The high protection rating IP65 and the closed

surface provide protection even under adverse environmental conditions. Even extreme temperatures or permanent shock and vibration do not affect the functions of the ecomatPanel.

I/O modules in general

Decentralised I/O modules connect binary and analogue sensors and actuators to the mobile controller. They enable decentralised evaluation of sensor signals and control of actuators or proportional valves.

Data output and setting of the device functions is handled via a CAN interface.

The modules are particularly suited for mobile machinery such as construction equipment, agricultural machines or municipal vehicles. The ifm product range includes models with digital, analogue and frequency inputs combined with digital or PWM outputs.

Modules for field use offer high protection ratings as well as shock and vibration resistance. The units offer increased EMC levels and hold an e1 type approval. Modules to be installed in drivers' cabs, control panels or control boxes serve to connect operating and display elements to the CAN bus.



The ecomatPanel is designed for use in drivers' cabins on machines operating in rough environments, as well as in control panels and control boxes.

For more information contact ifm South Africa.

Tel: +27 (0)12 450 0400

Email: info.za@ifm.com

Visit: www.ifm.com

Data centres could become a critical utility service

As the world moved online seemingly overnight in the face of the Covid-19 pandemic, the criticality of data centres and the unrelenting reliance on them across all walks of life became an enduring storyline of the crisis. This reality will manifest in new ways in 2021 as data centres and the information ecosystems orbiting them emerge as a fourth utility, with critical utility-like status, and all the expectations and responsibilities that implies. This is among the emerging data centre trends identified by Vertiv, a global provider of critical digital infrastructure and continuity solutions.

Data centres have long been held to high availability standards, but the shift towards utility-like status will be noticeable in two ways. First, those high expectations for network availability will extend deep into rural and remote areas, bringing critical applications to more of the population. This will increase pressure on data centres to maintain connectivity even at the outer edges of their networks. Second, any distinction between availability and connectivity will be erased, as the ability to ensure and protect connections across increasingly distributed hybrid networks becomes as much of a requirement as any traditional measure of data centre uptime.

"Data centres have been moving towards public utility-type status for some time, but the pandemic has crystallised the need to establish the kinds of official guardrails that have been commonplace across other utilities," says Gary Niederpruem, Chief Strategy and Development Officer for Vertiv. "This isn't just about working from home, although that is part of it. It is also, importantly, about supporting the digital economy in its most mission-critical forms, which include increased reliance on telemedicine and

health, enhanced e-commerce, and global telecommunications and mass media."

The pandemic effectively established a new baseline for digital infrastructure as the industry adjusts to and eventually moves beyond the global shutdown. Against this backdrop, Vertiv's experts identified several other emerging trends to watch in 2021.

Digitalisation on fast forward

Covid-19 will have a lasting effect on the workforce and the IT ecosystem supporting the new work-from-home model. Vertiv experts expect the pandemic-motivated investment in IT infrastructure to continue and expand, enabling more secure, reliable and efficient remote work capabilities. Remote visibility and management will become paramount to the success of these work-from-home models.

Already remote service capabilities have emerged to minimise the need for on-site service calls, and those practices are likely to continue long after the pandemic. Any cautious steps taken early in the crisis will be accelerated as the pandemic pushes into 2021 and organisations accept these changes not as a temporary detour, but rather a permanent adjustment to the way we work and do business. Over time, what is done in-person



Going forward it is anticipated that data centres will require the implementation of utility-level asset safety measures.



Accelerated digitalisation across home, business, industrial and institutional sectors has placed a premium on connectivity and data availability.

versus remotely will change, and the change will be driven by customers looking to minimise their on-site presence. That places a premium on connectivity, remote monitoring, data analytics, and even artificial intelligence to make decisions.

John-David Lovelock, distinguished Research Vice President at Gartner, said in a recent statement: "Recovery requires a change in mindset for most organisations. There is no bouncing back. There needs to be a reset focused on moving forward."

Bringing large data centre capabilities to the edge

Today's edge is more critical and more complex, functionally an extension of the data centre rather than the glorified IT closet of the past. Cost and complexity have prevented implementation of data centre best practices in these spaces, but that is changing. Vertiv's experts anticipate a continued focus on bringing hyper-scale and enterprise-level capabilities to edge sites. This includes greater intelligence and control, an increased emphasis on availability and thermal management, and more attention to energy efficiency across systems.

"Wherever there is a high density of data processing, there will be a demand for edge computing. That demand, and scale, will necessitate more resilient and intelligent edge infrastructure," says Giordano Albertazzi, President of Vertiv in Europe, Middle East and Africa (EMEA). "We are seeing expansion of the edge in many countries and that will extend to emerging markets. Edge deployments are also closely aligned to other key trends such as 5G and environmental sustainability, and the integration of edge sites with energy grids can support the transition towards renewables."

5G: energy consumption and efficiency

In this early stage of 5G planning and launches, the discussion has focused on the benefits of the technology – increased bandwidth and reduced latency – and the applications it will enable. But, as many countries begin their 5G rollouts in 2021, and the early adopters start to drive breadth and scale, the focus will shift to the significant energy consumption increases brought on by 5G and strategies to deploy more efficiently and effectively. The network densification necessary to fully realise the promise of 5G unavoidably adds to increased energy demands – estimated to be 3.5x more than 4G. The coming year will see greater focus on managing that significant increase in energy consumption by exploring more efficient products and practices.

Sustainability comes to the forefront

5G is one piece of a broader sustainability story. As the proliferation of data centres continues and accelerates, especially in the hyper-scale space, cloud and co-location providers are facing increased scrutiny for their energy and water usage. The amplification of the climate change conversation and shifting political winds in the United States and globally will only add to the focus on the data centre industry, which accounts for about one per cent of global energy consumption¹. The coming year will see a wave of innovation focused on energy efficiency, and especially thermal management, across the data centre ecosystem. The



As edge functionality becomes more comprehensive, there will be a need for more intelligent and resilient infrastructure.



While the benefits of 5G technology are recognised, it will also bring a significant increase in energy consumption.



In light of the increasingly intense focus on sustainability, efficient use of resources will become a priority.

benefits for data centre operators are clear, starting with cost reduction, compliance with existing and anticipated regulations, and the goodwill that comes with establishing a leadership position in the global sustainability movement. □

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For more information visit: www.vertiv.com

The Industrial Ethernet protocol for I/O networks

Darrell Halterman, Senior Product Manager, PAC Systems Controllers, at Emerson's Automation Solutions, sees PROFINET as a great choice for I/O networks. Here he sets out the advantages of using the PROFINET protocol for PLC, PAC and industrial edge controller applications.

The PROFINET industrial Ethernet communications protocol was purpose-built to deliver interoperability, high-performance communications, high-availability architectures, and advanced diagnostics to help with troubleshooting. These features help to minimise operational downtime and enable designers to create robust and reliable industrial automation input/output (I/O) networks that are maintainable long-term. Programmable logic controllers (PLCs), programmable automation controllers (PACs) and industrial edge controllers rely on such I/O networks to perform deterministic control.

Early industrial automation protocols relied on proprietary media and components, partly to guarantee performance. As industrial networking made the transition towards commercial Ethernet technology, it remained necessary to address the 'always-on' need for automation systems while guaranteeing performance. Here are some of the reasons that PROFINET is an ideal fit for industrial I/O networks.

Connectivity

Automation systems for industrial machines and equipment rely on the connection of controllers to hardwired field devices, such as sensors and actuators, via I/O modules. Controllers also connect with more intelligent and capable I/O devices, such as variable frequency drives (VFDs) and smart pneumatic solenoid manifolds. These devices often have Ethernet connectivity and can be located in a protected control panel or installed directly on equipment. Using an industrial protocol such as PROFINET, designers have the flexibility to choose any combination of best-of-class I/O systems. They can select panel- or field-mountable versions of each

device as required to fit the application, and can source them from different suppliers, with high confidence in their reliability and interoperability.

Uninterrupted communications

Much like consumer-grade home networks, industrial-grade I/O systems can be connected with switches and cables in a star topology. However, the always-on performance demand of automation often requires solutions more robust than those available using basic IT technology. PROFINET addresses these concerns by providing various levels of redundancy, with the specific aim of providing uninterrupted communications.

Using a ring network configuration, Media Redundancy Protocol (MRP) provides communications recovery within a few milliseconds of networking loss resulting from a cable, device or switch failure. These networks can be designed with external switches to form a ring. Designs can be simplified for industrial controller and I/O systems by incorporating on-board embedded multiport switches within controllers and I/O devices, enabling a ring network to be created without the need for external switches.

Controller redundancy is often needed in the most critical applications, which requires PLCs, PACs or industrial edge controllers that can be installed in pairs on an MRP ring. One controller is the primary and the second is the hot back-up, configured to take over seamlessly if the primary controller fails.

Diagnostics

Should there be a problem with an industrial automation I/O system, operators and maintenance personnel need to know about it as soon as possible. This still applies to systems that have been configured with MRP and redundant controllers because, even though operation will continue after a single failure, the system may then be just one further failure away from an outage. PROFINET provides diagnostics to help users debug industrial I/O systems. Controllers can be configured to recognise I/O failures, notify users and, if need be, initiate an orderly shutdown. Users can also access diagnostic tools to monitor I/O

Automation systems for industrial machines and equipment rely on the Ethernet connectivity of controllers to hardwired field and other I/O devices.





The PROFINET industrial Ethernet protocol enables designers to create reliable industrial automation I/O networks.

network performance and system health, which provide an early indication of any impending issues.

Industrial I/O roadmap

In addition to providing I/O interoperability, redundant architectures and helpful diagnostics, PROFINET has further features that make it an ideal solution for PLCs, PACs and industrial edge controllers. A specified profile enables data to be shared easily between PROFINET and OPC UA

At a glance

- Using PROFINET, designers can choose any combination of I/O systems to ensure connectivity between controllers and hardwired field devices.
- PROFINET addresses the 'always on' performance requirement of automation systems by providing various levels of redundancy.
- Diagnostics help users debug industrial I/O systems and allow them to monitor I/O network performance and system health.

networks. Another standard profile makes it possible to connect IO-Link sensors and devices to PROFINET. Time-sensitive networking (TSN) represents a set of networking standards for improving performance by minimising latency to provide high availability data transmission over deterministic Ethernet networks.

PROFINET enables users to create the highest performance I/O networks that can support the most demanding applications such as motion control, while further improving their overall network capabilities, robustness and security. □

For more information visit: www.emerson.com

INDUSTRY 4.0 + IIOT : PRODUCTS + SERVICES

Mobile robot with 1 500 kg payload capacity

Omron has launched the HD-1500, the strongest in the company's series of mobile robots. The new HD-1500 boasts a heavy payload capacity of up to 1 500 kg. It is ideal for modern factories where autonomous material handling solutions need to manage demanding industrial automation tasks within new social distancing requirements due to the Covid-19 pandemic.

The 1 500 kg capacity of the HD-1500 enables transportation of large automotive components such as car chassis and high volume pallet size payloads – items that would traditionally have been moved using forklifts. With the release of the HD-1500, Omron's mobile robots, including the LD-60/90 and LD-250, form a line-up of models that can transport a wide variety of items – from components to WIP (work in progress), finished products, and heavy material.

Ensuring efficient material handling in factories, Omron's industry-first Fleet Manager can control up to 100 mobile robots of different sizes, configurations and payload capacities under one system to automate complex material transport and logistics applications.

The robots can automatically calculate the best route while collaborating safely with people and navigating around obstacles, without the use of magnetic floor tapes or other guides. The HD-1500 battery charges in just 36 minutes and can handle a full shift on a full load, reducing downtime.



The HD-1500 mobile robot offers 360° safety coverage promoting a safe collaborative working space.

"On-site logistics to move products and materials within the factory and warehouse are becoming a bottleneck for many companies due to high frequency, compounded by the need to meet social distancing protocols. Fast-paced manufacturing environments require speed and flexibility. Omron's HD-1500 mobile robot can help companies solve this issue because it can work 24 hours a day, punctually, and safely side-by-side with people," says Tom Mathias, President and CEO of Omron Robotics and Safety Technologies, Inc.

For more information contact Omron Electronics
Tel: +27 (0)11 579 2600, email: info_sa@omron.com
Visit: www.industrial.omron.co.za

New IoT gateway for the process industry

Siemens has introduced the Sitrans CloudConnect 240 (CC240 IOT), a new IoT gateway for the process industry. It provides a second data channel, completely independent of the control system, which is used to transmit data from any HART®-based field devices to the IT world.

In the process industry, field instrumentation is a central source of data in digitalisation. The Sitrans CC240 IoT gateway establishes a second data channel which makes field level data that was previously hidden available to the user – without adversely affecting the existing control technology. The system creates a direct connection between the field device and IT or the cloud and reads not only basic process values but also identification, configuration, and diagnostics parameters – for any HART® device of Version 5 or later. The system then makes this data available via an OPC UA server or the Siemens MindSphere IoT-as-a-Service solution.

The data is harmonised in line with the Namur Open Architecture information model. This creates a standard perspective on the installed base – irrespective of the technology and manufacturer – which means digital applications can be created, for the first time, for both on and off-premises environments. For example, asset monitoring and management solutions can be implemented, particularly for smaller plants.

Sitrans CC240 supports the connection of up to 64 devices and has an on-board web server with the necessary configuration options and management views so additional tools are not required.

The available connectivity options also mean that it can be integrated into existing systems. OPC UA can be used to transfer field device values and data directly to automation or IT systems, for example, providing for calculations or analyses to be performed outside the actual control task. The connection to MindSphere supports the distributed use of several Sitrans CC240 systems – ideal for monitoring globally distributed assets on a central instance.



Siemens Sitrans CC240 IoT gateway for the process industry provides a second data channel to transmit data from field devices to the IT world.

With Sitrans store IQ from Siemens, the user has an app for stock monitoring and management in production and logistics. Filling levels of tanks, silos, racks or other storage facilities are measured and acquired then transmitted via the Sitrans CC240 or familiar MindConnect gateways to Siemens MindSphere. Sitrans store IQ visualises the acquired data and generates alarms and events. The application is available for desktop and mobile devices so alarms and events, which can be user-defined, could, for example, trigger notifications via SMS or e-mail.

The open system has many advantages; it is possible to customise the structure and display, and to acquire and process any desired variables. For the management of materials and the necessary infrastructure, the user often requires not only the central filling level information but also supporting measurements such as temperature, pressure, humidity, or binary inputs. The cloud technology supports full scalability, which goes hand in hand with the flexibility of Sitrans CC240. Sitrans store IQ can therefore be scaled for use for a few local containers, to larger tank farms or globally distributed infrastructures. The structure and presentation can be individually configured according to the user's requirements.

For more information visit:
www.siemens.com



TwinCAT IoT supports numerous standardised protocols for cloud communication.

Integrating data and communication services

Beckhoff has offered diverse IoT communication capabilities with its TwinCAT IoT product family since 2015. Transmitting data to the cloud or between networked machines in this way creates significant potential for increasing production efficiency. MindSphere®, the Industrial IoT (IIoT) as a service solution from Siemens, is another solution that can now also be integrated with TwinCAT.

TwinCAT 3 automation software can communicate with HTTP(S) servers as an HTTP(S) client, to exchange data via a REST API, for example. Establishing a connection with MindSphere® is also possible via HTTPS communication to exchange telemetry data. The connection is se-

cured by TLS (Transport Layer Security) and additionally uses MindSphere®-specific authentication mechanisms.

Documented sample implementations of the TwinCAT 3 Function TC3 IoT HTTPS/REST (TF6760) show users how to establish connections with MindSphere®. The examples provide a simple introduction and allow users to adapt the program code to suit individual requirements.

For more information contact Dane Potter at Beckhoff Automation.

Tel: +27 (0)11 795 2898, Mobile: +27 (0)79 493 2288

Email: danep@beckhoff.com, visit: www.beckhoff.co.za

Robots in bakeries and breweries

As automation has become more widely implemented in manufacturing and materials handling, it has taken over many previously laborious manual processes, largely to the benefit of employees' health and wellness. Across various industries, robotics have taken this one step further with robots designed for specific applications, such as handling, packaging and palletising. These new pick and place robots allow for more speed and consistency in throughput, and are customisable to meet production requirements.

According to Yaskawa Southern Africa, sectors such as the automotive and pharmaceutical industries are already substantially invested in the use of industrial robots. More recently, the South African food manufacturing sector has also embraced this technology.

Yaskawa Southern Africa's Durban Branch Manager, Rudi von Fintel says, "In KwaZulu-Natal we've seen an increase in the implementation of pick and place robots in food manufacturing, especially in the big bakeries. These bakeries produce over 8 000 loaves of bread an hour, 24 hours a day, so speed and consistency are absolutely essential to their operations. In terms of application, the robots are responsible for taking the bread out of hot ovens and placing the loaves onto the conveyor belts."

Considering the quantity of loaves in production, as well as how hot the loaves are, it is a task that would be difficult to do, in the same time, without the assistance of robots. This illustrates one of the main benefits of pick and place robots, as they do the work that would prove too much for human workers.

Although lifting heavy items or handling hazardous materials still present a risk in some industries, advances in technology generally ensure safer working environments and robots can take on these demanding

and repetitive tasks: whether it be handling litres of burning-hot cooking oil or moving thousands of glass milk bottles.

"Palletising in the beverages industry is another area where we've seen a significant uptake," von Fintel says. "Due to the different sizes of bottles, cans or cartons, it is important to have robots that are easily adaptable to the products coming down the line. And because the volumes are so high, the robots are instrumental at the end of the production line."

A notable example is at Bavaria Brewery (when production is viable with Covid-19 restrictions). It now manages to palletise 100 000 cans of beer per hour, after the business decided to revolutionise its picking, packing and palletising processes. It also boasts high process reliability. It is results like these that appeal to manufacturers and other business owners looking for greater process efficiencies.

Pick and place robots can operate in tight spaces with minimal hassle. The end-of-arm tooling is simple enough to swap out, and fewer components mean easier access for maintenance. Furthermore, as robots support a wide range of communication protocols and digital signals, they can be easily integrated into existing automation or production lines.

As we move into a world where production needs to happen without 'human touch' or intervention, pick and place robots could be the solution to many industry concerns. At the same time, they could prove to be the productivity boost that so many businesses need.

For more information contact Yaskawa Southern Africa.

Email: brenda@yaskawa.za.com

Visit: www.yaskawa.za.com



Robots are being used increasingly to achieve greater process efficiencies.

New LoRaWAN resource site

Mouser Electronics Inc., authorised global distributor of semiconductors and electronic components, has created a new resource site dedicated to the LoRaWAN® standard and its capabilities, applications and related products.

LoRaWAN is a low-power, wide-area (LPWA) network protocol designed to provide internet connections to battery-operated devices in regional, national and global networks. The high-performance protocol supports key Internet of Things (IoT) requirements, including end-to-end security, bi-directional communication, mobility and localisation services. The new resource site from Mouser offers engineers and designers a broad range of useful information on LoRaWAN technologies, strategies and devices, providing a single source for advice and insights.

Through standardisation and an accredited certification scheme, the LoRa Alliance® delivers the interoperability needed for LPWA networks to scale,

making LoRaWAN the premier solution for global LPWAN deployments. Mouser, as part of the TTI family of companies, has partnered with the LoRa Alliance to deliver and promote this new standard in networking solutions.

With its low-power and security capabilities, the LoRaWAN specification offers a wide range of use cases with specific nuances for each design. The new LoRaWAN resource site includes technical articles, videos, product descriptions and instructional flipbooks, providing information on how to leverage LoRaWAN connectivity in agriculture, smart cities, sensors, autonomous vehicles and other applications.

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



Mouser Electronics' new LoRaWAN resource site offers engineers and designers a range of useful related information.

The future of energy for independent power producers

Aytek Yuksel, Content Marketing Leader – Power Systems, Cummins

The International Energy Agency annually releases its World Energy Outlook with the aim of deepening our understanding of the future of energy. The report runs over 800 pages and offers great insights around the future of energy. Here we summarise five key insights every IPP should know with regard to the future of energy.

It is forecast that the world's installed electrical capacity needs to grow by 80% from 2018 to 2040 to fulfil our increasing need for electricity. There are technologies such as renewables, and efforts such as energy efficiency to manage and meet this increase in demand. Independent power producers (IPPs) play a key role in bringing the solutions to expand the installed electrical capacity to life.

Key insights from the IEA's World Energy Outlook

Electricity use grows faster than energy demand

Demand for energy is forecast to grow 1% a year until 2040, while electricity use is forecast to grow twice as fast. While the use of electric vehicles is one of the reasons most highlighted for this increase in demand, there are three other drivers that have a greater impact: industrial motors, household appliances and cooling needs.

The increasing demand for electricity will strengthen its position as the second most popular choice of energy in final consumption, challenging oil's position at the top. A mix of technologies will fuel this transition, where solar photovoltaic (PV) and wind will take the lead. By 2040, more of our electricity will be produced through renewable sources than from fossil fuels.

Demand for power infrastructure flexibility grows faster than the demand for electricity

Renewable technologies bring great benefits in terms of zero carbon emissions, but also introduce the challenge of

flexibility. The continually increasing share of renewables in our energy infrastructure translates into an increasing share of variable electricity generation. At the same time, consumers are increasingly using electricity for cooling and to fuel their cars, changing the electricity demand profile. A combination of these two factors will result in a greater need for power-system flexibility.

While traditional power plants and interconnections continue to be the key levers to deliver flexibility, gas-fired generation will grow across most regions. The expanding availability of natural gas and its relatively cheaper price foster this growth. IPPs will bring to reality the solutions to address the growing demand for energy and electricity.

Africa offers vast opportunities

Demand for electricity generation is forecast to grow faster in Africa than in any other region. A mix of factors – including an estimated over half a billion people expected to move from rural areas to cities across the continent, increasing access to electricity, and expanding mineral extraction activities – will drive this demand.

Africa is also well-positioned to find the fuels to fulfil this need. On the renewables front, Africa is solar-rich, yet less than 1% of the world's installed solar capacity is in Africa. This indicates significant opportunities for power producers. When we consider low-carbon fuels, Africa has seen recent discoveries of substantial gas deposits: between 2010 and 2018 40% of global gas discoveries were in Africa.

Two sides of scalability for renewables

The installed base of solar PV has grown over recent years and is forecast to account for more installed capacity than any other energy source by 2040. However, scaling up solar PV results in more electricity being produced around the same time of the day in a given region. This could be interpreted as decreasing the value of additional electricity production as the solar PV installed capacity increases, unless there is a sufficient installed base of energy storage batteries to redeploy electricity produced for use at another time of the day.

Offshore wind is expected to become the star performer with regard to scalability, due to its high annual average capacity factor. Offshore wind's annual average capacity



It is estimated that the world's electrical capacity needs to grow by 80%, 2018 to 2040, to meet ever-increasing demand for electricity.



The International Energy Agency releases its *World Energy Outlook* annually.

factor is already comparable to that of gas-fired power plants in many regions and better than that of other variable renewables. This means the growth in installed base in offshore wind would not result in a diminishing value of electricity output.

Battery storage technologies will become an integral part of energy infrastructure

Energy-storage batteries are projected to be the rising star in building our energy infrastructure, as battery technologies advance and costs decrease. It is estimated that there will be a forty-fold increase in battery storage capacity by 2040, higher than almost every other mainstream technology.

Increased use of energy-storage batteries will also

At a glance

- By 2040, more of our electricity will be produced through renewable sources than from fossil fuels.
- Africa is solar-rich, yet less than 1% of the world's installed solar capacity is in Africa.
- It is estimated that there will be a forty-fold increase in battery storage capacity by 2040.

impact how we manage the intermittent nature of solar and wind. As noted, scaling up solar PV results in more electricity being produced around the same time of the day in a given region and could reduce the value of additional electricity production, but a combination of solar PV and batteries would address this challenge. As the addition of batteries increases the levelised cost of electricity (LCOE), the LCOE for solar PV and batteries is forecast to be competitive with that of fossil fuels.

With the rapid changes in energy markets, new insights emerge continually. IPPs that stay up to date with the latest insights could outperform others in realising the ideal solutions to address our increasing need for energy and electricity. □

For more information visit: www.cummins.com
and: www.iea.org/topics/world-energy-outlook

ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT : PRODUCTS + SERVICES

Wind power in Ethiopia

Siemens Gamesa has signed its first wind power project in Ethiopia with state-owned electricity company Ethiopian Electric Power (EEP), as the country begins to expand its green energy capacity to meet ambitious renewables targets.

The 100 MW Assela wind farm will be located between the towns of Adama and Assela, some 150 km south of the capital, Addis Ababa, and will contribute clean and affordable power for the country's electricity grid.

Ethiopia aims to supply 100% of its domestic energy demand through renewable energy by 2030. According to the African Development Bank, the country has abundant resources, particularly wind with a potential 10 GW of installation capacity and 324 MW installed at present.

Roberto Sabalza, CEO for Onshore Southern Europe and Africa at Siemens Gamesa said, "We aim to expand our leadership across Africa, and in turn help a growing transition to green energy across the continent. We are pleased to begin work in Ethiopia and look forward to collaborating with EEP and the country to continue to promote their drive to install more renewables and meet transformational energy targets."

According to a Wood Mackenzie forecast, around 2 GW of wind power will be installed in Ethiopia by 2029. The Assela wind farm will be made up of 29 SG 3.4-132 wind turbines and is set to be commissioned

by the start of 2023. The project will generate about 300 000 MWh per year. Siemens Gamesa will provide full engineering, procurement, and turnkey construction.

The project will be financed by the Danish Ministry of Foreign Affairs via Danida Business Finance (DBF) adding to a loan agreement signed between the Ethiopian Ministry of Finance and Economic Cooperation (MoFEC) and Danske Bank A/S.

Ethiopia has many renewable resources including wind, solar, geothermal and biomass, and the country aspires to be a power hub and the battery for the Horn of Africa. The country's National Electrification Programme, launched in 2017, outlines a plan to reach universal access by 2025 with the help of off-grid solutions for 35% of the population.

For more information visit: www.SiemensGamesa.com



Siemens Gamesa will provide full engineering, procurement, and turnkey construction for the 100 MW Assela wind farm project.

REDZ in South Africa's Just Energy Transition

Renewable Energy Development Zones (REDZ) have a key role to play in South Africa's Just Energy Transition, creating priority areas for investment in the electricity grid, extending South Africa's green energy map, and enabling higher levels of renewable power penetration. Mercia Grimbeek, Head of Project Development for Enertrag in South Africa and Chair of the South African Wind Energy Association (SAWEA) notes that wind energy developers are investigating the potential for development in the eMalahleni REDZ in particular.

Although Mpumalanga is not known for high levels of wind, this challenge can be overcome with increased turbine hub height, Grimbeek says.

As the wind industry embarks on a journey of localisation and local economic development, industry players believe the region can be positioned as a component manufacturing hub, which will further entrench the wind energy industry's positive impact on job creation. It is recognised that engagement with the relevant government stakeholders is critical.

Grimbeek, says, "The new eMalahleni REDZ marks a huge step towards accelerated economic development in Mpumalanga. As we move to implement the requirements of the Integrated Resource Plan (IRP) 2019, it would seem natural that a portion of the 1 600 MW to be developed per year should be allocated to the northern region of the country, and research has dispelled the myth that wind is not an economically viable option in this region.

"Through the implementation of national and even regional auctions the area could receive the economic stimulus it needs and reduce the almost complete reliance on mining-generated income to drive and support the

local economy. Renewable energy such as wind power can be deployed fairly quickly when compared to other large infrastructure projects. This allows for the economic benefits to flow through to communities in a relatively short time, directly through job creation as well as indirectly through manufacturing and supply chain management," Grimbeek adds.

Due to the high number of energy-intensive users in and around eMalahleni it is seen as an ideal location to promote private off-taker agreements for the purchase of energy from independent power producers (IPPs). The deployment of wind energy, backed by a regulatory regime that supports private power purchase agreements, would stimulate local economic development within a short timeframe.

Hence, the development of the eMalahleni REDZ could be viewed as a perfect partnership between government and IPPs, further enabling a Just Energy Transition for the benefit of the communities of Mpumalanga.

The development of wind energy generation is an effective vehicle for direct infrastructure investment and a positive multiplier of economic opportunities in industries such as construction, procurement, engineering and logistics. With the provision of a consistent regulatory framework that supports a focused project delivery pipeline, the renewable energy industry would have the opportunity to expand the manufacturing value chain in this REDZ.

"A stable and consistent project pipeline will support manufacturing of components locally, with the added benefit of skills development and training for the local communities. One cannot ignore that the introduction of renewable energy would require a significant amount of skills transfer and human capital investment, so we believe that by expanding renewable energy into eMalahleni, local communities will be empowered and less reliant on a single industry to provide economic certainty," Grimbeek says. □



Umoya Energy wind farm, Cape West Coast. The development of wind energy generation is an effective vehicle for direct infrastructure investment and local economic development.

For more information visit: <https://sawea.org.za>

Gas-to-power options emerge in SA

As South Africa races against the clock to fill an electricity supply gap of some 2 000 MW by 2022, gas-to-power projects will play a significant role. According to Nicola Rump, Principal Environmental Scientist at SRK Consulting, the government's risk mitigation independent power producer procurement programme (RMIPPPP) launched in late 2020 attracted the interest of a number of private sector players in the gas-to-power industry.



Nicola Rump, Principal Environmental Scientist at SRK Consulting.

“While the longer-established renewable energy independent power producer procurement programme (REIPPPP) is delivering notable results in solar and wind energy generation, we are now seeing an exciting start in exploring the potential of gas in South Africa's energy mix,” Rump says.

She notes that the field of gas-fired generation in the country had previously seen little activity from private developers. This changed fast, as the Department of Mineral Resources and Energy moved towards evaluating RMIPPPP project bids at the end of 2020. With South Africa's power system being as constrained as it is, government aims to see these projects start feeding into the national grid by mid-2022. SRK is currently conducting a number of environmental impact assessments (EIAs) for gas-to-power projects in the Eastern Cape and KwaZulu-Natal.

Key aspects of the planning process for these projects include EIAs and related licencing requirements. Within the tight timeframes envisaged, these need to be carefully managed to prevent them becoming stumbling blocks.

“The introduction of strict timelines for the EIA process in recent years means that while EIAs are generally completed in less time than before, the process leaves very little time to accommodate any changes to the project design,” says Rump.

It also requires that a significant amount of work must be completed before the application is lodged with the regulator.

“Gas-to-power projects need to submit a final scoping study to the Department of Environment, Forestry and Fisheries (DEFF), and this must be approved before the EIA phase can begin,” she says. “Once the final environmental impact report (EIR) has been submitted, DEFF would decide on the conditions applying to the authorisation.”

While an important attraction of gas is its lower carbon footprint than coal, SA's dominant fuel source for energy, it is not without its environmental impacts. These include carbon emissions, for which projects would require an air emission licence before proceeding.

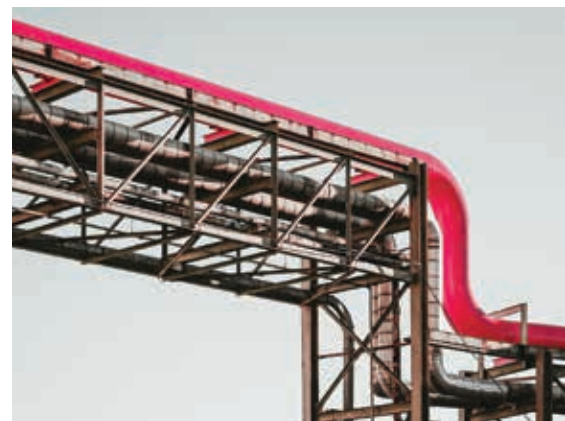
“Climate change impacts are also becoming an

increasingly important consideration in these assessments,” Rump cautions, “especially in the light of South Africa's commitments to international agreements on combating global climate change and reducing greenhouse gas emissions – with specific emissions reduction targets in place.”

Other impacts include noise and traffic as well as effects on marine ecology of those projects that require offshore infrastructure. Currently, gas-to-power projects tend to be close to ports to facilitate the supply chain from sea-borne liquefied natural gas (LNG).

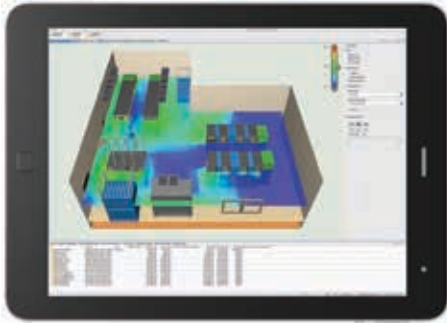
Rump notes that over the short-term, projects will need to overcome South Africa's lack of gas pipeline infrastructure, basing their viability on LNG sources being shipped in. However, among the advantages of developing a fledgling gas-to-power sector through the RMIPPPP is that this would contribute to the growth of local gas markets – helping pave the way for the installation of costly gas infrastructure. This, in turn, could reduce the cost of gas as a fuel and spur the uptake of it as a cleaner option in South Africa's energy landscape. □

Current projects will have to overcome South Africa's lack of gas pipeline infrastructure.



SRK is an independent, global network of consulting practices operating in over 45 countries on six continents. Its experienced engineers and scientists work with clients in multi-disciplinary teams to deliver integrated, sustainable technical solutions across a range of sectors – mining, water, environment, infrastructure and energy.

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



EcoStruxure™ Power and Process enables companies to break down the barriers between power and process control systems for greater digital efficiency.

Energy savings through power and process management

Schneider Electric, a leader in the digital transformation of energy management and automation, has launched EcoStruxure™ Power and Process to unify engineering design, operations and maintenance, and optimise enterprise-wide decision making. Developed in partnership with AVEVA and already implemented at several energy-intensive production sites globally,

EcoStruxure™ Power and Process allows a medium to large oil refinery, for example, producing 450 000 barrels per day, to attain 10% process energy usage improvement, reducing CO₂ output by 567 000 metric tons and saving US\$210 million a year.

EcoStruxure™ Power and Process enables companies to break down the traditional barriers between power and process control systems and move towards greater digital efficiency. Based on the vendor agnostic principles of universal automation, the solution connects all assets at every level, across the full lifecycle and the entire supply chain. This enables plant and enterprise-wide data analysis to drive resilient operations and optimise energy usage to achieve profitable operation.

Businesses implementing EcoStruxure™ Power and Process can expect:

- Electrical, instrumentation and control (EI&C) CapEx reduction of up to 20%

- Uptime improvement by 3%
- Unplanned downtime reduction by 15%
- Process energy usage improvement by 10%

Visibility removes complexity

In recent years, the sometimes immense complexity of disparate systems has made project execution and subsequent operations increasingly difficult. Despite advances in automation, machine learning, and analytics, it is reported that 30% of project implementation and maintenance costs come from a lack of efficiency and operational visibility. Siloed engineers and programmers are required, separately, to build up and maintain operations.

By achieving complete visibility and connectivity, businesses can gain full situational awareness and build operational resilience across their sites and production facilities, improving profitability at every level, from planning and installation, to energy use and carbon emissions.

"The siloed nature of industrial operations is crippling performance," said Peter Herweck, Executive Vice President of Industrial Automation at Schneider Electric. "Our vision is a completely unified architecture, across every site and the entire supply chain. EcoStruxure™ Power and Process is another step in the journey toward complete unification, providing unparalleled access and insight to users. To drive industry development, businesses with locked-in industrial equipment and systems solutions can benefit from the solution equally. Combined with universal automation, it has the potential to drive profitability and sustainability at every operational level and empower managers to

New technology increases solar yield, lowers costs

Micro-grid specialists at DHYBRID have introduced a new technology that lowers energy costs for stand-alone grids by achieving significantly greater solar yields. By improving system management, the recently patented inverter control system can increase the proportion of solar power by more than 10%, with corresponding

reductions in the amount of power required from diesel generators or other connected power grids. The Maximum Inverter Power Tracking (MIPT) system achieves these results by continuously adjusting the output of individual inverters or groups of inverters in accordance with the needs of the micro-grid.

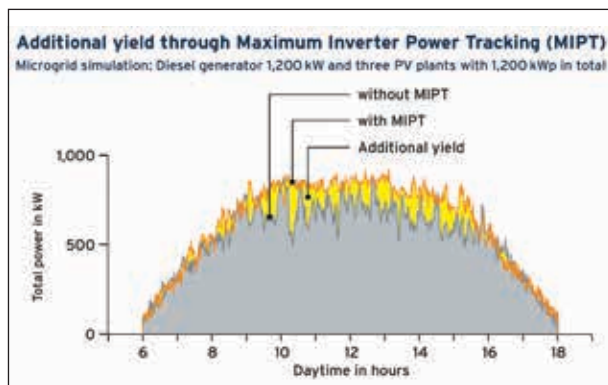
Conventional micro-grid control systems treat all inverters the same, assigning them an identical maximum feed-in rate – which could be a fixed percentage of their nominal capacity. This means that within a micro-grid, PV systems that are producing high yields at any given time are treated the same as those that are not performing as well. The resulting power output losses are entirely avoidable and can have significant effects for micro-grids in particular. Micro-grids often

comprise several PV systems which are all connected but may experience different degrees of shading, for instance.

The MIPT system ensures optimal control by continuously monitoring the outputs of the various PV systems, allowing the maximum feed-in capacity to be dynamically distributed across all connected inverters several times per second. Systems that are running better can feed in more energy, making it possible to take full advantage of the photovoltaic output.

"A similar approach has been used to optimise performance between the PV module and inverter. Our technology takes this to the next level and optimises the performance of individual inverters within a hybrid system. This allows us to improve efficiency significantly and increase

The dynamic inverter control system ensures higher yields, optimising the feed-in of solar energy.



make the best decisions. In pilot projects, our customers were able to achieve 20% E&IC CapEx reduction with payback in 12 months."

Holistic management

Power management systems provide key information on the flow of power in an electrical generation or power plant, improving overall power efficiency. Process management systems enable managers to plan and monitor the performance of operations within an industrial or business environment. For decades, these two systems have worked independently, stunting innovation and efficiency.

The convergence of power and process management systems moves industry into holistic management and provides instant and significant benefits.

Chris Dartnell, President of Oil, Gas and Petrochemicals Business, Schneider Electric, said, "The industrial world has been too slow to digitise. Despite the prevalence of new, cutting-edge technology with huge potential, industry is still largely dependent on human interaction. We now have the ability to unlock that potential and move to a fully automated, fully digital means of industrial operation and communication. Implementing EcoStruxure™ Power and Process across an entire ecosystem will drive production efficiency, profitability and sustainability locally and globally. Connectivity and visibility are central to the new era of open, universal integration, to create new efficiencies and new innovations."

**For more information contact Schneider Electric SA.
Email: quintin.mccutcheon@se.com, Visit: www.se.com**

potential savings," explains Tobias Reiner, CTO at DHYBRID.

"In some cases, we have been able to increase the proportion of PV in our systems by more than 10%," Reiner adds. To save costs, the new technology relies solely on the MIPT algorithm in the DHYBRID software. As neither special inverters nor other energy producers are needed, the innovative solution can be used to optimise new and existing systems.

A positive side effect of employing the dynamic inverter control system is that the output of connected diesel generators does not need to be adjusted as often as is normally the case. When generators run steadily, their efficiency and service lives improve, an effect that is clearly evident in the substantially smoother feed-in curves.

The operating principle and the advantages of the new control system become even clearer when an inverter fails. Conventional approaches would treat the defective inverter as if it were still functional, even though it can no longer deliver any yields. By contrast, the MIPT system assigns the remaining systems a higher maximum output power so they automatically compensate for part of the shortfall.

For more information visit: www.dhybrid.de/en

New series of gas engine gensets

Rolls-Royce is launching the new MTU gas engine Series 500 for power generation. With a power range of 250 to 550 kW and peak efficiencies of up to 42.6%, the gas gensets offer a climate-friendly and economical solution for the industrial and utility sector and other applications. Gas gensets and cogeneration plants can be ordered on the basis of 6-cylinder in-line engines as well as 8- and 12-cylinder V-engines for the 50 Hz market. In cogeneration, when electricity and heat are generated, efficiencies of around 90% can be achieved.

"With the 500 series, we are offering our customers state-of-the-art products equipped for the future in terms of efficiency and environmental friendliness," says Andreas Görtz, Vice President Power Generation at Rolls-Royce Power Systems. "With efficiencies of up to 42.6%, low lifecycle costs and high availability, the gensets also offer plant operators the benefit of low fuel consumption and thus high yields," says Görtz.

The products will initially be available for operation with natural gas, and from mid-2021, also with biogas. In addition, the 500 series is H2-ready, which means the engines can be converted to hydrogen operation at a later date.

All gensets are equipped as standard with the flexible MTU Module Control System (MMC), which can be customised to perform all important functions required for continuous monitoring and control of a complete customer solution. The MMC is located in a separate panel next to the genset. This allows the gensets to be integrated into complex systems such as micro-grids and provides access to the global MTU service network.

With the MMC control system, the 500 series gensets are suitable for use in a range of applications, such as in combined heat and power plants and in complex industrial applications. Rolls-Royce offers its customers a comprehensive portfolio of energy systems that contribute to reduced carbon emissions – from simple storage solutions to complex micro-grids that intelligently combine battery storage with renewable energies and diesel or gas gensets. A micro-grid solution combining heat and power from a gas genset such as the new MTU Series 500 with photovoltaics and a battery storage system, can cut energy costs by over 40% compared to a conventional system, significantly reducing its carbon footprint.

For more information visit: www.rolls-royce.com



The MTU Series 500 gensets will initially be available for operation with natural gas.

Mini-grid asset leasing option

The contraction of the global economy paired with far-reaching travel restrictions during most of 2020 slowed down many industrial sectors. It had a significant impact on the implementation of rural electrification projects in developing economies. After several slow-moving months, SustainSolar, South African provider of off-grid solar power generation solutions, finished the year with another nine mini-grid systems to be delivered early in 2021.

In response to the Covid-19 crisis, OnePower, a mini-grid developer based in Lesotho, ordered seven containerised, rapid deployment, off-grid solar systems from SustainSolar to energise remote health clinics and their surrounding communities. The modular, turnkey, high quality features of the Sustain Compact™ product range suited the specific needs of the remote health facilities. Each system has an initial solar PV capacity of 20 kWp powered by SMA inverters and is supplied with 51 kWh of Solar MD storage, which can be extended to more than double this size as electricity demand grows. The first two systems were delivered in early December, with the aim to have the first unit installed and running before Christmas. The remaining systems will go live early this year.

Another two Sustain Compact™ solutions were ordered by Equatorial Power, a Uganda-based mini-grid developer that has pioneered off-grid electrification and its productive use in Uganda and neighbouring countries. Equipped with pre-installed and pre-tested SMA inverters supporting about 30 kWp of PV capacity and almost 90 kWh of lithium-ion from Solar MD, the SustainSolar containers will travel to their destination in the DRC this year, where they will be installed and connected to an off-grid distribution system. The turnkey, pre-configured system design and configuration of the SustainSolar



SustainSolar's turnkey, containerised, pre-installed solar systems are equipped with solar PV panels, electronics and lithium-ion batteries.

solution allow for this to be done within a matter of days.

Undeterred by the global slowdown, SustainSolar leveraged its regional and industry knowledge and joined the European Investment Programme, Get. Invest, for support with the refinement of its innovative asset leasing proposition for mini-grid developers. The Cape Town based company is currently designing several pilot cases to demonstrate that an asset leasing model, commonly used in more mature industries like construction and mining, can be an attractive alternative to traditional CapEx financing. Designed to address some of the bigger hurdles faced by mini-grid developers, SustainSolar's leasing model increases project viability by reducing CapEx, improving mini-grid project returns, and speeding up scaling. The pilot phase to test and validate the model with a number of enthusiastic mini-grid developers was scheduled to launch in January.

For more information contact SustainSolar.

Tel: +27 (0)21 204 1881

Email: maxime.delafay@sustainsolar.co.za

Visit: www.sustainsolar.co.za

Global Eco-Industrial Parks in SA

The Department of Trade, Industry and Competition (dtic) and the National Cleaner Production Centre South Africa (NCPC-SA), in partnership with the United Nations Industrial Development Organisation (UNIDO), has launched the Global Eco-Industrial Parks Programme (GEIPP) in South Africa.

GEIPP aims to demonstrate the viability and benefits of Eco-Industrial Parks approaches in scaling up resource productivity and improving the economic, environmental and social performance of businesses, thereby contributing to inclusive and sustainable industrial development in the participating developing and transition economies.

The programme was launched in a virtual ceremony in December 2020, officially opened by dtic Deputy Director-General Sipho Zikode and Ambassador of Switzerland to South Africa, Dr Nicolas Brühl.



The project is funded by the Swiss State Secretariat for Economic Affairs (SECO) and implemented internationally by UNIDO.

South Africa was chosen to host the programme of Eco-Industrial Parks (EIP) to support the Industrial Park Revitalisation Programme (IPRP) of the dtic, matching the core focus areas of economic, social and environmental benefit in support of the national priorities to address poverty, employment, inequality and growth.

The NCPC-SA will be the national implementer of the three-year programme, following a successful pilot project in 2018-19.

The EIP approach is flexible and can be applied to parks of all sizes, privately or publicly owned.

Zikode said the NCPC-SA project will focus on three government-owned EIP parks, including East London Industrial Development Zone (SEZ), the Phuthaditjhaba Industrial Park and Ekandustria.

He said the launch marked an important chapter in building capacity of state-led industrial parks in the country contributing towards the articulation of a green economy.

140 MW Nxuba wind farm comes on stream

The Enel Group's South African renewable energy subsidiary, Enel Green Power RSA (EGP RSA), has achieved commercial operation on its 140 MW Nxuba wind farm in the Eastern Cape. Construction of the project involved an investment of 200 million euros. The new facility is expected to generate 460 GWh of energy annually.

Salvatore Bernabei, CEO of Enel Green Power said, "This important milestone confirms EGP's commitment to South Africa and cements our position as the leading renewable energy independent power producer in the country. We are continuing to make investments to further diversify the generation mix, and promoting a sustainable and inclusive energy transition, creating shared value for our stakeholders."

Producing clean, renewable energy, the Nxuba wind farm will obviate the emission of about 460 000 tons of CO₂ annually. It will be supported by a 20-year power supply agreement with the South African energy utility Eskom, as part of the South African government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). In its fourth round in April 2015 the REIPPPP awarded a total of five wind projects for 700 MW to the Enel Group.

The Eastern Cape is well suited for wind generation, largely due to the strong winds along the province's coastline between Cookhouse and the western border of Lesotho. The region also has the advantage that it is close to major grid connections, making it convenient to feed energy into South Africa's national electricity grid.

With the Nxuba wind farm now online, EGP RSA has eight operational projects in the country, with an overall installed capacity of more than 650 MW. In the Eastern Cape, in addition to Nxuba, EGP RSA has two other

wind farms in operation: Nojoli (88 MW) and Gibson Bay (111 MW). In the Northern Cape, the company has solar plants Upington (10 MW) and Adams (82.5 MW). Additional solar plants include Pulida (82.5 MW)

in the Free State, Tom Burke (66 MW) in Limpopo, and Paleisheuvel (82.5 MW) in the Western Cape. Two projects, Garob in the Northern Cape and Oyster Bay in the Eastern Cape, will commence full operation in the second quarter of 2021, and another two, Karusa and Soetwater in the Karoo Hoogland, in the fourth quarter of 2021, each with an installed capacity of 140 MW.

The construction of the Nxuba wind farm involved a significant skills transfer element, with EGP RSA enlisting the services of small and medium enterprises from the local Blue Crane Route and Raymond Mhlaba municipalities to assist on the project. Additionally, the concrete tower sections were manufactured locally in the town of Somerset East.

The development also involved the deployment of digital tools to perform on-site quality checks and the smart tracking of wind turbine components. Using such innovative solutions has allowed for more reliable and precise data collection, improving the overall quality of work and streamlining communications between workers on- and off-site.

During the construction of the facility, rigorous safety protocols were implemented, in light of the ongoing pandemic and in line with the indications provided by health authorities, with the aim to ensure the necessary protection for the workers involved as well as the communities where the wind farm is located. Enel Green Power established strict guidelines for travel, which included quarantine when workers moved to cities outside the construction site region, increased sanitisation of facilities, vehicles and environments on the construction site, and other measures to ensure safe work practices. Teams and operations were structured to maintain social distancing and the company carried out testing campaigns on all employees working on the site.

With Nxuba now operational – thanks in part to the support of Eskom in the commissioning of the facility – the new wind farm consolidates EGP RSA's position as the leading renewable energy independent power producer in South Africa and demonstrates its commitment to providing sustainable and clean energy to the country.



Now operational, Nxuba wind farm in the Eastern Cape is expected to generate 460 GWh of energy annually.

"Our pursuit in establishing sustainable industrial ecosystems, especially in the township and rural communities, should incorporate holistic balanced economic indicators which are contextual to their environment. Together with international agencies such as UNIDO and SECO, we aim to strengthen the IPRP to achieve this," Zikode said.

Dr Brühl said the programme will further improve the environmental, economic, social performance and competitive advantage of industrial parks, which will contribute to strengthening economic development. "The EIP Programme will foster the development of a low-emission and climate resilient economy by supporting the implementation of appropriate framework conditions which, in the long run, will contribute to economic growth, job creation, more equality and less poverty," Brühl said.

The launch of the GEIPP followed the ninth session of the Joint Economic Committee (JEC) meeting between the two countries which took place in November last year.

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

For more information visit contact Enel Green Power.

Tel: +27 (0)10 344 0200

Email: communications.egprsa@enel.com

Visit: www.enelgreenpower.com

Sensors support traditional crispbread production in Sweden

What is the most typical Swedish product? It does not take long to answer: crispbread. Sweden's largest producer of the traditional round crispbread is based in the small town of Leksand in central Sweden. In this application report, ifm explains how sensors are used to support the smooth running of the automated production process.

The company Leksands Knäckebröd was founded in 1920 and has been family-owned since then, today in the 4th generation. While the recipes are still the same after about 100 years, the production process is now completely different. Production is automated with the latest state-of-the-art technology. To ensure the systems always run smoothly, different sensors monitor the production process – from the supply of the ingredients to the dispatch area.

Peter Joon, Managing Director at Leksands Knäckebröd, says, "We use many different sensors as this is a modern, highly automated production process. To maintain the high productivity of 99.6%, we need sensors we can trust. For this reason we are now using many sensors from ifm. They are of good quality and function well with our systems."

Lars Ohlner, Automation Engineer at Leksands Knäckebröd, adds, "We use products from ifm because they are easy to configure and they are cost-effective; they simply function reliably. We mainly use photoelectric and capacitive sensors and some flow sensors. We obtain high-grade and effective automation and a reliable production process."

Some examples of the particularly innovative applications of sensors are outlined below.



Capacitive sensors detect the flour through the walls of the pipes.

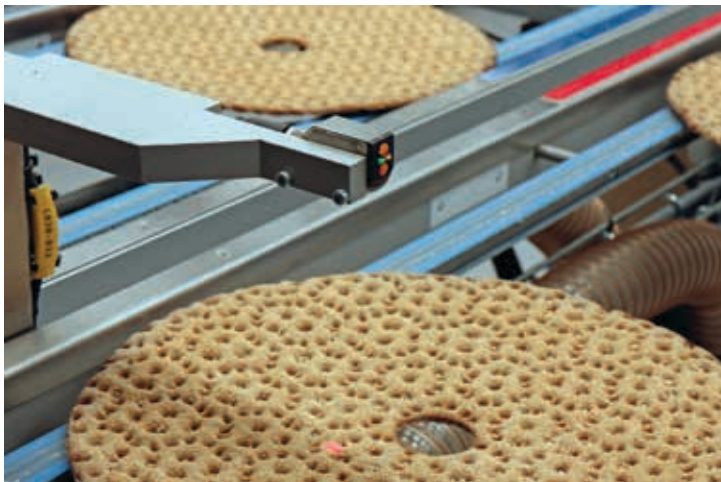
Capacitive sensors

The main ingredients of crispbread are rye meal and finely ground rye and wheat flour. They are supplied to the mixing tools via various pipes. Capacitive sensors monitor the supply at the pipes or the level in the temporary storage tanks. Capacitive sensors are distinguished by detecting different materials, even through the tank wall, unless that is of metal. If a pipe is no longer completely filled with flour, the capacitive sensor detects this state and sends a switching signal to the controller.

Often, several capacitive sensors are used on storage tanks or silos: at the top, for example, to signal a possible overflow in good time, or at the bottom of the silo to signal a critical empty state.

Potentiometers are used to adjust the sensors after installation. The switch point is adjusted depending on the wall thickness of the pipe and the type of medium to be detected. The new KI6000 sensors from ifm need to be set especially precisely. The 12-point LED signal display makes it much easier for the user to set the optimum switch point, which is in the centre of the display. The green LEDs on either side of the switch point indicate its reliability. Deposits, material changes and suchlike are displayed directly on the sensor and the user can readjust the switch point as needed. That means an imminent error can be detected in good time and avoided.

If help is needed with the effects of process changes, this is much easier to explain and rectify with the clear switch-point visualisation. By phone the user can describe



100 years of Swedish tradition: the Leksands crispbread follows the distinctive traditional form – round with a hole in the middle.



The ifm O6-series diffuse reflection sensors monitor the flow of material.

the LED behaviour and a support engineer can easily advise corrective measures.

By using non-contact potentiometers, the new units have the high protection rating of IP69K and are well suited for use in medium temperatures up to 110°C. Moreover, different functions such as PNP/NPN or NC/NO can be selected. The ifm sensors are equipped with IO-Link, so the user is set up for Industry 4.0.

Photoelectric sensors

Numerous diffuse reflection sensors are installed at the conveyor belts in the production plant. They monitor the flow of materials – individual slices of crispbread, for example, or completely packed products in the dispatch area.

In most cases, Leksands Knäckebröd uses the ifm O6 type diffuse reflection sensors. The sensors' optical performance is excellent. They are distinguished by a noise-immune background suppression function and the range of up to 200 mm is achievable independent of the object colour. This is important as the crispbread slices have different surfaces, depending on the type and recipes.

Even if there is vapour or dust in the environment, or in highly reflective environments, the automatic sensitivity compensation guarantees reliable function. The clean round light spot ensures consistent light distribution in the light cone. Scattered light around the operating range is avoided. The compact O6 WetLine is designed for use in wet areas. The two setting potentiometers are fitted with a double seal. Front pane and potentiometer are embedded flush to allow residue-free cleaning. These compact powerful units can also be supplied as through-beam and retro-reflective systems.

The robust and corrosion-resistant stainless steel housing with protection rating IP68 or IP69K ensures reliable long-term use, even under severe conditions.

The O6-series sensors are also available with IO-Link. Via this interface, the range, sensitivity, light-on/dark-on modes, switching delay or deactivation of the operating elements, for example, can be set remotely.

Magnetic inductive flow sensors

As well as the grains, water is an elementary ingredient in the crispbread dough. In the field of dough production, a magnetic-inductive flow meter from ifm is used.

These units feature high accuracy, measurement dynamics and repeatability. They are suitable for conductive

At a glance

- Different sensors monitor the automated production process to ensure the systems run smoothly, supporting a productivity level of 99.6%.
- Capacitive sensors, diffuse reflection sensors, and magnetic inductive flow meters are used at various points in the plant to monitor specific processes.



Above: The O1D sensor with time of flight technology enables position detection across longer distances.

Right: The amount of water for dough production is precisely monitored by magnetic inductive flow meters.



media from 20 μ S/cm. The 4-digit alphanumeric LED display is clearly visible. Besides the volumetric flow, the units also measure temperatures from -10 to 70°C. With integrated temperature monitoring there is no need for an additional measuring point. The robust, compact housing of the flow meter, use of resistant materials and a pressure rating up to 16 bar allow for flexible use.

With IO-Link technology, process values are available via the analogue output as well as digitally. This means there need be no conversion losses during measured value transmission. All sensor parameters can be saved, with simple and quick configuration and remote parameter setting functionality. Saved parameters also allow for easy replacement of sensors when necessary.

Looking ahead

Leksands Knäckebröd has been using reliable, long-life sensors from ifm for a long time. There are ifm sensors already older than 25 years in some places in the plant. The company is also looking towards tackling new challenges in automation.

Peter Joon says, "For the future, we need to develop sensors that can perceive the different texture and shades of the bread. ifm is working with us on the development of these sensors. We have created a new area which is based mainly on ifm products and this has proven its worth, so we will develop our future areas similarly. Ifm has the products we need." □

For more information visit: www.ifm.com

Hygiene under high pressure

Claudia Homburg, Marketing, VEGA Grieshaber KG

Milk is tops! But what makes milk so popular? It's not just a healthy blend of protein, nutrients and vitamins; from the farm to the production facility it is the end result of a safe, hygienic production process. New compact pressure and level switches from VEGA demonstrate that automation in food and beverage production can be simple, highly efficient and economical without compromising on dependability, hygiene or safety.

The demand for quality in food is higher today than ever before. More products are being manufactured to suit individual tastes and preferences, which makes ever-faster batch changes necessary. Consumers trust that everything is safe and hygienic at all times – and rarely think about the extensive network of safety measures that make it possible. Intelligent system design is one of them. It supports the reliability, efficiency and hygiene of manufacturing processes – with the help of high-tech sensors and the reliable measured values they deliver.

Level and pressure measurement technology from VEGA, in particular the plics® modular instrument series, has been making a significant contribution to safety and efficiency for many decades now – as if it were tailor-made for the high demands of the food industry. Food products do not require extreme solutions, but, in many areas, simple optimisation and cost-effective production methods. Here, less is usually more. VEGA has expanded its product range to include a compact instrument series that suits this need.

For extreme and standard applications

Standard applications, in particular, can be automated very economically with the new compact pressure sensors and

level switches with IO-Link. Integration and adjustment are especially easy to carry out. IO-Link ensures transparency throughout the production chain and seamless communication, from the field level to the control system. This performance class also guarantees cross-device connection options that support the continuous improvement of production facilities. The focus here is on compactness, flexibility, safety and optimised hygiene.



Robust, compact, efficient and reliable, the instruments are hygienic by design.

CIP – a real endurance test

Time is becoming an increasingly important factor in food production processes, and hygienic production in particular requires a lot of it. Cleaning in place (CIP) is one of the most time-consuming process steps. The potential for savings here lies essentially in consistent hygienic design that allows production systems to be cleaned and sterilised more quickly. However, in view of the industry's high cleanliness requirements, this assumes that the faster cleaning processes can still be relied on 100%. It requires components whose geometry does not allow microorganisms to collect in hidden spaces, and that themselves can withstand the cleaning and sterilisation processes.

Media that are hard on the materials of the measuring instruments are, for example, substances with a high fat content as well as aromatic substances. The cleaning agents are also very aggressive, making it necessary to use materials with high chemical resistance. The new VEGABAR and VEGAPOINT instrument series easily withstand both problematic media and detergents. These pressure sensors and level switches tolerate high temperatures without loss of function and cope with the combination of high temperature and long exposure times.

Hygienic design to the last detail

What 'Hygienic by Design' means in concrete terms can be seen even in the smallest components of the new sensor



The new VEGABAR and VEGAPOINT instrument series respond to the growing demand for simple sensors that support safe, hygienic and increasingly efficient food and beverage production.

series. All surfaces of VEGABAR 29 and 39 sensors that come into contact with the medium are made of stainless steel and have optimal surface roughness values. VEGABAR 28 and 38 are available in high-strength ceramic versions and VEGAPOINT sensors as PEEK versions.

All materials are approved and tested according to FDA and EC 1935/2004. This is confirmed by independent laboratories and institutes. The design of the instruments is certified according to the European EHEDG Directive and the North American 3-A Sanitary Standards Inc. Both standards prescribe the use of corrosion-resistant materials only. The components are also designed in accordance with GMP regulations (Good Manufacturing Practices), which ensures that microorganisms are reliably removed by cleaning and cannot multiply on surfaces or in gaps.

Simpler solutions

The new VEGABAR and VEGAPOINT instrument series respond to the growing demand for simple sensors with reduced variants that support increasingly efficient food production. Higher efficiency requires more standardised

products that are as easy as possible to use but still cover all fundamental hygienic requirements. It also calls for better networked products with easy connectivity to existing control systems and mobile devices. To fulfil these imperatives, VEGA now follows the motto: 'As little as possible – but with no compromises in quality.' □

With 60 years of experience in level and pressure instrumentation for numerous industries, VEGA has the expertise to ensure its products deliver maximum process reliability and efficiency. The complete portfolio includes level, switching and pressure sensors with certified hygienic design and high resistance to aggressive cleaning processes. All sensors meet the required standards and guidelines. In food production facilities they ensure improved process insight, higher process reliability and availability, and consistent product quality.

For more information visit: www.vega.com

The digital sensor age transforming industry

Since 1933 Danfoss has engineered solutions that allow the world to use resources in smarter ways – driving the sustainable transformation of tomorrow. The global company produces more than 250 000 products in 70 factories across 25 countries every day, developing and refining solutions in response to its customers' needs.

With the shift towards an increasingly digital world, Danfoss Industrial Automation has repositioned itself as Danfoss Sensing Solutions, representing the union of application-driven sensor technologies and an unparalleled commitment to helping customers navigate their journeys into the digital era.

Bert Labots, Vice President at Danfoss says, "Global mega trends increase the need for sensing. We see OEMs, wholesalers and installers adapting to it and facing fundamental choices. They're asking questions like 'What is the right path for us?' and 'Who will help us make the right decisions as we move along?'. Our new name reflects our commitment to embracing that future. It is our way of saying: We are your partner in navigating your journey across the digital sensor frontier – today and tomorrow."

In parallel with the name change, Danfoss customers will benefit from a broader product range, such as pressure transmitters, temperature sensors and position sensors, more and increasingly diverse sensor technologies, support and services for sensor ecosystems, as well as swift and simple customisation.

"As a leading global player, we know that companies adapting to the rapidly changing digital landscape require a competent partner. Danfoss Sensing Solutions provides industry-leading know-how and advanced sensor technologies to navigate the way forward for our customers and partners. An important

part of this journey is in extending our offering within digital sensor connectivity for wired and wireless sensor solutions. Another differentiator is diagnostics and smart sensors that allow for instant programmability and remote technical support on the sensor side," says Labots.

Danfoss Sensor Solutions offers a wide product portfolio in pressure and temperature sensors and position sensors, to meet the needs of diverse industries, such as mobile hydraulics, marine and offshore, water pumps, wind power, industrial hydraulics, industrial air compressors and more.

For more information contact Danfoss Sensing Solutions.

Visit: www.danfoss.com



Bert Labots, Vice President at Danfoss.

Vibration sensors inform preventive maintenance

Volatile global economic conditions and ever tougher regulations are making it increasingly difficult for pulp and paper producers to protect their operating margins. The situation is aggravated by rising energy and raw materials costs, as well as the challenges of meeting health, safety and environmental legislation. As a result, mills are looking for methods of reducing operating costs, one of which is to minimise maintenance activities, while optimising plant availability and uptime.

Equipment malfunctions in pulp and paper mills can, in most instances, be traced back to poor maintenance. As with any other industry sector, preventing a problem is generally more cost-effective than fixing it afterwards.

However, plant shutdowns, even scheduled plant shutdowns, have become increasingly expensive in today's continuous processes. By installing vibration monitoring equipment, the running time between shutdowns can be extended and the frequency of shutdowns reduced.

RC Sensors include a full range of vibration sensors to help industrial producers meet the challenges of monitoring and maintaining production machinery, including forming, pressing, drying and finishing systems.

The RC range of accelerometers or vibration transmitters are designed to suit the many different and challenging conditions found on pulp and paper production

machines, with solutions for online and offline monitoring. The range includes industrial accelerometers for use in tough environments and hazardous areas.

In wet areas, the standard ac sensors (RC-100 Series) fitted with integrated silicon cables and sealed to IP68 provide a reliable and effective method of data monitoring. The sensors can be supplied in top- or side-entry form and are fully submersible.

For press and dryer sections the ac sensors are available with integrated 2-Pin MS connectors, also with top- or side-entry options, depending on the headroom on the line. The accelerometers are available with a range of cable assemblies, including silicon that is flexible, easy to install in conduit and, when fitted to the accelerometer, provides IP66 sealing.

Junction, switch and connection boxes are available in stainless steel, painted mild steel and polycarbonate housings. They can be supplied with a number of different channels to suit different paper machine applications.

R&C Instrumentation supplies and supports the RC range of vibration measurement products. The instruments are manufactured in Europe and conform to European standards in manufacture, quality and reliability. As well as the standard range of RC vibration sensors, ATEX certified intrinsically safe units are available, as is a sensor with 4-20 mA vibration and 10 mV/°C temperature output. Portable instruments, raw data converters and programmable vibration switches complete the range of RC products.

For more information contact R&C Instrumentation.

Tel: +27 (0)71 471 2056, email: info@randci.co.za

Visit: www.randci.co.za

Vibration sensors reduce shutdowns in pulp and paper mills.



Plug and play temperature sensors

Turck is expanding its innovative range of fluid sensors with IO-Link-capable sensors for flexible and reliable process temperature measurement. The sensors are compact devices and are available with an integrated temperature probe (TS700) as well as processing and display units (TS720) for connecting resistance thermometers or thermocouples.

As part of the fluid sensor series that won the iF Design Award, the TS+ sensors also meet the growing demand for straightforward commissioning and high plant availability. This is supported by the robust stainless steel housing with touch operation instead of mechanical operating elements, plus IP67 and IP69K protection, which makes them suitable for use in harsh industrial environments. As well as monitoring process values, the IO-Link interface provides the user with condition monitoring data for smart IIoT applications.

To simplify commissioning, the TS+ devices feature automatic detection of the output type (PNP/NPN or cur-

rent/voltage), as is already offered by the PS+ and FS+ pressure and flow sensors. The processing units of the TS720 series also detect the type of temperature probe (TC or Pt), thus eliminating a frequent source of errors. If the TS+ is to be integrated into existing installations or is required to replace existing sensors, the selection of different IO-Link process data profiles makes it possible to adapt the device quickly, without the need for laborious modifications in the controller.

The TS+ sensors are typically used in machine and plant building applications as well as in the process industry. Compact TS700 devices operate in a measuring range from -50 to +150°C. Depending on the temperature probe connected, type TS720 processing and display units can cover temperature ranges from as low as -200 to 1 800°C.

For more information contact Brandon Topham at Turck Banner.

Tel: +27 (0)11 453 2468

Email: brandon.topham@turckbanner.co.za

Visit: www.turckbanner.co.za



The IO-Link-capable TS+ sensors deliver reliable process temperature measurement and can be used in harsh environments.

Monitoring mission-critical electrical equipment at Natref

The Natref petrol refinery in the industrial area of Sasolburg was commissioned in 1971 and is one of South Africa's only and oldest inland refineries. Historically, engineers at the refinery have had difficulties monitoring the operations of circuit breakers at the refinery's substations, leading to increased maintenance costs and unplanned downtime. Ian Loudon, International Sales and Marketing Manager at remote monitoring specialist Omniflex, reports how improvements on the monitoring system have helped plant managers overcome these difficulties.

The Natref petrol refinery, a jointly owned venture between Sasol and Total, has been at the cutting edge of refining technology since it was established nearly half a century ago. Because the local market for heavy fuel oil is limited, Natref is designed to get the most out of crude oil. By optimising its use of the bottoms upgrading refining process, Natref can produce 70% more white product than coastal refineries, which rely on heavy fuel oil.

Across the 17 substations on the Natref site, automatically operated circuit breakers are used to protect electrical circuits from damage in the event of a short circuit or system overload. They do this by interrupting current flow if a fault is detected. Unlike a fuse, which can be used only once before it needs to be replaced, circuit breakers are reset to resume normal operation. However, they have a finite operating life and can be reset only a certain number of times before they need to be replaced.

Monitoring the operation of circuit breakers at the substations has been a long-standing problem for maintenance engineers as they had no way of knowing if one went off and had automatically reset. Existing on-site alarms showed only the current state of the circuit breakers so, if they had been reset, they would present as normal. This meant engineers were unaware of underlying issues at the substations because all circuit breakers were showing as normal when inspected, and incidents went undetected.

The system had not been designed to detect and record faults and this was leading to increased maintenance costs because engineers were not aware of issues until they were serious enough to cause system failure – and unplanned downtime. To address these problems, the plant managers engaged Omniflex to provide a way of monitoring and recording circuit breaker activity.

Monitoring the switches

The solution from Omniflex proposed the implementation of alarm annunciators to monitor circuit breaker operations and sequence of events logging that records events at the substations at frequencies faster than one millisecond.



Across the 17 substations on the Natref site, automatically operated circuit breakers are used to protect electrical circuits.

The data is timestamped and recorded on a built-in SD card to produce an electronic data repository for auditing purposes. The biggest benefit is in narrowing down the root cause of the trip by reviewing the logged sequences of events. This enables more accurate fault-finding – and, in turn, more effective maintenance.

From each monitored switch, the signal is split so it goes to the annunciator and the sequence of events recorder in parallel. The contact from the circuit breaker is monitored, open or closed, and the annunciator traps the momentary alarm caused by the circuit breaker tripping and maps it to the alarm status. Consequently, engineers can see if there has been an incident, even if the circuit breaker has automatically reset in the meantime. The event stream is captured on the SD card ensuring the momentary trip and its sequence in time is recorded.

Each substation has a GPS time synchronisation



Monitoring the operation of circuit breakers at the substations had been a long-standing problem with no indication if one went off and had reset.



The newly implemented alarm and events logging technology means maintenance engineers can see when an incident has occurred.

By adopting this technology at the refinery's substations, the Natref plant managers can reduce maintenance downtime and implement a predictive maintenance programme, replacing circuit breakers as they reach the end of their service life and minimising unplanned downtime. Furthermore, by tracking all circuit breaker trips, problem areas in the system can now be identified by looking at repeated circuit breaker trips that previously would have gone unnoticed and undocumented. Omniflex is a specified technology partner of the Natref refinery for providing this alarm

and sequence of events technology. □

module which updates and synchronises time across the entire system so time in one substation is the same in the others, allowing for useful comparisons to be made across the plant on a unified time-base.

For more information visit: www.omniflex.com

PLANT MAINTENANCE, TEST + MEASUREMENT : PRODUCTS + SERVICES

Benchtop test and measurement equipment

RS Components, a trading brand of Electrocomponents plc, a global omni-channel solutions partner for industrial customers and suppliers, is now stocking an extensive range of RS PRO bench test and measurement equipment. The range includes programmable power supplies, oscilloscopes, waveform generators, digital multimeters, and arbitrary function generators, covering various functions and applications and providing a full suite of electronic instruments for customers in the engineering community.

The RS PRO RSST-2000 series of insulation testers are electrical safety testers featuring a double insulation design that makes them the world's first to comply with the IEC 61010-2-034 safety standard. Comprising four models, the series caters to a wide range of applications and each model includes features for greater functionality.

The electrical safety testers provide a high-quality and high-efficiency solution to any electrical testing needs with an output capacity of 200 VA. As troubleshooting

tools they are ideal in preventing potential equipment failures before they occur. The primary test functions include ac and dc withstanding voltage, ground bond, and grounding continuity.

The series features output adjustment resolution, measurement resolution, controllable voltage ramp up and ramp down time settings and upper/lower limit judgement settings. The high illumination LED lights (flashing or permanently lit) and high-volume audio indicator provide warnings of the status during ongoing tests or judgement results from the safety analyser.

Other features of the RSST-2000 series include 100 sets of manual test memory for storage of different test conditions; rear output terminal for system integration; and front panel remote control terminal mount/rear panel signal I/O for users to control the analyser's output/stop, based on requirements.

The RS PRO RSST-2000 series is competitively priced, carries the RS PRO Seal of Approval and carries a three-year warranty. The instruments have been through high-calibre compliance and quality testing to ensure quality, durability, and consistency.

The full range of RS PRO bench test and measurement equipment is available to order online from RS South Africa and across sub-Saharan Africa.

For more information contact RS Components SA.

Tel: +27 (0)11 691 9300

Email: sales.za@rs-components.com

Visit: <https://za.rs-online.com>



The full range of RS Components' own-brand benchtop electrical test and measurement equipment is available to order online.

Safe NDT in Koeberg's SGR project

Dekra is recognised globally as an expert in non-destructive testing (NDT) and inspection. With a presence in more than 50 countries on five continents, and a history of 95 years in the industry internationally, Dekra is dedicated to ensuring long-term safety, quality and environmental protection across all industries.

Dekra Industrial RSA continues its parent company's commitment to the highest testing, inspection, safety and quality standards, and has developed a respected reputation in South Africa and pan-Africa for its dedication in this regard.

The company was recently awarded a tender to undertake NDT inspection and testing at South Africa's Koeberg nuclear power station, on the west coast near Cape Town. Subcontracted by the two main suppliers, Dekra Industrial secured the NDT portion of the contract for the steam generator replacement (SGR) project, based on its sound reputation in the industry as well as its established presence in Cape Town.

"Safety is the cornerstone on which our global and local reputation is built – and with our skilled local team, we were successful in our tender to supply the SGR project at Koeberg," says Johan Gerber, Dekra Industrial RSA Director.

Gerber adds that with a national and regional footprint and its proximity to the plant, Dekra Industrial is also geographically and logistically well-positioned to conduct nuclear NDT and inspection on the SGR project.

"We have furthermore been assessed in accordance with the RD-0034 nuclear safety compliance standard – as part of the NDE (non-destructive evaluation) scope of work for the SGR project – and we are currently addressing the requirements and defined gaps to become completely RD-0034 Level 2-compliant.

"Although this is still subject to acceptance and verification from external parties, from Dekra Industrial management's standpoint, we are confident we will meet the requirements as contracted and managed between Dekra Industrial and our clients through the relevant project plans," Gerber says.

Once the above process has been completed, Dekra Industrial will be one of the few companies certified to this Level 2 supplier qualification in South Africa. Given the extremely stringent safety compliance standards in the nuclear sector, it will be a noteworthy achievement for the company to attain this level of expertise.

Part of the project entails Dekra Industrial undertaking radiographic inspection on the reactor coolant system for the SGR project – specifically inspection of the connection welds between the steam generator and existing pipework. The other part of the contract involves non-destructive examination services on the secondary welding on additional pipework.

Dekra Industrial's inspections include visual examination, penetrant testing, magnetic particle testing, ultrasonic testing and phased array ultrasonic testing, as well

as industrial radiographic testing on the welds. "This brings a set of challenges with it, as it obviously has a radiation component," says Cape Town Branch Manager and Project Leader Rudolf Vermeulen.

"Introducing another source of radiation (even in such a small amount) into a nuclear plant entails even stricter adherence to already stringent safety protocols, and involves a lot of compliance-related administration," Vermeulen says, pointing out that people and equipment run the risk of potential radiation contamination in this testing.

"While the Koeberg nuclear plant has many protocols in place to mitigate any form of contamination, there is always the potential human error element to consider. However, we always ensure the correct level of oversight, with the most rigorous procedures in place, to prevent potential errors or non-compliance from occurring," he adds.

"What also worked favourably for Dekra Industrial in securing this project was that – as a leading NDT and inspections provider – we are recognised for having good operational, safety compliance and behavioural measures in place, and a solid safety culture and track record within the nuclear environment," Vermeulen says.

Gerber concurs, adding, "We also have the approval of the Atomic Energy Association and – at short notice if necessary – we have the support of Dekra's Services division in Europe."

Another aspect of the SGR project required the company to provide NDT technicians and assistants to carry out the NDT inspections. It turned to the local community to fill these roles, particularly from Atlantis, as the area is conveniently close to the power plant. Permanent in-house Level 3s NDTs were drafted in to train the candidates accordingly.

Vermeulen says working in the nuclear sector was a new experience for many of the general workers (brush-hands) sourced locally, and there was significant mentoring involved in the training process. As well as serving Dekra Industrial, this facilitated skills empowerment and upliftment of the local community at the same time.

The company has recently been ISO 45001-certified, in terms of the international standard for occupational health and safety (OH&S) management, a further endorsement of its safety profile.

For more information contact Dekra Industrial RSA.

Email: johan.gerber@dekra.com

Visit: www.dekrarsa.com



Johan Gerber, Director, Dekra Industrial RSA.



Rudolf Vermeulen, Branch Manager, Cape Town.

Chain and hoists for maintenance on wind turbines

Becker's Kito electric chain and manual hoists are designed for dependable use in materials handling and maintenance applications in diverse industries. These include mining, construction, shipbuilding, food and beverages, pharmaceuticals, manufacturing and general industry, as well as in chemical and petrochemical plants and the wind power sector.

Kito electric chain hoists and manual hand chain blocks and lever hoists are manufactured in Japan to stringent quality and safety specifications and are well suited to demanding applications in wind turbines.

"Wind power is growing globally as a reliable source of renewable energy and this is a growing business sector for our Kito range," says Rick Jacobs, Senior General Manager for Consumables, Becker Mining South Africa. "While traditional coal-mining for energy production requires hoists that can operate safely in confined and dust-filled conditions underground, the available space in wind turbine nacelles (which house the drive train and other tower-top components) is also confined, but these are often hundreds of metres above the ground, and sea spray rather than dust, is usually the related environmental hazard.

"The strictest safety standards are critical during construction, maintenance and operation of wind turbines, which is why dependable, industry-approved equipment must be correctly used, by properly-trained workers.

"Specialists in the wind power sector have specified stringent requirements for hoists, including the need for their service life to be at least 20 years, to match that of most wind power generators. It is also important that the hoists operate reliably in tough environments, like corrosive coastal conditions and high mountainous areas.

"The robust Kito range, which meets – and exceeds – industry requirements, can be customised by Becker specialists to suit exact requirements of every wind turbine installation. Optional components include a radio remote control, foam hook protector and plain, geared or motorised trolleys.

"Corrosion-resistant, heat-treated Kito load chain is the only electroless nickel plated chain available. Its advantages include high uniform strength and lower wear than conventional load chains."

Kito standard ER2 electric chain wind hoists – with a maximum load capacity of 800 kg, a lifting height up to 150 m and 3 phase 400/690 operating voltages – are available from Becker with higher load capacities, greater lifting heights and special voltages on request.

The wind hoists have an IP55 ingress protection rating to guard against the ingress of dust and water, a fan-cooled motor system for optimum cooling, and a thermal overload limiter to prevent the motor from overheating. The aluminium die-cast body ensures a stable structure and a friction clutch protects components that are subjected to stress against overloading. Additionally, five or six pocket load sheaves, dependent on the product model, ensure smooth operation.

The top hook or connector can be easily assembled and disassembled for reliable suspension. The load hook pivots through 360° to avoid kinking and twisting of the load chain. Internal connectors enable direct cabling for easy connection and helical gears reduce operating noise.

For enhanced safety, upper and lower limit switches stop the hook when the highest or lowest positions have been reached and an electromagnetic brake or a pull rotor brake ensure powerful braking, holding the load securely at all times.

The convenient display of operating data – including operating hours and load cycles – allows maintenance intervals to be planned efficiently.

The Kito range used in wind turbines also includes: single-phase ED electric hoists, lightweight yet robust, weatherproof and corrosion resistant; manual chain hoists with load capacities up to 50 000 kg, which are used to lift components to the machine room during assembly and maintenance procedures; and lever hoists which can move loads of up to 9 000 kg.

Kito hoists are available in Southern Africa exclusively from Becker Mining SA and a network of selected distributors, which offer a technical advisory, repair, test and backup service. To ensure safety and performance, it is critical that the hoists are tested regularly at Becker Mining SA's workshops, or any certified repair centre.

For more information contact Becker Mining SA.

Tel: +27 (0)11 617 6300

Email: info@za.becker-mining.com

Visit: www.za.becker-mining.com



Kito electric chain hoists, manual hand chain blocks and lever hoists are increasingly being used in the maintenance of wind turbines.

Upskill your workforce with condition monitoring training

Condition monitoring technology is advancing so fast that ongoing training for staff working in the machinery maintenance arena is essential in order for them to stay abreast of current trends.

This is the view of WearCheck Technical Manager, Steven Lumley, who plays an instrumental role in developing the company's training schedule and ensuring all courses are compliant with lockdown regulations.

"We have found that customers who invest in upskilling their staff definitely gain a higher return on investment in their condition monitoring programme. For example, if maintenance staff know how to interpret vibration readings accurately, or take an oil sample correctly, or take proper care of the machinery, the efficacy of the condition monitoring programme is boosted a hundredfold, and training plays a key role here.

"Due to the ongoing Covid-19 situation," says Lumley, "it is important that customers should contact us to confirm whether the courses will be held at a venue or online, as we strive to comply with lockdown regulations and keep course delegates safe and healthy."

WearCheck's range of oil analysis and condition monitoring training courses is geared for maintenance practitioners operating at various levels within an organisation. Delegates can earn valuable CPD (continuing professional development) points from many of the courses.

Customer training courses run by WearCheck range across: Precision Shaft Alignment, Precision Balancing, Vibration Analysis, qualifications for Asset Reliability Practitioners, Lean Maintenance Planning, Operator Asset



WearCheck training consultant Jan Backer (third from left) recently conducted oil analysis training courses in Johannesburg for delegates from Glencore-Rhovan Vanadium Mine, NEA Mining and SPH Kundalila.

Care, Root Cause Analysis, and Transformer Oil Analysis.

Most are one- or two-day courses and a few run up to five days. They are conducted at WearCheck venues around the country or online. The company also conducts customised training courses on request.

WearCheck has been an accredited training partner for the internationally acclaimed Mobius Institute since 2015 and all the Mobius courses can be attended online or in person.

More details on course content and prices can be obtained from the website.

For more information or bookings contact Michelle van Dyk at WearCheck.

Tel: +27 (0)21 001 2100, Mobile: +27 (0)82 381 3321

Email: training@wearcheck.co.za

Visit: www.wearcheck.co.za

True-RMS multimeter for electrical troubleshooting

Comtest, local representative for Fluke, has introduced the new Fluke 110, a versatile multimeter to measure voltage, continuity, resistance and more. Fluke multimeters have long been trusted by electricians for all essential electrical measurements. The new 110 is the ideal meter for go/no-go troubleshooting, offering manual and automatic ranging in a compact, ergonomic design for one-handed operation. The unit is supplied with a holster and probe holders for easy storage. It also fits into the optional ToolPak™ magnetic hanger for hands-free operation.

Key features of the Fluke 110 multimeter include:

- True-RMS ac voltage for accurate measurements on non-linear signal
- Measurement of resistance and continuity
- Large white LED backlight to work in poorly lit areas
- Safety rated CAT III 600 V
- Min/Max/Average to record signal fluctuations
- 3-year warranty

- Included are Fluke TL75 HardPoint test leads and protective caps for high voltage areas, and 9 V battery (installed)

The Fluke 110 multimeter can be used by electricians working in industrial and facilities maintenance, or electrical utilities, in wet facilities that include food or chemical processing, or dusty environments like cement plants, steel mills and foundries. The Fluke 110 is also suitable for use in hazardous areas such as the mining industry (MHSA approval pending) and the petrochemical industry.

For more information contact Comtest.

Tel: +27 (0)10 595 1821

Email: sales@comtest.co.za, visit: www.comtest.co.za



The Fluke 110 True-RMS Multimeter is ideal for accurate electrical troubleshooting in the field.

Testing electrical products for hazardous environments

South African manufacturer Pratley aims to launch three new electrical termination products in 2021, specifically for the offshore, oil and gas, industrial and shipping industries, all of which present particularly harsh and hazardous operating environments. "It is an exciting time for us," says Sven Breedt, who heads up the electrical R&D division.

"The offshore environment represents some of the most challenging conditions you can encounter, with extreme cold and air saturated with corrosive salt. Currently, most equipment used in this sector is manufactured from specialised materials. We think we have some improved solutions to develop new products," he adds.

At the beginning of last year, Pratley launched its world-first Ex d/e corrosion-resistant Enviro compression cable gland. "We have had a lot of international enquiries and are currently certifying this product for use in the US and the European Union. It is the feedback we have received that has led to the latest developments we are bringing to the market to supplement our range."

While cable glands are relatively low-cost items compared to some other electrical equipment, they are safety-critical elements in any electrical reticulation setup. Breedt notes: "We push the boundaries to explore what we can achieve in terms of design engineering and safety, from the materials themselves to an array of cost-effective measures incorporated into our products."

Pratley operates two test and research laboratories at its Krugersdorp manufacturing facility, which places it in the top league of electrical equipment manufacturers globally. The fully equipped laboratories are staffed by highly qualified scientists and technicians like Breedt, who is regarded as a global expert in the science and standards of electrical equipment for hazardous areas.

The electrical testing laboratory has the distinction of having more state-of-the-art equipment than the SABS, and other accredited laboratories approach the company to make use of its advanced equipment. Here, Breedt oversees product development and research, with his department designing all the necessary tooling and machinery for production.



Sven Breedt at work in the electrical testing laboratory.

In addition to having ISO 9001 quality management accreditation, the electrical testing laboratory complies with ISO 17025 in terms of its processes and calibration accuracy. Pratley is able to test its own products in-house, with the oversight of an international laboratory, to all the IEC 60079 series of standards for hazardous areas, and the two main European ATEX directives for explosive atmospheres. "I would say we have one of the most advanced laboratories in this field in the country," Breedt says. Pratley's in-house testing capability has been acknowledged by other international laboratories as being world-class.

Equipment ranges from a salt-spray tester for corrosion testing, to an environmental chamber that ages materials at different temperatures and humidities, a dust chamber to look at the ingress of dust particles into electrical enclosures, impact testers to gauge the impact resistance of electrical equipment, water ingress equipment to determine the level of water-tightness, and tensile-strength testing equipment for material development.

"We have a new ultra-low temperature deep freeze and are looking to expand this service going forward as it is so specialised. By being able to test to minus 86°C, we can guarantee that a product can operate in practically any environment on earth. We have also acquired a few additional smaller machines and recently upgraded our tensometer. We are looking at procuring more equipment in early 2021," Breedt adds.

He explains the multi-pronged product development approach at Pratley. "We use customer feedback as a basis to see what the market is looking for. We also draw on our own expertise to ascertain any gaps in the market and how we can service that need. A parallel development process allows us to push the boundaries of what can be achieved in terms of optimal solutions and products."

For more information contact Pratley.

Tel: +27 (0)11 955 2190

Email: sales@pratley.co.za, visit: www.pratley.com



State of the art equipment in the electrical testing laboratory.

Graduating wind turbine service technicians

In December 2020, SARETEC, the South African Renewable Energy Technology Centre at the Cape Peninsula University of Technology (CPUT), hosted a virtual press briefing to recognise and celebrate the graduates from the 5th intake of its Wind Turbine Service Technician training programme, WTST5, and all the players, from the public and private sectors, local and international, who support the programme and make it feasible.

SARETEC was established as an initiative of the Department of Mineral Resources and Energy (DMRE), working in collaboration with the South African National Energy Development Institute (SANEDI), the GEF (Global Environment Facility), and the UNDP (United Nations Development Programme). It was created specifically to provide technical training to serve the renewable energy sector as it grows and evolves in South Africa, the SADC region and across Africa.

A number of other partners and sponsors support the centre, the training programmes it offers and the students that participate. Among them are South Africa's Department of Higher Education and Training; SAWEF, the South African Wind Energy Project; international government agencies such as GIZ, the German organisation that fosters mutual learning and networking to support successful international cooperation; and private sector businesses active in the renewable energy sector in South Africa who offer work experience for students as part of the training programme as well as employment opportunities for successful graduates.

WTST5 saw 12 students graduate from the seven-month training programme. Henk Volschenk, Training Supervisor at SARETEC, explained that further intakes scheduled for the year were disrupted by the coronavirus pandemic. Volschenk said the aim is to accommodate three intakes per year of about 12 students per intake. To date between 80 and 90 trained technicians have graduated from the programme. He added that past intakes have included not only first-time students but also already qualified electricians and artisans looking to add to their skills and extend their expertise. WTST6 is now planned to kick off in the first quarter of 2021.

Speaking at the press briefing Ntombifuthi Ntuli, CEO of the South African Wind Energy Association SAWEA, pointed to the growth trajectory for the wind energy sector – in line with plans set out in the IRP2019 to increase its contribution to the national supply to some 1.6 GW by 2030. “Our calculations indicate that this means we will need to see more than 190 wind turbine service technicians graduating every year through the next 10 years – so we would then have about 1 700 qualified technicians committed to the wind energy sector in the country. At that level we can reduce our reliance on imported skills and build more local



employment and business development opportunities,” she said.

Dr Ayodele Odusola, resident representative in South Africa for the UNDP, raised the bar, suggesting that SARETEC should be looking to serve the renewable energy sector not only in South Africa but, over time, in the SADC region and across the continent as well. He suggested it should become a centre of excellence in Africa for skills training in this field.

A further highlight of the press briefing came from the graduates themselves when a couple of them – Phumla Siphambo and Brent van Rooyen – presented short video clips briefly reporting some of what they had learned from the programme, expressing their appreciation for the opportunity, and describing where they are working now on wind farms in different parts of the country.

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

A new collaboration for hydrogen-fuelled trucking



In the broad move towards fossil-fuel-free transport, Volvo is already launching a complete range of electric trucks, available in Europe in 2021.

In December 2020, Daimler Truck AG, IVECO, OMV, Shell and the Volvo Group committed to work together to help create the conditions for the mass market rollout of zero emission hydrogen-fuelled trucks in Europe.

As a growing number of governments and businesses align on a common vision of a net-zero emissions energy system, the H2Accelerate participants believe hydrogen is an essential fuel for the complete decarbonisation of the truck sector.

Achieving a large-scale rollout of hydrogen-fuelled trucks is expected to create new industries: zero-carbon hydrogen production facilities, large-scale hydrogen distribution systems, a network of high-capacity refuelling stations for liquid and gaseous hydrogen, and the production of the hydrogen-fuelled trucks. H2Accelerate participants believe synchronised investments across the sector during the 2020s will create the conditions for the mass market rollout of hydrogen-fuelled heavy duty transportation which is required to meet the European ambition of net-zero emissions by 2050.

The decade-long scale-up is expected to begin with groups of customers willing to make an early commitment to hydrogen-based trucking. These fleets are expected to operate in regional clusters and along European high capacity corridors with good refuelling station coverage. During the decade, these clusters can then be interconnected to build a pan-European network.

Throughout the scale-up, support from the public sector will be required. In terms of H2Accelerate, the participants aim to work together to seek funding for early pre-commercial projects during the first phase of the rollout. In parallel, they will engage with policymakers and regulators to encourage a policy environment which will help support the subsequent scale-up into volume manufacturing for hydrogen trucks and a Europe-wide refuelling network for zero carbon hydrogen fuel.

From the participants

Martin Lundstedt, President and CEO of the Volvo Group,

said: "Climate change is the challenge of our generation and we are fully committed to the Paris Climate Agreement for decarbonising road transport. In the future, the world will be powered by a combination of battery-electric and fuel-cell electric vehicles, along with other renewable fuels to some extent. The formation of the H2Accelerate collaboration is an important step in shaping a world we want to live in."

"The prize is clear. By boosting scale in a big way, hydrogen-fuelled trucks will need to become available to customers at or below the cost of owning and operating a diesel truck today. This means truck customers will need to have access to a fully zero emissions vehicle with a similar refuelling time, range and cost range compared to the vehicles in use today. To achieve this ambition a clear regulatory framework is needed, including policies addressing the supply of hydrogen, hydrogen-fuelled trucks, refuelling infrastructure and consumer incentives in a coordinated way," said Elisabeth Brinton, Executive Vice President for New Energies at Shell.

Martin Daum, Chairman of the Board of Management of Daimler Truck AG and Member of the Board of Management of Daimler AG, said: "The participant companies in H2Accelerate agree that hydrogen-powered trucks will be key for enabling CO2-neutral transportation in the future. This unprecedented collaboration is an important milestone for driving forward the right framework conditions to establish a mass market for hydrogen-based trucking. It is also a call to action for policymakers, other players involved and society as a whole."

Angelika Zartl-Klik, OMV SVP HSSE & New Energy Solutions, said: "H2Accelerate is playing a pioneering role and OMV is making an important contribution here. In order to achieve the climate targets, we will need any low-carbon technology. Hydrogen is an option for the climate-friendly mobility of the future."

Gerrit Marx, President Commercial & Specialty Vehicles at CNH Industrial, said: "The widespread adoption of hydrogen fuel-cell technology in heavy-duty transport is a function of the necessary infrastructure. We also need very concrete projects to demonstrate with hauliers and other stakeholders in the industry that this solution is financially and operationally viable. The ground-breaking H2Accelerate collaboration will create the conditions for this to happen and accelerate the transition to zero-emission transport."

For more information visit: www.volvogroup.com

PHASE 1	PHASE 2
ROLLOUT OF FIRST STATIONS AND TRUCKS	EUROPE-WIDE COVERAGE
▪ 100s of trucks ▪ >20 high capacity stations ▪ Proving high capacity station concepts ▪ Selective locations/clusters	▪ Second half of 2020s: Achieve volume manufacture '000s per year ▪ Rapidly reaching > 10 000 trucks ▪ Europe-wide coverage of major corridors ▪ High capacity/reliability stations

Securing IoT devices and networked machinery

Lukas van der Merwe, Specialist Sales Executive: Security at T-Systems South Africa

Cyberattacks on Internet of Things (IoT) devices are increasing at an unprecedented pace and this puts manufacturing companies at risk of hackers bringing production processes to a standstill and/or stealing business-critical data.

According to the 2019 SonicWall Cyber Threat Report^[1], there were 13.5 million IoT attacks in the first half of 2019, an increase of 55% compared to the first six months of the previous year. This highlights the alarming speed with which IoT devices are being compromised to deliver malware payloads.

For manufacturing companies, it spells an urgent need to introduce new security strategies for networked machinery, a critical enabler of business innovation and efficiency that, traditionally, has not been designed with security in mind.

IoT/Operational Technology (OT) devices are essentially soft targets for hackers, as they are unseen on traditional security networks. They are also unmanaged and unpatched, and often have weak or default credentials, as well as vulnerable open source components.

The more industrial control systems are connected to the internet, including those that are remotely accessible to allow remote process monitoring, system maintenance, process control and production data analysis, the larger the exposure becomes for an organisation.

Blurring the lines

The increased adoption of IoT and big data is blurring the lines between IT and OT, and the increased attack surface results in a heightened risk of cyberattacks. These risks must be mitigated, as digital transformation continues and is driving a greater urgency to bridge the cybersecurity gap between IT and OT.

While companies can optimise development, production and logistics processes based on operational and status data, industrial control systems lose their previously insular position once production machines are networked.

The machines send data to control systems and, in some cases, communicate via the internet with devices in other locations. In the case of maintenance work, specialist service staff may access machines remotely, either because the specialist resources are not on site, or to save costs.

Companies can increase productivity in this way – but where the production operations and office spheres of a company were previously separated, there are now IT links, and this gives hackers a gateway.

Overall, cybersecurity is emerging as one of the top barriers to implementing Industry 4.0 strategies successfully among many manufacturing companies. It is proving to be a major challenge in the manufacturing environment, mainly due to the risks posed by devices and systems that are unseen across the IT estate.

A paradigm shift

At the same time, an increasing number of enterprises are beginning to recognise the need to bridge the gaps between IT and OT. This challenge is being taken much more seriously than it was a few years ago. It requires a major paradigm shift where numerous factors must be considered.

Organisations need to recognise that people in the OT space do not respond well to change. So, 'digital empathy' must underpin the

deployment of security tools, recognising and responding to people and their working environments, and removing the blockers to productivity that traditionally present themselves.

With the assistance of an experienced technology solutions provider, organisations can empower those people to be part of the journey to improve productivity and build bridges to enable digital transformation at a whole new level.

A suitable partner can accelerate a company's digitalisation initiatives with the simplest and most robust solutions for reducing risk from IoT/OT network threats and unmanaged devices. This can be done via a passive approach that has no impact on productivity or the manufacturing technology.

Bridging the gap between OT and IT security should not be done by force, or seen as a retrofit, but should be about creating something new, especially in highly bespoke environments. Industrial companies often (legitimately) fear that IT security solutions in the field of industrial control systems can interfere with production processes, so security providers must adapt their strategies – typically developed within the world of IT security – for correct use in the OT environment.

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

References

[1] <https://blog.sonicwall.com/en-us/2019/07/mid-year-update-2019-sonicwall-cyber-threat-report/>



Lukas van der Merwe, T-Systems South Africa.

The ‘*Terra Carta*’ – mainstreaming sustainability in business

As part of the Sustainable Markets Initiative launched by HRH The Prince of Wales in January 2020 at the World Economic Forum's Annual Meeting in Davos, and following his call for a 'Marshall-like Plan for Nature, People and Planet' during Climate Week in September 2020, The Prince recently unveiled the *Terra Carta* (Earth Charter) – which offers the basis of a recovery plan to 2030 that puts Nature, People and Planet at the heart of global value creation. It provides a roadmap for businesses to move towards an ambitious and sustainable future; one that will harness the power of nature combined with the transformative power, innovation and resources of the private sector.

As The Prince this year marks 50 years of campaigning for the environment, speaking at the One Planet Summit in Paris in January 2021, HRH made an urgent appeal to private sector leaders around the world to join this endeavour and to give their support to the *Terra Carta*.

Supporters already include Bank of America, Unilever, BlackRock, EY, AstraZeneca, Schroders, BP, Heathrow Airport and Sir Jony Ive.

In line with global agreements such as the Paris Climate Agreement, the Convention on Biological Diversity and the Sustainable Development Goals, the *Terra Carta* outlines ten areas for action and comprises nearly 100 actions for businesses to pursue as they refocus and rebuild, adopting new ways of operating. It aims to encourage and provide a framework for each actor to accelerate their respective transition journeys.

The *Terra Carta* is based on a series of recommendations developed over a year of HRH convening 'coalitions of the willing' among global business leaders across industries in almost every sector, challenging them to identify ways to set our planet on a fundamentally more sustainable trajectory. Together, they have developed a charter of



ambitious but practical action, aimed at building a truly sustainable future.

The charter further aims to unlock the catalytic potential of consumer demand, and to drive investment into solutions (nature-based and engineered) that address the climate and biodiversity crises.

In targeting a global private sector and multi-industry audience, not all actions of the *Terra Carta* will apply equally to all industries, businesses or investors. At the same time, to reach a sustainable future, the systems-level shift required relies on the leadership, resources and interdependence of knowledge and ideas to propel the world towards sustainability at a faster pace through private, public and philanthropic collaboration.

Over the next ten years, the *Terra Carta* will be updated and reported on annually by HRH's Sustainable Markets Initiative in order to reflect the pace of change and continuous progress being achieved around the world.

Speaking at the One Planet Summit, His Royal Highness The Prince of Wales said: "Today, I am making an urgent appeal to leaders, from all sectors and from around the world to give their support to this *Terra Carta* – to bring prosperity into harmony with nature, people and planet over the coming decade. I can only encourage, in particular, those in industry and finance to provide practical leadership to this common project, as only they are able to mobilise the innovation, scale and resources that are required to transform our global economy."

Welcoming the launch of the *Terra Carta*, Brian Moynihan, SMI Co-chair and Chairman and CEO Bank of America and Founding Partner of SMI said: "The *Terra Carta* is a comprehensive roadmap for the private sector to help drive towards a sustainable future. By integrating sustainability into our operating models the private sector can marshal the resources that will be needed to reach the climate, biodiversity and development goals. HRH Prince of Wales's leadership and commitment has created a spirit of possibility that business leaders are proud to join."

One of the actions in the *Terra Carta* has already been initiated. The SMI has created a Natural Capital Investment Alliance to develop Natural Capital, to help the initiative arrive at a common language on Natural Capital Investment so it can start putting money to work and improve the flow of capital. The alliance will work to increase capital allocation actively in this direction targeting \$10 billion by 2022. It will also aim to expand the flow of Natural Capital investment through corporate offsetting and carbon pricing prospects. Founding partners of the Alliance are HSBC Pollution Climate Asset Management, Lombard Odier and Mirova.

For more information visit: www.Sustainable-Markets.org



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