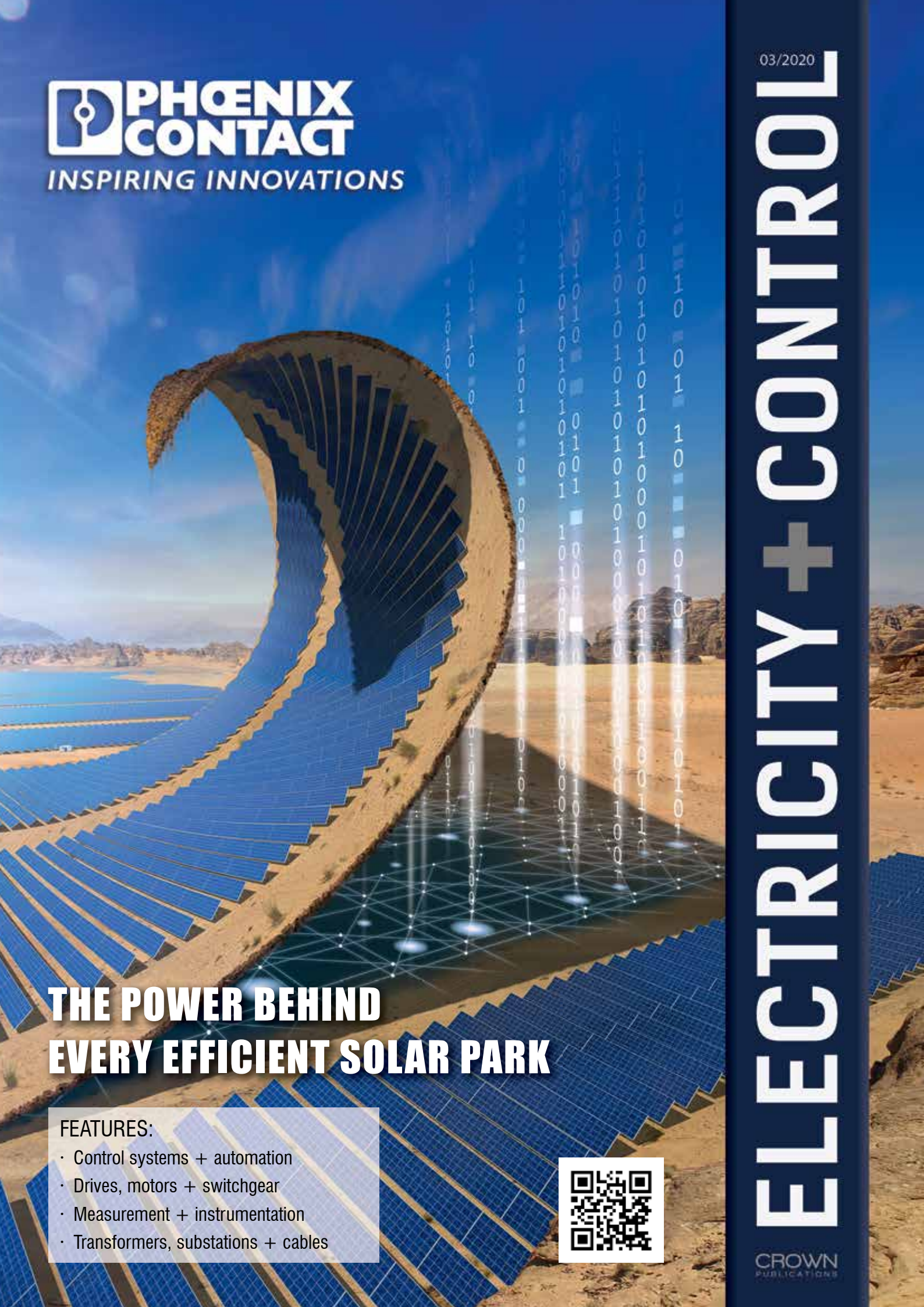
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African solutions for Africa

It is remarkable to see the growth rates across this continent.

Over the past while, there have been many slogans and promotions – whether for the continent or the country – from Africa Rising to a New Dawn – and so on.

The truth is that this continent simply will ascend – there can be no doubt. Education is getting much, much better; innovation is driving many of the economies; a number of countries are positioned as gateways to the continent.

Africa's resources are pretty much unrivalled – and they are to be guarded.

Increasingly we hear of companies with a foothold in South Africa actually doing far and away most of their business 'up north'. And this is not an unhealthy situation at all. In fact, it would be more helpful, I suspect, if we begin more to think of the continent as a collective.

Right now, the challenges remain access to markets, easy mobility, and administrators and lawmakers getting their act together to make all of this possible.

But the potential of skills moving about the continent, and the potential of African solutions for Africa is quite profound.

When we couple this with many of the innovations emerging from the continent (it turns out that our youth are right up there!) then we begin to see a rather interesting future.

Oddly, most folk one engages on these topics fail to see it. Many, in fact, still seem to see only the very negative aspects of what is happening in our own country – and there really is a lot of that.

But I do reflect, now and again, on Adrian Gore's musings. When Gore, founder and CEO of Discovery Limited turned the spotlight onto what is actually good, he pointed to the things that, somehow, we simply fail to see, or will not see.

The one that stands out, of course, is that our GDP has more than doubled in dollar value between 1994 and now, and most of our provinces (maligned as they are), have GDPs that compare to the economies of other well-recognised African countries. The really peculiar thing is how we look to those nations as glowing examples of success, yet we do not recognise what is actually going on here.

Yes, there are problems – and yes, we seem to have denialists all over the show (you need only focus on one or two commissions or courtroom dramas…) who are incapable of understanding why on earth anyone should ever be held to account for anything.

But the fact remains that we are not seeing the good for the bad.

Best we begin to do that – because that will shape up our attitude and allow us to step up and serve right across this continent.

Ian

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

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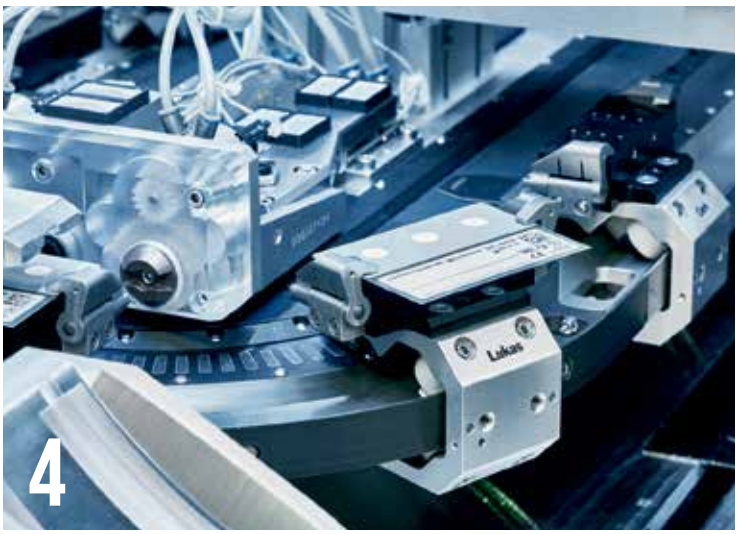

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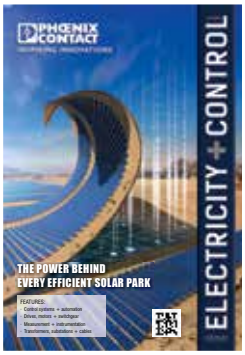


Intelligent management system for PV parks

Due to decreasing system costs, the economic efficiency of photovoltaics (PVs) is steadily increasing. The startup and maintenance effort required for large-scale PV systems can by reduced by up to 50% with the park management system from Phoenix Contact.

Maren Gast, Industry Management Solar in the Industry Management and Automation division of Phoenix Contact Electronics in Bad Pyrmont, Germany, says, in general, the industry is seeing a growing trend towards larger photovoltaic systems. She points to several parks around the world already delivering very high installed total capacity: in Arizona (USA) – 579 MW, Tamil Nadu (India) – 648 MW, and in the Chinese province of Qinghai – 850 MW. The Mohammed bin Rashid Al Maktoum solar park in Dubai is set to provide one gigawatt of solar PV power by 2020 and will be expanded further to deliver up to five gigawatts by 2030. When implemented on this scale, the conversion of sunlight into electrical energy to generate power can easily compete with conventional power stations.

Transferring the solution to other projects

With the world's first PV park management system based on industry standards, Phoenix Contact is addressing the challenges encountered in the startup and operation of large-scale PV power stations. The combination of intelligent automation and comprehensive visualisation tools enables operators to record and evaluate data continuously from the solar park. From data acquisition at field level through to feed-in control and the display of information on a portal, comprehensive solutions are available to meet all requirements. The open monitoring system enables quick and easy integration and startup of the park. The scalable concept provides for efficient and reliable management of PV systems.

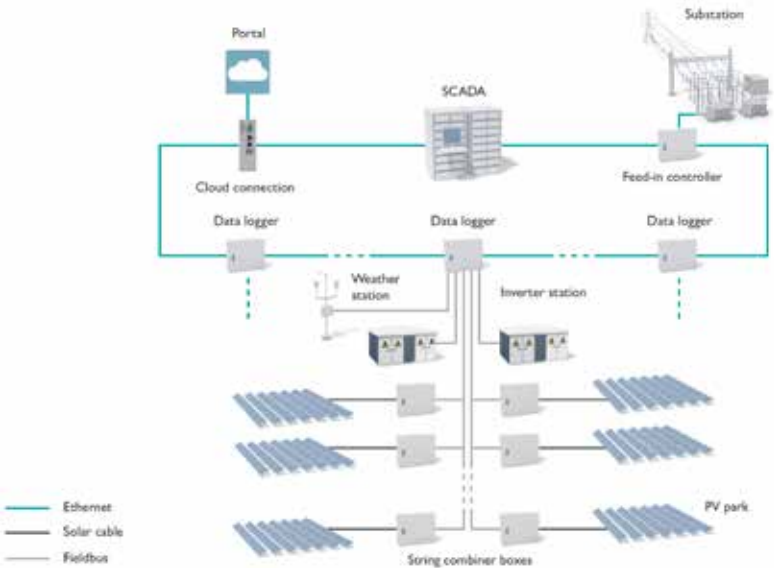
The individual subcomponents – such as data loggers, feed-in controllers, weather stations, the SCADA connection, and the web portal – intermesh seamlessly without any interfaces having to be adapted. The park management system is suitable for use in systems of various sizes and, where necessary, can be tailored to the relevant requirements. Comprehensive process support provided by Phoenix Contact's PV specialists – from planning through to the fully assembled DIN rail during the first project – establishes the foundation for the implementation of future PV parks. With its global sales network, Phoenix Contact can respond flexibly to the rapidly changing solar market. Locally produced components and systems ensure long-term availability. As a result, up to 90% of previously designed PV parks can be incorporated into the implementation of new solar projects.

Compatibility with third-party devices and systems

The individual solutions are already programmed and self-configuring. Once the parameters have been configured, the ready-made modular system can be implemented seamlessly because all park devices are detected automatically. Automatic plug and play of all components and systems simplifies startup significantly and saves 50% on setup time. This solution also offers a high level of compatibility with devices – such as inverters and sensors – from other manufacturers, as well as other park device systems.

Phoenix Contact in South Africa is hosting a seminar on the new PV park management system on 19th March.

For more information contact
Rudi Erasmus at Phoenix Contact.
Email: rerasmus@phoenixcontact.co.za



Previously designed solar PV parks can be incorporated into new solar projects via the PV park management system.

Efficient production of PSCs simplifies access to HIV tests

Stefan Ziegler, Beckhoff Automation

Roche has developed the Cobas Plasma Separation Card (PSC), a new technology that simplifies and improves the examination and monitoring of HIV patients, particularly in remote areas. For the first time, blood plasma samples no longer need to be cooled during transport to the laboratory. A prerequisite for this breakthrough was a flexible, compact and dynamic production technology that allows for the PSC to be produced cost-effectively. This was realised with the eXtended Transport System (XTS) from Beckhoff, which increases efficiency with its high flexibility.

Headquartered in Basel, Switzerland, the Roche Group operates in more than 100 countries and employs around 94,000 people worldwide. The company maintains a position as one of the leaders in personalised medicine, primarily through the combination of pharmaceuticals and diagnostics under one roof. The entire value creation chain, from diagnostics to the pharmaceutical end product, offers great potential for innovation. The Roche site in Mannheim, Germany, with around 8,300 staff, is a case in point. The new plasma separation card, part of the Cobas product range, meets the sensitivity requirements of the World Health Organisation for determining an appropriate HIV therapy. It is a stable and easy-to-use blood plasma sampling card that enables HIV viral load testing.

Roughly credit-card-sized, the Cobas plasma separation card (PSC) requires only a small amount of blood from a patient's fingertip and it greatly simplifies sample transport. For example, for people in rural areas of sub-Saharan Africa, HIV testing is now more accessible as the Cobas PSC eliminates the need to cool blood samples during transport to the lab. In this way it significantly changes the way plasma samples are taken and prepared, and it facilitates reliable quantitative testing even in environments with extreme heat and humidity.

Short time to market

The PSC is manufactured in a compact machine measuring around 3.5 by 3 m, in which the eXtended Transport System (XTS) from Beckhoff plays a central role. It was developed at Roche's Mannheim site by the company's in-house mechanical engineering specialists in the Manufacturing Service & Technology department. Lukas Nagel, Specialist Engineer at Roche, explains that experts from development and production worked hand in hand to complete the project in just two years, ready for production. As a highly flexible transport system, XTS allowed for the production unit to be adapted to changing requirements during the development process. Process optimisations can be implemented rapidly using the software-based functionality, which is easy to modify.

This was important not least in view of the complex structure of the PSC, which consists of several layers. Nagel explains: "A carrier layer is used for mechanical fixing. Next, a thin adhesive layer attaches to the plasma-separating membrane. Underneath is a nonwoven material separated with a chemical stabiliser, to preserve the human plasma for up to six weeks during transport. A label is provided on which the patient information can be recorded by hand. And lastly, there is a protective layer. A special feature of the product is that the human plasma only needs to dry a little for safe transport and it can then be easily liquefied again in the laboratory, to be analysed in the same way as normal blood plasma."

The complex structure of the PSC is illustrated in the sophisticated production process. The carrier layer is used mainly for sample transport. Two adhesive strips are applied to it, followed by the nonwoven fabric to absorb the plasma. The desired geometry is punched into a carrier tape. Small adhesive dots are then applied to seal the plasma so that it cannot escape. A card is laminated with an adhesive tape to form the underside and bonded to the carrier layer. The two layers together then form the first intermediate product. The second intermediate product, the top side of the PSC, is produced similarly. The desired geometries are also punched and the card corners are rounded off for easier removal in a subsequent step. After several optical test steps, the two intermediate products are bonded, then the assembly and label placement are subjected to a final check.

An XTS with 10 movers and a three-metre circumferential track length serves as the central element of the production unit for the plasma separation card.

At a glance

- The plasma separation cards are manufactured in a compact machine, measuring about 3.5 by 3 m, in which an eXtended Transport System (XTS) from Beckhoff plays a central role.
- With 10 movers and a three-metre track length, around which the individual workstations are set up, the XTS enables highly flexible product transport as well as providing precision and software functionality in the motion axes of the workstations.
- It also offers additional benefits with its dynamic cycle and easy synchronisation of fast workstations with slow process sequences.

Precise handling of nonwoven material

According to Nagel, the fact that the special fabric for the plasma-separating membrane is very sensitive and expensive had to be taken into account in the development of the production unit. "This resulted in stringent requirements for the cutting of the nonwoven fabric and exact adherence to the desired geometry, to minimise wastage costs. Furthermore, the forces acting on the nonwoven fabric must not exceed seven newtons (7 N), in order to avoid altering its structure and to ensure that the permeability of the structure is maintained."

To achieve this, a laser cuts out the membrane very gently and a special measuring procedure occurs in the production unit, as Nagel outlines. "When the unit starts up, the processing table from which the membrane is collected is measured. The system then checks the workpiece carriers on all 10 XTS movers. In this way, all component tolerances are accommodated.

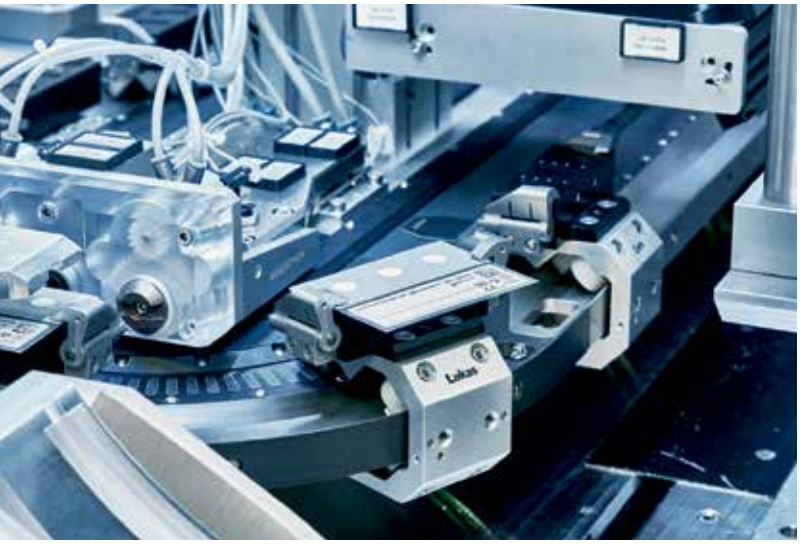
"In order to exert as little process force as possible, the membrane is applied to the adhesive layer with vacuum grippers. In this demanding product handling environment, XTS offers the great advantage that the component tolerances that were determined can easily be stored in the software and can therefore be assigned to each mover individually for the entire production process. In a conventional transport system, this would have to be implemented mechanically at each workstation and would therefore be much more complex.

"In addition, XTS automatically provides traceability, which would otherwise have to be implemented using QR codes, for example."

Nagel also notes the benefits of precision and software functionality in the motion axes of the workstations – such as the cutting units, rotary tables and transfer arms – which is implemented using EL7211 servomotor terminals and AX5000 servo drives. A good example is the measuring probe function of the AX5000 servo drive, which can be used to store the actual position of the controller without time offset, depending on an event. "This function comes into play when punching the geometry into the carrier tape and was a great advantage during the development process. Initially, neither the exact card size nor the number of openings to be punched for subsequent application of the plasma were known. The lifting and punching sequences could be quite easily determined by software and adapted as required. For example, the card size could be optimised efficiently, the number of application fields defined and the card corners rounded off."

The Cobas PSC consists of a carrier layer with the bonded nonwoven fabric and an upper layer for protection and labelling.

Lukas Nagel (right), Specialist Engineer at Roche, demonstrates the convenient machine operation via the CP3221 multi-touch Panel PC with 21.5-inch display to Udo Gruber, System Consulting/Sales at the Beckhoff office in Mannheim.



The layers of the plasma separation card are placed in the workpiece carrier of the XTS mover using vacuum grippers and transported to the production and testing stations.

The EL7211 servomotor terminals (right) ensure precise motion sequences involving multiple axes in a particularly compact way.

All images courtesy of Beckhoff Automation.

Compact machine design

XTS enables highly flexible product transport with minimum space requirements. “With XTS, we were able to design an extremely compact system and accommodate it in the limited space available in the production environment,” says Nagel. “An XTS with 10 movers and a three-metre track length is used and the individual workstations are set up around this. With this symmetrical machine layout, the first preliminary product – the carrier layer – is processed on one side and the second preliminary product – the upper layer – is processed and optically inspected on the other side. The membrane is cut out in the centre of the unit, so the complete card can be produced in a single XTS cycle. A system based on a rotary indexing table, which had been considered initially, would have been much bigger.”

XTS offers additional benefits through its dynamic cycle and easy synchronisation of fast workstations with slow process sequences. Workstations can be better used by duplicating time-consuming work processes. Nagel says, “The slowest processes in the line are laser cutting of the nonwoven fabric and the associated pick-and-place. With XTS, it is easy to prepare six cards at a time, transfer them to the laser cutting unit and then glue them individually to the corresponding card tops. Without this level of flexibility, we would have had to process much larger membrane pieces or make provision for multiple transfer stations. XTS, on the other hand, automatically adjusts itself to the slowest process step and remembers the current processing status and the missing input materials for each mover. The mover then moves to the corresponding stations.”

The flexible product transport enabled by XTS also simplifies early ejection of defective sub-components. If a part is recognised as a reject, the mover ignores all other workstations and follows the other movers as a 'pusher' until the part can be ejected. Compared to a rotary indexing table, XTS thus avoids an unproductive cycle and unnecessary further processing of rejects.

In addition to the collision avoidance and synchronisation functions provided by the TwinCAT 3 XTS Extension software, Roche benefits from the option of limiting the controller current. Nagel says, “We use this function when the workpiece carriers for opening the holding clamps are mechanically fixed. Limiting the controller current simplifies this mechanical referencing without losing the position control via the XTS encoder system that is advantageous elsewhere in the system.” The EtherCAT communication system on which the concept is based offers further advantages, in its high performance, simple commissioning and widespread use as a global standard. According to Nagel, the IP 67-rated EtherCAT P I/O modules, which combine power and communication in a field-mountable form, also contributed to simplifying the production unit by reducing the wiring effort. □

Automation engineering framework enables integration

With the new TIA Portal (Totally Integrated Automation Portal) V16, Siemens has expanded its engineering framework with practical new functions for various development phases: from planning, to engineering, to commissioning. The innovations concentrate on the continuous integration of the development process. They include standardisation, integrated engineering spread across teams, and an integrated function test. This enables users to increase the quality of their software, shorten commissioning times and reduce engineering costs.

During the development process, the focus is on distributed working concepts and teamwork. On the TIA Portal project server, the user can now access server projects via the new Exclusive Engineering function – with features such as project revision and change protocol as well as automated reporting and archiving. This means there are no functional restrictions when organising automation tasks on a device, object or function-oriented basis. No special licence is required for use of Exclusive Engineering.

To enable projects to be commissioned by teams, TIA Portal V16 has been expanded with an 'asynchronous commissioning' mode, whereby loading to the Simatic S7-1500 controller is carried out by a second TIA Portal instance running in the background. The TIA Portal instance running in the foreground can be operated again immediately, enabling load times to be shortened considerably.

TIA Portal V16 includes the new Version Control Interface (VCI) to external versioning systems such as GIT, SVN and TFS. The import and export of software objects via the portal interface allows versioning to be integrated seamlessly into the development process. This enables completely transparent versioning of all software objects outside the TIA Portal.

Another innovation is the Test Suite. In addition to enabling automated creation and checking of adherence to programming guidelines – that is, the Styleguide Check – the Test Suite makes it possible to generate and carry out application tests with the virtual S7-PLCSIM advanced controller. This support reduces engineering and commissioning times and enhances the quality of the software.

With TIA Portal V16, all Simatic S7-1200 controllers are now equipped with OPC UA server functionality. Connection to higher-level systems, such as manufacturing execution systems, can be implemented for vertical data integration. Controller-controller communication across all Simatic controllers is also possible using OPC UA. Standardised interfaces, known as companion specifications, are simple to import, making it easy to integrate machines into production lines or plants. The SiOME – Siemens OPC UA Modelling Editor – helps the automation engineer with the interconnection of tags and simplifies their import into the Simatic machine control. The SiOME also has some new functions such as the creation of data blocks based on OPC UA information models, or the option of checking OPC-UA information models and companion specifications for conformity. Users can now model server interfaces or companion specifications in the TIA Portal V16. In simplified form and without the need for specialist knowledge, it is possible to create a server interface or use a companion specification.

The new Simatic Drive Controller has been integrated for motion control applications. It combines a Simatic S7-1500 control system with motion control technology and safety functionality, with a Sinamics S120 drive control in a single device, thus saving space. The new package also enables Simatic users to perform advanced motion control tasks, such as those involving multi-axis drive systems, in a familiar environment.

Simatic WinCC Unified is also available in TIA Portal V16. The completely redesigned visualisation system provides solutions for HMI and SCADA applications, and in future for industrial edge, cloud and augmented reality scenarios. It includes a new generation of HMI devices which can be configured with TIA Portal V16 – the Simatic HMI Unified Comfort Panels.

Another feature in the latest TIA Portal version, is that the Simatic Energy Suite includes a load management function. This option automatically prevents load peaks by using intelligent strategies to switch generators and loads on and off, without influencing the production process. The user configures the load management via the screen form in the TIA Portal, program generation is completed, and the corresponding visualisation configured.

For more information contact Siemens SA.
Visit: www.siemens.com

The latest version of Siemens' Totally Integrated Automation engineering framework provides for teamwork and continuous integration of projects in progress.

The TIA Portal was launched by Siemens in 2010 and enables users to perform automation and drive tasks quickly and intuitively through efficient configuration. The software architecture is designed for high efficiency and ease of use for new and experienced users. It offers a standardised operating concept for controllers, human machine interfaces (HMIs) and drives for shared data storage and consistency, for example during configuration, communication and diagnostics, as well as powerful and comprehensive automation object libraries. The simple engineering in the TIA Portal facilitates access to the full spectrum of digitised automation, from digital planning and integrated engineering to transparent operation.

Electrical control and instrumentation on time

Usually the last contractor on site, electrical control and instrumentation (EC&I) specialist, EnI Electrical, strives to help its clients around Africa meet their scheduled start-ups.

Russell Drake, General Manager Operations at EnI Electrical, says with decades of experience in mining and industrial projects on the continent, the company understands the challenges that developers face. Among its mining projects, it is currently involved in a large copper mine expansion in Zambia.

"Implementation on large projects is complex, and it's often made more challenging by the logistical constraints that many African projects face," Drake says. "There are invariably delays at various stages, which places more pressure on the EC&I contractor, who must in many ways 'complete' the roll-out."

EnI Electrical, part of the Zest WEG Group, works extensively with project houses and directly for mining companies and is a preferred supplier to many of them. Drake says a key reason for this is its proactive attitude which is supported by its depth of technical expertise.

Calvin Fisher, EnI Electrical Overhead Lines Manager, emphasises the importance of on-time completion, together with reliable electricity supply.

"With the various issues that can delay a project at different stages, there is usually growing urgency as the deadline date approaches. This is normally when EnI Electrical enters the project, so we are accustomed to working under some extra pressure," Fisher says. "Our team actively looks for ways to advance the work, especially when the previous phases may not be quite ready for us to begin."

He notes that the team often does not have all the site access they need, so some innovation is required to push the job along.

"We may even collaborate with other contractors if we have spare resources, to help them complete their work so we can start ours," he says. "Our focus is on being part of the solution, and this is an approach that really helps clients meet their deadlines."

The linking up of electrical infrastructure, connections and equipment is one of the final stages that enables any project to start operating. In this role, EnI Electrical installs a range of electrical infrastructure including medium and low voltage cable reticulation, motor control centres, lighting, earthing protection and energy management systems.

Its control and instrumentation work ranges from process instrumentation and plant automation, to custom control stations and fibre or copper networks. It also designs and installs overhead power lines up to 161 kV and substations.

Drake highlights that the company has permanent bases in countries such as Zambia and Ghana – with significant in-country investment in technical assets – which underpins the efficiency of its work. "We understand our working environment very well, so we can quote accurately and fairly. This is important to reduce variations during projects, which can be disruptive to the project and the client."

He emphasises that with its experience and technical capability, EnI Electrical has the confidence to present the most cost-effective solutions to clients. This provides certainty and reduces overall project risk.

"We also take pride in developing local capacity in the countries where we are based," he says. In addition, operating from locally registered entities ensures legal compliance and ensures the company maintains a 'social licence' to operate.

EnI Electrical's operations base in Zambia – established in 2002 – employs 188 local staff, including highly skilled technical teams. In Ghana, Drake notes, ongoing investment in assets and skills gives the office the capacity to run up to R300 million in contracts at any given time.

"Our success in Africa is built on our specialised expertise and experience, and what clients really appreciate is our willingness and ability to 'take up the slack' towards the end of a project when time is not on their side," Fisher says. "Our close contractor interface and solution-driven approach enable us to do this."

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

Dual pole overhead line assembly.

Well-constructed racking is key to efficient project implementation.

220 kV static VAR compensator.

Turck Banner's SC-XM3 external drive allows for easy setup and consistent configuration of safety controllers.

Simplified setup for safety controllers

Write the configuration for the safety system once, save it to an SC-XM3 external drive, and load it onto any additional safety controllers requiring the same configuration. The configuration, network settings and passwords will download automatically. A single user can configure multiple safety controllers in a matter of minutes without a PC.

These are among the key benefits offered by the SC-XM3 external drive from Turck Banner.

It also simplifies device swap-outs as it enables users to back up safety system configurations to the SC-XM3 external drive, label it appropriately, and store it in the micro USB slot on the safety controller. No safety system expertise is needed to load and apply the saved configurations to a replacement safety controller.

Using the SC-XM3 ensures consistency by eliminating the need to rewrite identical configurations for additional or replacement safety controllers. Users can save tested and perfected configurations to the SC-XM3 and reapply them without the risk of introducing an error or inconsistency into the configuration.

For more information contact Brandon Topham at Turck Banner.
Tel: +27 (0) 11 453 2468 or email: brandon.topham@turckbanner.co.za

Holistic network solutions

Networks are becoming more densely connected, systems more self-sufficient, and intelligence more distributed. General digitalisation means integrating previously isolated processes as a whole. Creating added value for the customer is increasingly important and, according to Pepperl+Fuchs, this requires holistic, universal solutions that build on standardised technologies.

Besides having specific requirements regarding device function, the market demands approaches that are as holistic as possible, with suitable software solutions and standardised interfaces. Over recent years, IO-Link has become widespread and is set to establish itself as another standard alongside AS-Interface (actuator-sensor interface). However, it has been a while since it was used for parameterisation alone. The number of interface connections to IO-Link masters is increasing rapidly. This is also evidenced by the data used via IO-Link during operations. IO-Link masters make it easy to convert interfaces, as is often required for connecting existing installations to modern TCP/IP interfaces.

For more complex products and for higher levels of the automation pyramid, Ethernet-based communication solutions are most commonly used. Whether similar solutions such as PROFINET, EN IP, EtherCAT, and CC-Link IE will continue to exist in parallel remains to be seen. TSN technology could provide a new alternative.

As a sensor manufacturer and automation specialist, Pepperl+Fuchs covers everything from sensors and connectors to the cloud as well as application-specific software solutions. This holistic approach includes intelligent sensors with additional functions, innovative safety solutions, and complete infrastructures connected to the control system and the cloud. Fieldbus modules are also well-established in the portfolio, offering communication via PROFINET, EN IP, and EtherCAT with its multi-protocol capability. They can now be combined with a powerful, integrated IO-Link master with capacity for up to eight devices. The IP68/69K-compliant design sets a new standard in this regard.

With its acquisition of the American digitalisation specialist Comtrol Inc., Pepperl+Fuchs has significantly expanded its offering in this field. IO-Link masters that communicate via the OPC UA, MQTT and JSON protocols, in parallel with the fieldbus interface, are now available. This MultiLink function can be used to transmit data to the control level, to other machines, and to the cloud, creating great flexibility for users and system architects.

Numerous interface converters (DeviceMaster) make it possible to connect old devices to new communication technology. They can convert the serial protocols TCP IP, MODBUS, EN IP, and PROFINET into one another. In addition, RocketLinx switches are available for forming networks. These are rugged and ideal for industrial use. Unmanaged switches can be used to connect simple components conveniently and easily, and managed switches can be used for the targeted parameterisation of network structures.

From a single source

Connection through the BTC12 (box thin client) edge gateway enables the targeted management of access rights and ensures security from the outside world. Pepperl+Fuchs subsidiary, Neoception, can develop higher-level, application-specific software solutions. This means all the required components come from a single source and provide well-defined interfaces. The process is overseen by a team of specialist developers from the Pepperl+Fuchs Industrial Communication Interface department. And the company's global presence gives customers access to all products and services worldwide.

For more information contact Pepperl+Fuchs.
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email: info@za.pepperl-fuchs.com

IO-Link masters make it easy to convert interfaces, as is often required for connecting existing installations to modern TCP/IP interfaces.

Enabling the secure, smart factory

Smart manufacturing practices making use of connected technology hold the power to improve efficiency and optimise factory operations. However, with the increased use of the Industrial Internet of Things (IIoT) comes the threat of a cyber breach. To ensure that its customers can make a safe digital transition, Schneider Electric has built in cybersecurity measures to its latest motor control solution.

TeSys island is a new, innovative load management solution that makes machines smarter and more reliable while ensuring that the benefits of connectivity do not present vulnerabilities to the customer's industrial network. The solution makes use of Achilles Level 2 protection and safety up to Cat 4. It is designed to switch, protect and manage motors and other electrical loads up to 80 Amps (AC3) in an electrical control panel.

For intuitive customisation of machines, TeSys island features a catalogue of 40 TeSys avatars – similar to a digital twin – which represent a range of pre-configured functions to simplify PLC programming. The TeSys island bus coupler, with embedded programming, provides for reduced PLC programming time and is easy to use. Seamless integration is achieved through function blocks in the EcoStruxure architecture as well as that of PLCs from other major automation players, simplifying system integration so users can get up and running more quickly. Additionally, application selection and system configuration are simplified, and engineering tasks are reduced, enabling faster machine installation.

TeSys island from Schneider Electric is a new motor control and load management solution with built-in cybersecurity measures and advanced diagnostics.

EcoStruxure Machine Advisor, part of the EcoStruxure Apps & Analytics architecture, features a dashboard that displays energy consumption and other critical data for C-level and plant managers, as well as advanced diagnostics on particular issues. The system makes it possible to track, monitor and increase system performance remotely, and conduct maintenance outside operational hours.

Using EcoStruxure Augmented Operator Advisor, the operator or maintenance service is provided with easy, secure access to the live data of the machine while it is in operation, as well as datasheets, tutorials and other documents that are used during operation or maintenance.

TeSys island provides device-related data that enables the end-user to make informed decisions ahead of time, with pre-alarms that help reduce machine stoppages and downtime. If a breakdown does occur, the system enables fast prescription of spare parts using QR codes and device replacement via embedded functions and SD cards.

Christo Kotze, Offer Marketing Manager for Tesys at Schneider Electric South Africa says, "As a leader in reliable, sustainable and efficient motor control, we have a responsibility to provide industry with automation solutions they can trust. By ensuring cyber protection, reducing installation time and enabling integration into third-party automation systems, we are assisting industry customers to reap the rewards of a smart factory."

Delivered through its EcoStruxure architecture, Schneider Electric's IIoT technologies, including integrated software, are ready for smart manufacturing and can deliver new business opportunities for plants and machine builders – increasing profitability and productivity.

For more information contact
Schneider Electric South Africa.
Tel: +27 (0)11 245 6400 or visit: www.se.com/za

Customised control room video walls

Matrox® has expanded its collaboration with long-term partner Xilinx Inc. a leader in adaptive and intelligent computing, to integrate advanced processing functionality into the award-winning Matrox QuadHead2Go™ multi-monitor controller product line. Leveraging a dedicated Xilinx field-programmable gate array (FPGA) to accelerate all processing operations, Matrox QuadHead2Go cards and appliances offer customers a powerful and comprehensive feature set – including capture, scaling, cropping, rotating, and more – to build highly customised, easy-to-deploy video wall designs.

Matrox QuadHead2Go brings together Matrox's well established video wall expertise and Xilinx's industry-leading silicon technology. David Chiappini, Executive Vice President of Research and Development at Matrox says, "Backed by a high-performance Xilinx FPGA, QuadHead2Go provides customers with an optimal combination of performance, flexibility, and adaptability to fine-tune and tailor video walls for any commercial or control room environment."

Commenting further on the collaboration, Ramesh Iyer, Director of Pro Audio, Video and Broadcast BU at Xilinx Inc says, "With Xilinx's 16 nm FPGA technology, Matrox QuadHead2Go is a remarkable video wall platform enabling customers to deploy and scale video walls as required. Xilinx's 16 nm technology is at the heart of video-over-IP products in Pro AV and broadcast, enabling Matrox to deploy an entire line up of value-add products."

QuadHead2Go Q185 DisplayPort™ input and QuadHead2Go Q155 HDMI® input controllers capture a single video signal – of up to 4 Kp 60 and 8K x 8K – for display across up to four screens, at resolutions up to 1920 x 1200 per output. The input content can be from any source and displays can be arranged in various configurations. In addition, QuadHead2Go units can be used together to build extra-large video walls under any operating system, including Microsoft® Windows® 10 and Linux®.

For more information contact Matrox.
Visit: www.matrox.com/graphics

Nine drives supplied to new DRC copper mine

Leading drive and automation specialist SEW-EURODRIVE has supplied a comprehensive drive package to a major greenfield copper-mining project in the Democratic Republic of Congo (DRC). The package comprised nine drives in total. The five main 500 kW drives each weighed 12 t. The other four included two 90 kW drives for the decline sacrificial conveyor, and two 30 kW drives for the tip-truck sacrificial conveyor.

Working through a local project house with which it has a longstanding relationship, SEW-EURODRIVE received the initial enquiry in August 2018. The final units were delivered to site in September 2019, with installation and commissioning following that, says Project Sales Representative Thato MR Sookane.

Due to the hot and humid conditions near Kolwezi, the drives had to be installed with thermal sensors to monitor the input and output bearing temperature, and the oil sump temperature. This is to ensure optimal performance at all times. Positioning sensors were also installed, in addition to cooling units due to the size of the drives, and sun covers to protect the surface of the drives from the worst of the harsh sunlight.

As this is an underground copper mine, the decline conveyors are integral to removing the ore. SEW-EURODRIVE worked with the project house from the start of the project to ensure that all its specific requirements for this application were met and incorporated in the final design.

"As this is a new mine, there is significant scope for our further involvement down the line," Sookane adds.

SEW-EURODRIVE collaborates with project houses to secure long-term work across Africa and has the support of its own project and exports departments. "The project house assists the client by providing a specific solution and then approaches the OEM, like SEW-EURODRIVE, to assist in turning its designs into a practical reality," says Sookane.

SEW-EURODRIVE has gained significant experience in the copper-mining industry, having also supplied a 110 kW variable speed drive (VSD) for a slurry application at a Zambian copper mine last year. This was one of the largest VSDs supplied by the company to date.

Commenting on the state of the mining industry currently, Sookane notes that there are definite green shoots in Africa. He adds that while mining is an important driver for the company in terms of growth and profitability, it has also diversified into other sectors such as the food and beverage industry, pulp and paper, sugar, and the automotive industry.

For more information contact SEW-EURODRIVE.
Tel: +27 (0)11 248 7000
or visit: www.sew-eurodrive.co.za

SEW-EURODRIVE recently supplied nine drives, including five 500 kW drives each weighing 12 tons, to a new copper mine near Kolwezi in the DRC.

JB Switchgear Solutions was contracted to supply a number of motor control centres to a coal-mining project near Middelburg.

Heavy-duty switchgear for Goedehoop Colliery

Gauteng-based JB Switchgear Solutions was recently awarded a contract to supply skid-mounted motor control centres (MCCs) to a project site of one of the major coal mining companies near Middelburg. This brownfield project entails the development of an existing shaft.

The MCC contract called for two special 1 000 V skid-mounted MCCs manufactured from 5 mm thick steel plate, for the incline conveyor and the trunk conveyor. The heavy-duty outdoor MCCs contain 250 kW DOL starters, and a number of smaller circuits for pumps, lighting and small power.

In addition, there is a 525 V surface fan MCC containing a number of 250 kW variable speed drives and smaller, peripheral circuits.

In this project, JB Switchgear's popular Eagle series panels were supplied.

For more information contact: Johan Basson at JB Switchgear Solutions. Tel: +27 (0)11 027 5804, email: info@jbswitchgear.co.za

Smarter format changes for short-run production

The motorised size changeover of machine spindles or machine axes can be implemented in various ways. Intelligent positioning drives offer an efficient solution.

The more complex systems become, the more sophisticated the data exchange required. Intelligent networks, such as industrial Ethernet, as well as enabling the fast and efficient exchange of process data, require a high degree of diagnostic capability for fault analysis, in order to prevent maintenance disruptions. For the smart size changeover, actuating drives are therefore necessary. Over and above the standard motorised changeover, these drives permit a complex data exchange with control systems, reliably detect operating states outside the fixed range, and communicate status or error messages. A constantly increasing load current, for example, could signal that the adjustment axis may be heavily contaminated by pollutants and needs to be cleaned during the next maintenance service. This is where the SIKO intelligent actuators, available from Instrotech, fit the bill. In addition to the exchange of process data, the actuators make all diagnostic values available to prevent unplanned downtime resulting from format setting.

An all-in-one drive

With the new AG24, SIKO has expanded its portfolio of positioning drives with intelligent RTE (real-time Ethernet). In addition to the tried and tested AG25 and AG26, which are characterised by their ultra-compact design, the AG24 extends SIKO's portfolio of actuators. Delivering considerable output power and speed, the AG24 integrates all components into one housing. No external components or junction boxes are needed to connect to a higher-level controller. This means that the drive is connected only to the supply voltage and the port for data exchange has to be connected directly to the controller or the next drive in the network – offering a simple network connection.

Communication standards

In industrial automation it is important that standards are met to make it easier for the system integrator to integrate the peripheral equipment into its control environment. The AG24 serves the leading standard communication interfaces – Profinet, Ethernet IP, Powerlink and Ethercat. Numerous function blocks, add-on instructions as well as different libraries are additional software tools which make system integration simpler. From the extensive experience it has gained through applications of the AG25 and AG26 drives, which are already successfully established in the market, SIKO also offers a selection of corresponding software tools for the AG24.

With the AG24, SIKO serves applications in which difficult manual changeovers have previously been possible to automate only with great effort. This is why here too the governing philosophy is that all modules which form an intelligent drive are integrated into one unit, so no external, additional components need to be installed and wired. The AG24 is a compact drive which also delivers impressive performance.

Instrotech offers customers looking to purchase positioning drives the full package, including function modules and software tools, to test, free of charge. This enables customers to test the equipment under no obligation – and to assess the quality and performance of the positioning drives for themselves.

For more information contact Instrotech.
Tel: +27 (0)10 595 1831, email: sales@instrotech.co.za

The SIKO AG24 intelligent positioning drive provides for the efficient automation of complex changeovers in production.

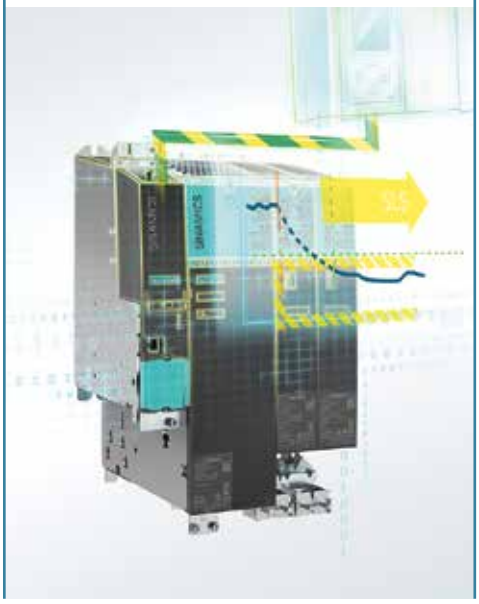
Integrated safety checks in engineering software

With Sinamics Startdrive commissioning software, Siemens supports machine builders with a guided safety acceptance test, providing for the validation of safety functions for Sinamics frequency converters. Sinamics Startdrive offers a tool for the integration of drive hardware into the TIA (Totally Integrated Automation) Portal engineering framework. The integrated guided acceptance test for safety functions is available for Sinamics G and S series frequency converters and complies with EN ISO 13849-2 and IEC 62061.

The safety acceptance test has been developed to be user-friendly. A wizard guides the user step by step through the acceptance process and checks whether the safety functions have been parameterised correctly and executed correctly in the relevant application. For documentation purposes, a standard-compliant acceptance report is then created automatically. With the safety acceptance test integrated in Sinamics Startdrive, Siemens helps machine builders to carry out the legally required validation of safety functions easily and safely.

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

With Sinamics Startdrive, Siemens supports machine builders in the validation of safety functions for Sinamics frequency converters with a guided acceptance test.



Save energy costs with energy-efficient VFDs

Customers can realise significant savings on their total energy costs by replacing older motor starters with energy-efficient Delta variable frequency drives (VFDs). This is according to ElectroMechanica (EM), a leading local supplier of industrial electrical products, motor control switchgear and electronic automation products, and distributor of Delta VFDs.

EM Product Manager, William Cameron says, "Energy is always a factor to consider and should never be taken for granted. We all know the importance of energy efficiency – and the volatility of the supply system due to the recent spell of load shedding reinforces this. Now more than ever customers should be thinking about energy efficiency."

Delta VFDs feature ease-of-use and reliability, which makes them ideal for sectors as diverse as agriculture, manufacturing and refrigeration. "Agriculture is an area of potential growth over the short- and longer-term as farmers are under pressure to save where they can. Using industrial control systems to maximise efficiency is a proven way to optimise energy savings," Cameron says.

EM also supplies Delta's control products such as PLCs (programmable logic controllers) and HMIs (human machine interfaces) which can integrate seamlessly with the VFD range. Using standard I/O or fieldbus solutions, Delta control equipment has a host of special instructions or drivers to assist the user in integrating the drive to a larger network with ease. This reduces development time and, in turn, costs.

One of Delta's high-end VFDs, the C2000 series, is a high-performance field-oriented control (FOC) ac drive. It is highly versatile, with a built-in PLC, numerous control options, over 300 parameters, predesigned application features, and a large LCD HMI keypad. With a power range from 0.75 kW to 500 kW (400 V), and a host of optional accessories, it is a powerful partner in industry.

Commenting on new developments for 2020, Cameron says EM's updated catalogue will feature a host of new products, including an extended drive range to meet the requirements of the wider market.

For more information contact
Karen Zotter at ElectroMechanica.
Tel: +27 (0)11 249 5000
email: karenz@em.co.za

Delta's reliable energy-saving variable frequency drives can be used across different industry sectors and are supported by a full range of Delta control products.

New automation control devices

Omron claims to have the largest panel solution line-up in the industry and aims to provide a complete solution to panel builders.

With its latest launch the company has introduced 237 new models in six categories: the J7KC, J7TC, J7MC, J7KCA and J7KCR series low voltage switching gears (LVSG), S8V-CP series dc electronic circuit protectors, and PTF-XX-PU sockets for LY relays with Push-In Plus technology.

Further assisting panel builders, with its 'value design' Omron aims to deliver space-saving devices that reduce the workload – and total cost of ownership for the end customer. To achieve this, it introduced Panel Solution, a unified design and size for control panel equipment, together with its proprietary wiring method, the screw-less Push-In Plus technology. Its LVSG offers a total package for a wide range of motor applications across diverse industry sectors, and its Push-In Plus technology has been developed for high vibration environments: the strong retention of the spring ensures that the cable will always be perfectly connected.

Since the first range launch in April 2016, Omron has expanded the product line-up built on this common design platform to 17 250 models in 53 categories. The products have been adopted on the frontline of manufacturing by more than 15 000 global companies which, Omron says, have been able to reduce control panel size by about 30% and the wiring lead time by half.

With the introduction of the LVSG series, Omron now covers 80% of all the components needed in a panel, including machine automation controllers and timers.

Omron's new low voltage switching gears – with Push-In Plus technology – are ideal for motor applications, including conveyors and pumps, for example, for PCB assembly lines, packaging machines and machine tools.

The unified design enables increased efficiencies in the production of control panels as design work required in the upstream design phase is reduced, as is ongoing maintenance work, and panel space is saved.

The dc electronic circuit protectors – S8V-CP series – realises branches of the 24 V dc load and offers reliable protection for each branch. Compared with general thermal magnetic circuit protectors, 8-branch models can reduce the units' width by about 70%. In addition, the S8V-CP series provides for reliable tripping with electronic circuits. The rated output current can be changed in the range of 2 A to 10 A, making it possible to respond to sudden design changes. Push-In Plus terminal blocks contribute to less wiring work and downsizing of equipment.

Sockets with Push-In Plus technology PTF-XX-PU series are added to the PTF socket series for LY bi-power relays. The terminal blocks with Push-In Plus technology reduce wiring and maintenance work. With the introduction of this socket, Omron's line-up of G2RS, MY and LY relays can be mounted on Push-In Plus sockets using the unified wiring method and tools, contributing to further efficiency.

For more information contact Omron Electronics.
Tel: +27 (0)11 579 2600
or visit: www.industrial.omron.co.za

Ratio pyrometers – operating theory and applications

In industry there are many applications where a standard one-colour thermometer may read the temperature incorrectly and a two-colour or ratio pyrometer will be preferable to provide correct temperature measurements. R&C Instrumentation outlines the advantages of using two-colour pyrometers in particular applications.

Some of the typical applications where a standard one-colour thermometer may read the temperature incorrectly include those where:

- the object is too small to fill the cone-of-vision
- dust, smoke or steam obscures the line of sight
- windows in the process become dirty and difficult to keep clean
- the emissivity of the product changes (due to a change in alloy or surface condition, for example).

However, a two-colour or ratio pyrometer, like the Endurance pyrometer by Raytek and Ircon, operates effectively even where such problems exist and will indicate the correct temperature.

At a glance

- Two-colour or ratio pyrometers determine temperature from the ratio of radiated energies in two separate wavelength bands (colours).
- The radiated energy from a target is, in most cases, equally reduced when objects or materials in the atmosphere block some portion of the field of view. It follows that the ratio of the energies is unaffected, and thus the measured temperatures remain accurate.

Theory of operation

The two-colour ratio technology provides for accurate and repeatable temperature measurements, which do not depend on absolute radiated energy values. In use, a two-colour sensor determines temperature from the ratio of the radiated energies in two separate wavelength bands (colours). The key benefit of two-colour sensors is that accurate measurements can be made under conditions where:

- the field of view to the target is partially blocked or obscured
- the target is smaller than the sensor's field of view
- the emissivity of the target object is low or changing by the same factor in both wavelength bands.

Another benefit is that two-colour sensors measure closer to the highest temperature within the measured spot (spatial peak picking) rather than an average temperature. A two-colour sensor can be mounted further away, even if the target does not fill the resulting spot size. The convenience is that the user is not forced to install the sensor at some specific distance based on target size and the sensor's optical resolution.

Partially obscured targets

The radiated energy from a target is, in most cases, equally reduced when objects or atmospheric materials block some portion of the field of view. It follows that the ratio of the energies is unaffected, and thus the measured

Two-colour or ratio pyrometers can provide accurate temperature measurement in applications where one-colour thermometers may not be able to do so.

temperatures remain accurate. A two-colour temperature sensor performs effectively in those conditions that limit the effectiveness of a one-colour temperature sensor. These include the conditions noted above as well as where:

- measurements are made through items or areas that reduce emitted energy, such as grills, screens, small openings or channels
- measurements are made through a viewing window that has unpredictable and changing infrared transmission due to accumulating dirt and/or moisture on the window surface
- the sensor itself is subject to dirt and/or moisture accumulating on the lens surface.

Targets smaller than field of view

Similarly, when a target is not large enough to fill the field of view, or if the target is moving within the field of view, radiated energies are equally reduced, but the ratio of the energies is unaffected and measured temperatures therefore remain accurate. This remains true as long as the background temperature is much lower than the target's.

The following examples illustrate where two-colour sensors can be used when targets are smaller than the field of view.

In measuring wire or rod – where the product is often too narrow for the field of view or moving or vibrating unpredictably – it is much easier to obtain accurate results because sighting is less critical with two-colour sensors.

In measuring molten glass streams – which are often narrow and difficult to sight consistently with single-wavelength sensors – two-colour sensors can deliver accurate measurements.

Uncertain or changing emissivity

When the emissivity of the target is uncertain or changing, a two-colour sensor can be more accurate than a one-colour instrument as long as the emissivity changes by the same factor in both wavelength bands. Accurate measurement results are dependent on the application and the type of material being measured. The emissivity of all real objects changes with wavelength and temperature, at varying degrees, depending on the material. □

Fast, accurate elemental analysis in metals industry

SPECTRO Analytical Instruments has introduced the eighth generation of its SPECTROMAXx with iCAL 2.0 ARC/SPARK OES Analyser – with innovative new capabilities and advances in performance to achieve fast, accurate elemental analysis precisely tuned for material control and foundry applications.

The SPECTROMAXx is one of the industry's leading OES (optical emission spectroscopy) analysers, with more than 13 000 installations. The latest generation instrument features outstanding speed, quick and simple standardisation, reliable and accurate results, minimal gas consumption, and a low cost of ownership for a more intelligent elemental analysis of incoming source materials, for in-process testing and traceability, and for final quality inspection.

With its faster measurement times and low consumables consumption the new SPECTROMAXx analyser enables greater productivity, analytical performance, ease of use and cost-effectiveness than before.

Outstanding speed is achieved with optimised spark parameters which deliver a 12% reduction in measurement times. Rapidly available information means users can respond quickly to changing process conditions to gain substantial savings in time and energy costs.

The new SPECTROMAXx with iCAL 2.0 enables rapid analysis of materials for material control and foundries.

The new analyser features SPECTRO's proprietary iCAL 2.0 calibration logic, which provides for quick simple standardisation. It needs only five minutes and a single sample per day, rather than the 30 or more minutes needed by conventional analysers. With iCAL 2.0 the analyser compensates for most changes in environmental temperature or pressure without requiring reruns. SPECTRO's Spark Analyser Pro software features a simplified operator view and programmable application profiles to ensure ease of use for less experienced personnel. This results in stability, productivity and savings.

The new SPECTROMAXx also minimises the use of costly argon gas, reducing operational expenses without sacrificing analytical performance. Low maintenance requirements contribute to a lower cost of ownership overall. Advanced diagnostics with critical status indicators make maintenance easier and reduce downtime to deliver higher availability.

In addition, AMECARE services help promote uninterrupted performance and maximise the return on investment for customers with machine-to-machine support that allows proactive alerts, backed up by an on-request PC connection with a remote SPECTRO service expert.

For more information contact SPECTRO Analytical Instruments. Visit: www.spectro.com/maxx or email: spectro.info@ametek.com

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Dependable flow control in tough environments

BMG's Fluid Technology division supplies and supports an extensive range of components for fluid technology systems and general industrial applications. Its products include valves, hydraulic hoses and fittings, accumulators, cylinders, heat exchangers, hydraulic motors and hydraulic plumbing, as well as pumps and reservoir accessories.

In BMG's valves portfolio the InterApp Bianca and Desponia butterfly valves are recommended for high efficiency and safe use in demanding industrial flow control applications.

Willie Lamprecht, BMG's Business Unit Manager - Fluid Technology Low Pressure, says, "Robust butterfly valves are designed for dependable shut-off and control of corrosive fluids as well as high-purity applications. Compact butterfly valves with good flow characteristics and low maintenance requirements are extremely versatile and ensure dependable operation, even in the toughest environments.

"Unlike a ball valve, the discs of butterfly valves are always present in the passageway within the flow. This means a pressure drop is induced in the flow, regardless of the position of the valve. Ball valves should be used only for isolation, whereas butterfly valves can be safely used for isolation and control of flow.

"An advantage of using quarter-turn butterfly valves rather than any other type of valve, is the simple, wafer-shaped design, with fewer parts, for easy repair and minimal maintenance," he adds.

BMG's InterApp Bianca centric butterfly valves, with durable PTFE liners, are built for long service life. They can be used in aggressive and corrosive fluids and for applications where absolute purity is essential.

The high-performance valves, available in sizes between DN 32 and DN 900, are manufactured with a ductile iron, carbon steel or stainless steel body, to suit the requirements of different industries. Bianca butterfly valves can be individually configured by BMG to ensure dependable operation and optimum safety in specific applications.

For example, FDA (US Food and Drug Administration) compliant Bianca valves (DN 50 – DN 200) with mirror-polished stainless steel discs and high-purity PTFE liners, ensure safety for the production of active pharmaceutical ingredients. Bianca valves with PFA-coated discs and PTFE liners are recommended for use in highly corrosive, chemical applications.

Valves in this range, with specially-selected conductive disc and liner materials, also conform to the explosion protection directive ATEX 94/9EG, ensuring safe operation in explosive environments.

BMG stocks a wide range of semi-finished components to offer customers short delivery times, even on large sizes of the Bianca series. The valves are typically used in mining and slurries, for the extraction of acids and solvents; in the oil and gas sector, for the processing of additives; and for highly corrosive processes in the steel industry. The Bianca butterfly valves are also suitable for use in water treatment plants where the smallest impurities must be excluded.

BMG's multipurpose InterApp Desponia and Desponia Plus centric butterfly valves, with a tough body and robust elastomer liners, are designed for safe and reliable control of liquids and gases in diverse sectors.

Desponia valves, available in sizes from DN 25 to DN 1600 and for pressures up to 16 bar, are available in cast iron or ductile iron and are suitable for various industrial applications.

The Desponia Plus range is available in sizes from DN 25 to DN 600 and for high-pressure applications up to 20 bar. The valves are available in ductile iron, cast iron or stainless steel and can be used in high-temperature or vacuum applications as well as process automation.

The elastomer liners and discs of this series play a crucial role in the valves, as they are the only two parts in contact with the fluid. Flucast® liners are suitable for abrasive applications and also meet FDA and EU regulations.

The Desponia range ensures safe operation in water treatment processes, in power generation and in demanding chemical processing applications. The valves can also be used in the steel industry where shut-off valves used to gas molten steel are exposed to harsh conditions. With specially-coated discs, the valves are suitable for use in mining and slurries, in extraction processes which require valves with the highest abrasion and corrosion resistance.

Enhancing its fluid technology services to meet growing market demand, BMG is introducing new products with the latest developments in design technologies, materials and coatings. The company's fluid technology services also cover project engineering and consulting, cylinder design and manufacture, training, repair and testing, and onsite container services. BMG also offers total process and lubrication management solutions throughout Africa.

The InterApp Bianca and Desponia butterfly valves deliver high efficiency and safe use in demanding industrial flow control applications.

For more information contact
Willie Lamprecht at BMG. Tel: +27 (0)11 620 1581
email: williaml@bmgworld.net

Easy-to-use laser distance meter

Fluke's new 417D laser distance meter is now available from Comtest. It is an accurate, durable, point and shoot laser distance meter, designed for indoor and outdoor use and able to withstand dusty and wet conditions.

Easy, one-button operation means users can minimise the time taken in measuring, and the Fluke brand assures users of the reliability of measurements taken.

With simple function buttons, three different measurement tasks can be completed quickly and easily. The extra-bright laser is clearly visible, so the target point can always be seen, even if the target object is in a hard-to-reach spot, or at a long distance. The 417D has a large two-line illuminated LCD screen and three buttons for easy-to-use one-handed measurements.

Key features of the 417D distance meter include:

- Measures up to 40 m (accuracy of 2 mm)
- One-button instant distance measurement
- Quick calculation of area (square metres)
- Continuous measurement capable
- Battery life 3 000 measurements and improved by 'auto shut-off'
- One-metre-drop tested
- IP54 dust and water resistant
- Three-year warranty.

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

Fluke's 417D point and shoot laser distance meter can be used for indoor and outdoor distance measurement.

Monoblock for sampling and Injection processes

WIKA's new monoblock is designed to meet the requirements of the process industry. It is especially well suited to applications in natural gas and aggressive media. The compact design integrates two shut-off valves to separate the process from the instrument side.

The modular monoblock design allows for use of an arrangement of ball valves and/or needle valves. Injection valves also have an integrated non-return valve to prevent bi-directional flow. The integral probe is solidly attached to the valve and is designed according to the flow condition in the pipeline.

The valve seat design and the redundant seals of the valve body ensure high durability and tightness. In case the soft valve seat fails, the metal-to-metal seat ensures that the valve can still be operated and set to a safe position. The tightness is guaranteed for the connection between the process and the measuring instrument and towards the atmosphere.

The highly-finished machining of the internal parts provides for smooth and precise operation, even at high pressures and after long periods without valve operation. The surface finish also minimises corrosion in aggressive media and makes the monoblock easier to clean.

For more information contact WIKA Instruments.
Tel: +27 (0)11 621 0000, email: sales.za@wika.com

The new monoblock is compactly designed and highly finished internally to provide for smooth operation, and externally to minimise corrosion.

Millimetre perfect – precise time of flight distance sensor

The innovative on-chip time-of-flight (ToF) principle with PMD (photonic mixer device) technology, make ifm's OGD type sensors capable of highly precise measurement. The distance information can determine the presence of parts or their correct installation: for example, whether an O-ring has or has not been mounted. Excellent reflection resistance and background suppression, together with a high excess gain, enable reliable operation.

The PMD technology of the OGD sensors is superior to conventional diffuse reflection laser sensors. The OGD Precision sensor is available with a very small light spot, at a 300 mm range, to detect very small parts.

The switch point is easily set to the nearest millimetre via the three operating keys, or alternatively via IO-Link, which also allows read-out of the current distance value.

For more information contact
ifm electronic ZA.
Tel: +27 (0)12 450 0400
email: info.za@ifm.com

The Long Range version of the OGD sensors has a range of up to 1.5 m and the Precision version is well suited to verifying the presence of parts by means of precise distance information.

Condition monitoring on transformers

Power transformers are expensive and critical equipment in power systems and play a significant role in the transmission and distribution of electricity. **Electricity + Control** ***put some questions to Gert Nel, Transformer Division Manager at condition monitoring specialist WearCheck, about the best measures to maintain transformers in good working order. This is his response.***

At a glance

- Condition monitoring that provides the relevant checks and information is essential to effective transformer asset management.
- Signs of trouble usually appear before electrical machinery or equipment fails. The condition of power generation, transmission or distribution system assets, can be determined through regular analysis of the insulating liquid.
- Regularly scheduled oil testing is a cost-effective and sound maintenance practice that serves to extend the life of transformers.

Although transformers are generally reliable, failures do occur. There are many degradation mechanisms operating in the components and subsystems that will, over time, limit the equipment's useful operating life.

Transformer asset managers generally aim to achieve the required levels of safety and reliability from their fleet of transformers at minimum cost. Condition monitoring that provides the relevant checks and information is therefore essential to efficient decisions in respect of transformer asset management. Without this information only the most basic maintenance activities can be done – such as time-based maintenance, replacement before end of life, or repair after failure.

Signs of trouble usually appear before electrical machinery or equipment fails. The condition of power generation, transmission or distribution system assets can be determined through regular analysis of the insulating liquid. Testing can detect developing problems in the apparatus, such as local overheating at a loose connection or electrical discharge between turns, so problems can be managed.

Transformer fluids, or oils, degrade as a result of oxidation and operation. Degradation of the oil produces sludge and other by-products that can cause equipment to fail. Various other conditions can adversely affect the performance of the oil and the apparatus. Condensation, leaking gaskets, internal arcing, for example, can affect the dielectric properties of the liquid significantly as well as the physical condition of the insulation. With proper diagnostic testing, equipment failures can be avoided.

WearCheck's Transformer Division provides oil analysis services to any operation that generates power or uses electricity. Nel says, "For example, we monitor transformers operated by municipalities, solar farms, wind farms, shopping malls and casinos. We monitor very small transformers run by housing complexes – up to the massive transformers servicing cities and large industrial operations."

The data gathered is analysed by experts and recommendations are made on remedial actions where required. All the analyses and recommendations are based on relevant standards and the company's long-established expert knowledge in this field.

Nel says, "We can conduct once-off tests, although we always recommend regular condition monitoring as the best approach to preventive maintenance. It is preferable to establish wear

WearCheck senior transformer consultant Ian Gray (centre with black shirt) with the transformer testing team on site for a customer.

Some of the typical tests conducted in condition assessment of electrical apparatus are outlined below. All tests carried out by WearCheck are aligned with recognised international standards.

Oil quality testing

- *Colour - insulating liquids generally darken with the presence of oxidation by-products and foreign materials.*
- *Visual inspection - identifies foreign material in the insulating liquid, which may lower its dielectric strength.*
- *Dielectric breakdown voltage - a low value indicates the presence of contaminants such as water, dirt or other conducting particles in the insulating liquid.*
- *Water content - excessive moisture is one of the primary causes of low dielectric breakdown strength in insulating liquid. High water content may be detrimental to the transformer under a variety of conditions.*
- *Interfacial tension - monitors the progression of oxidation and detects contaminants such as soaps, paints, varnishes and by-products of insulation aging.*
- *Acidity / neutralisation number - monitors the progression of oxidation by detecting acidic compounds which accelerate deterioration of the solid insulation and are precursors to sludge formation.*
- *Power factor at 90°C - a high power factor indicates the presence of contaminants like carbon, metal, soaps and by-products of oxidation.*
- *Specific gravity - identifies different types of insulating liquids by determining the ratio of the weights of equal volumes of oil and water at the same temperatures.*

Diagnostic testing

- *Dissolved gas analysis - the single most important test customers can perform to head-off potential transformer failures. It serves to monitor the generation of gas in transformers to provide advance notice of developing faults and is a good way to detect thermal and electrical problems before failure occurs.*
- *Furanic compounds - furanic compounds form when the cellulose in the paper used in the transformer breaks down. Since the paper is the most important dielectric component of the transformer, having the ability to assess its condition is essential to effective maintenance.*
- *Metals-in-oil - metals such as copper, iron, zinc and lead can be detected and these can be indicators of incipient-fault conditions, potential bearing wear from pumps or other wear metals from vibration of components.*

Paper quality testing

Testing the degree of polymerisation of paper (IEC 60450) provides a measure of paper aging and correlates with important physical properties like resistance to tearing and bursting. This is a critical factor in estimating the real aging of the main transformer insulation.

trends or patterns through regular ongoing tests which are conducted over a period of time. These can then be analysed and recommendations made." He adds that oil testing should be done at least once a year, as a minimum, and more frequently for specialised transformers such as those built for wind farms or solar power plants, or furnaces.

An important point is that the type of oil in the transformer must be specified for accurate analysis and correct diagnosis. It may be mineral oil, natural ester oil, synthetic ester or silicone oil in use and each type of oil has its own limits in specific tests.

Regularly scheduled oil testing is a cost-effective and sound maintenance practice that serves to extend the life of transformers. Using the knowledge obtained from diagnostic oil testing, customers can optimise their maintenance practices, performing maintenance when and where needed, rather than based on a fixed time schedule.

Nel points out that not all the tests need to be performed every time a transformer's condition is monitored. Some tests need to be done only annually. For example, the PCB (polychlorinated biphenyl) readings rarely change much, so these are tested once a year. Depending on how recently the transformer's oil was tested, certain tests will be recommended as a starting point. Once the transformer is part of an ongoing condition monitoring programme, the

Taking an oil sample for testing; oil analysis is a critical element of WearCheck's transformer condition monitoring programme.

appropriate tests are conducted as and when necessary. If particular problems are detected, further tests may be recommended. There is no fixed rule as to which tests are conducted and when.

He says, “We generally find that 80 to 90 per cent of transformers are healthy. However, when we are dealing with the problematic ones, we need to identify the problem and determine the severity of the problem. In extreme cases, we would advise that the transformer is taken out of service and the problem rectified.”

Transformer tests

The following tests are recommended for a basic fleet assessment, considering potential degradation of the solid insulation of the transformers’ active parts.

- Dissolved gas in oil test
- Oil quality results including moisture and acidity
- Estimated or measured moisture in cellulose
- Furans analysis
- Dissipation factor (DDF/Tan D) or Power factor (PF) of the main insulation
- Specified additives (restricted to inhibited and or passivated oils)
- Corrosive sulphur in oil test
- Transformer oil temperature (loading profile and cooling efficiency)

Complementary tests

- Particles (counting and sizing)
- Metals-in-oil test
- Sediment and sludge
- Environmental contaminants
- Specialist furanic tests (DP)
- Diagnosis of tap changers and diverters test data
- Gassing tendency of the oil.

On-load tap changer (OLTC) maintenance

WearCheck's Transformer Maintenance Division has developed a special OLTC programme to optimise maintenance based on its transformer diagnostic tests.

The OLTC assessment offers a number of benefits.

- It is a diagnostic programme that does not require equipment outages, thus enabling work management flexibility.
- It serves to identify problem OLTCs before failure, to reduce system outages.
- It is less intrusive than internal visual inspection.
- It is an irreplaceable aid in prioritising maintenance functions and reduces time-based maintenance and the associated expense.
- It enables customers to reduce overall costs of maintenance by being selective.

WearCheck supports its customers in spending the maintenance budget where it’s needed; this makes financial sense. Condition-based maintenance is an effective cost-saving tool as it enables customers to focus their maintenance efforts and investments where evidence shows these are required. □

A failed transformer can have a disastrous impact on the operations which depend on it. A good transformer condition monitoring programme detects potential failure before it occurs.

Gert Nel, Transformer Division Manager at WearCheck.

Specialised transformers for renewable energy projects

The local transformer manufacturing facility of the Zest WEG Group has supplied 36 specialised photovoltaic (PV) transformers to a solar energy generation plant in the Northern Cape.

This heralds Zest WEG's entry into the local production of transformers for the renewable energy sector.

Sales team leader Stuart Brown emphasises that conventional 'off the shelf' distribution transformers are not adequate for these applications. Distribution photovoltaic (DPV) solar energy transformers and generator step-up (GSU) wind turbine transformers are specially designed.

Brown says, "This exciting step into the renewables sector is supported by our technical collaboration with WEG's extensive research and development resources in Brazil. We see great potential for renewable energy solutions in Africa, particularly as generation technologies evolve with the harnessing of solar and wind energy."

Ronaldo Bertoldi, Engineering Manager at the Zest WEG manufacturing facility, says the design for the new transformers was reviewed by an international, independent consultant, to ensure the highest standards.

For the project in the Northern Cape, the dual-system PV transformers were manufactured to the customer's specification of 3 800/1 900-1 900 kVA and 22/0.66-0.66 kV. The units were also subjected to routine and type testing, including heat run, impulse and partial discharge tests. They were delivered to the project in batches between July and November 2019.

Bertoldi says the increasing use of renewable energy creates new demands and challenges for transformer design.

"Transformers for wind and solar energy generation have particular installation and operation characteristics that affect their design," he says. "And the design must also continue to meet the requirements for quality and cost in the finished product."

One of the specific factors affecting transformers in DPV power generation systems is, obviously, solar irradiation. "This directly affects the load profile as well as the thermal stress in the transformer materials," Bertoldi says. "A wide range in transformer temperatures must be accommodated – from minus 25 to plus 50 degrees Celsius."

Transient overvoltage is also an issue to consider. On the high voltage (HV) side, overvoltage transients may occur due to multi-stage capacitor banks switching, or from the circuit breaker operation. On the low voltage (LV) side, voltages are controlled with high frequency inverters which create harmonics and pulsed voltages.

"An electrostatic ground shield is required between the primary and secondary windings to eliminate capacitive coupling and transient overvoltage transfers," Bertoldi says. "This also filters harmonics of high frequencies and pulsed LV voltages."

He points out that the International Electrotechnical Commission (IEC), the Institute of Electrical and Electronics Engineers (IEEE) and the International Council on Large Electric Systems (CIGRE) are working to update standards related to this equipment. A number of international standards already apply.

"These include IEC 60076-16 standards for wind turbines, for transformers from 100 kVA to 10 000 kVA, as well as dry-type and liquid-immersed transformers up to 72.5 kV," he says. "The IEEE standard P57.159/D6 guides the design of transformers in DPV systems."

The CIGRE standard WG A2.50 also applies to distributed energy sources and induced reverse power flow on transmission and distribution transformers.

In addition to the local design and manufacture of transformers for renewable energy projects, Zest WEG can provide a range of integrated solutions for these projects. These include substations, e-houses, switchgear and inverters.

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

Two WEG PV transformers leaving the manufacturing facility to be delivered to site.

Active part assembly on a WEG PV transformer.

In-house transformer testing reinforces standards

In another development the Zest WEG transformer manufacturing facility in Heidelberg has recently installed an impulse voltage generator which enables it to test transformers in-house, saving time and money for customers.

According to Ronaldo Bertoldi, Engineering Manager at the facility, the substantial investment in this specialised equipment positions Zest WEG well for growth in South Africa and on the continent.

"The impulse generator is strategic equipment for us, enabling us to provide an important service, especially for our larger customers," Bertoldi says. Where the transformer size is bigger than the 72.5 kV voltage class, impulse testing is a routine test, according to IEC 60076-3. Customers have the option to do an impulse test in lower voltage classes as a type test.

An impulse generator produces short, high-voltage surges to test the strength of electric power equipment against lightning and switching surges. It comprises multiple capacitors that are first charged in parallel through charging resistors by a high-voltage, direct-current source. These are then connected in series and discharged through a test object by a simultaneous spark-over of the spark gaps.

Sales team leader Stuart Brown highlights that Zest WEG's acquisition of this equipment makes it one of only a handful of local original equipment manufacturers (OEMs) with this testing facility in-house. It enhances local engineering capacity and entrenches global standards, he says.

"Major energy utilities often require that suppliers have this capability. It is therefore a valuable resource as we expand the range of our transformers up to 50 MVA, 132 kV units."

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

Testing a transformer with the impulse voltage generator.

Submersible robots join transformer inspection services

Simcoa Operations is an Australian-based company committed to producing high quality silicon which is used in many of the products that make our modern lives easier. The company sources its power from the Australian grid and the manufacturing facility is supplied through two power transformers (rated at 132/22/11 kV).

When traces of gas were observed in the oil of one of the transformers, which handles 50% of the facility's production capacity, Simcoa Operations sought the expertise of the local ABB Transformer Service team in Australia to conduct an internal inspection of the unit.

According to oil test results, the transformer had experienced high energy discharges and electrical arcing. The initial hypothesis was that the issue was related to the tap-changer, a critical component in a transformer, and that it might need immediate maintenance.

Simcoa had planned to allow for the inspection using the traditional method – where personnel enter the confined space of the transformer, a process that first requires the lengthy draining out of the oil and then adding breathable air. Taking the faulty transformer out of service for inspection would also place significant strain on the other transformer which would have to handle the additional power load. Furthermore, this approach could take up to five days working around the clock, and carries with it safety concerns and some limitations on the visibility, to the human eye, of some areas in the internal works of the transformer.

ABB offered Simcoa a new way of inspecting the transformer – using its submersible inspection robot service, TXplore™. Simcoa Operations welcomed the chance to use this new inspection technology and once it was agreed, ABB was on site within two days.

Through the 'eyes' of the robot

Despite poor visibility due to the dark oil, the TXplore was able to capture all internal areas and faults of the transformer using its on-board camera and LED lighting system. It can also 'swim' through tight areas to investigate and document all the internal workings of the transformer.

The photos and videos taken during the inspection are streamed live and, in this instance, were viewed together by ABB's transformer engineers and the team at Simcoa Operations.

The transmission provided the data and evidence needed to make decisions for the next steps.

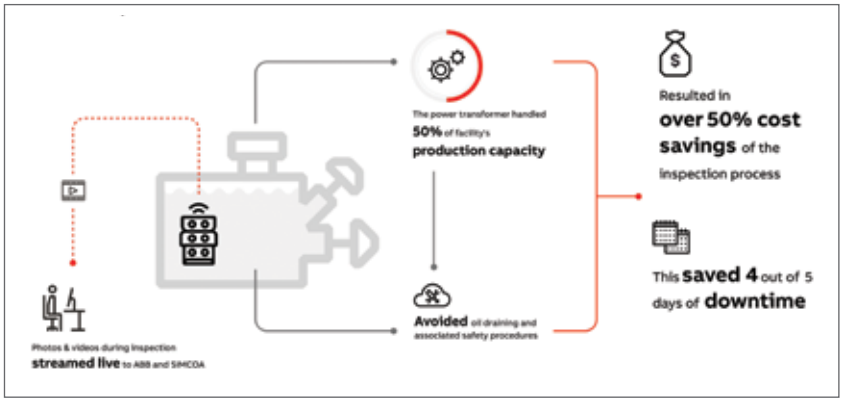
The tap-changer was found to be operating in good order and was therefore not the issue. On the same day that the unit was disconnected from the network, ABB concluded that the transformer could be energised and put back into service.

Reducing downtime and inspection costs

With the TXplore inspection service, there was no need to drain the oil, add breathable air or assemble a confined space rescue team. This saved about 50% on the costs of the traditional inspection process. It was found that the trace amounts of gas in the oil would not stop the transformer from working properly and the recommendation was that this issue be addressed during the next planned maintenance outage.

For Simcoa Operations, ABB's inspection of the transformer ensured minimal downtime of the transformer – just one day rather than a possible five or more – and enabled the issues to be identified quickly and safely.

For more information email: Namita Asnani, namita.asnani@in.abb.com or visit: https://new.abb.com



Using the TXplore transformer inspection service, Simcoa Operations could minimise downtime and saved on traditional inspection costs.

ABB's TXplore submersible robot.

A TXplore high-definition camera view through the transformer's dark oil.

Managing the risk of fire at substations

One of the biggest and busiest airports in Africa, OR Tambo International in Johannesburg, was plunged into temporary darkness on Sunday 12 December last year after a transformer at a substation in Kempton Park caught fire. While this highlights the vulnerability of such critical electrical infrastructure, CEO of ASP Fire, Michael van Niekerk, points out various measures that local authorities can implement to manage such fire risks.

The fact that substations are not manned means there is no-one on site to raise an alert in the event of any incident. In addition, a lack of maintenance means an increased likelihood of such incidents. The situation is exacerbated by load shedding, which results in current inrushes when the power is restored – and these can damage components such as ageing electrical insulation, increasing the risk of transformer fires.

Some substations are in remote areas, or in locations that are difficult to access after normal business hours. At these substations the installation of a standalone fire-detection system is recommended to protect high-risk items such as the transformers. In addition, a fire-suppression system using foam mist can be highly effective.

However, Van Niekerk notes that the dangerous combination of load shedding and a lack of preventive maintenance can result in arc flashes, which he describes as, basically, mini lightning bolts that can cause the insulation in substations to start burning. A lack of adequate maintenance of the cooling oil in a transformer can cause hot-spot temperatures that result in bubbles in the oil which, combined with high temperatures, increase internal tank pressure and may result in overflow or tank rupture.

It is exactly this kind of combination of factors that gives rise to so many reports of substations catching fire – and the resultant power outages and destruction of infrastructure.

ASP Fire can supply and install standalone fire-suppression systems which are not reliant on pumps and water-storage tanks in the event of a fire. Water is, instead, stored in nearby pressure vessels. This system has the added benefit of minimising the quantity of water needed to suppress a fire.

The major problem, however, remains the lack of adequate maintenance. "We are all aware of the challenges faced by local government in maintaining essential infrastructure. Ageing substations that are not well-maintained to begin with are increasingly vulnerable to load shedding – and what can then be disastrous consequences," van Niekerk warns.

"The cost in replacing a single transformer is prohibitive, and this behoves local authorities to ensure they have a maintenance schedule in place, and/or have conducted a fire-risk assessment, even if they are not in a position, financially, to install proper fire detection and suppression systems immediately."

For more information contact ASP Fire.
Tel: +27 (0)11 452 2169, email: michael@aspfire.co.za

A lack of maintenance on municipal substations and ongoing load shedding from the national grid, raise the risk of substation fires damaging ageing electrical infrastructure.

Dry-type transformers in coal mining environment

Trafo Power Solutions, expert in dry-type transformers, recently completed a contract that involved the design, supply and installation of two 200 kVA – 22 kV to 400 V – dry-type transformers as part of a significant upgrade at a coal mine in Mpumalanga. The units were housed in specialised IP42-rated enclosures and were specified by a design house, on behalf of the end-customer.

Trafo Power Solutions Managing Director David Claassen says, "The contract demonstrated our application engineering capability and our experience in coordinating our solution within a larger project. This included meeting detailed specifications and ensuring our design for the transformers and their enclosures matched the requirements and constraints of the site."

Trafo also equipped the units with the necessary earth fault protection, surge protection and vibration pads.

"Dry-type transformers are well suited to the coal mining environment, with its hazardous areas and its regulations to mitigate fire risk," Claassen says. "The dry-type technology uses air to cool the transformers, doing away with the need to use oil as a coolant."

Claassen emphasises that the absence of oil has advantages for safety, as the possibility of oil igniting is removed. The units can also be well protected against fine airborne coal dust. An added advantage is environmental, as there is no chance of an oil leak contaminating the ground or groundwater.

For more information contact Trafo Power Solutions.
Visit: www.trafo.co.za

Cast resin transformer in a fully enclosed mini substation configuration.

Transformers and electrical upgrades for global brewer

In another project, Trafo Power Solutions has delivered transformers and other electrical upgrades for the expanded facilities of a global beer maker in Gauteng.

In addition to requiring three transformers, the customer was looking for a partner who would interface with various suppliers of electrical equipment. According to Trafo Power Solutions Managing Director David Claassen, Trafo therefore interacted closely with the customer's Europe-based engineering team and with local electrical contractors and consultants.

Meeting high-pressure deadlines, the three transformers designed, supplied and commissioned, included a 1 250 kVA and a 1 600 kVA unit – both with 11 kV to 400 V capacity – as well as a 2 000 kVA unit for 11 kV to 690 V application.

"These transformers all comply with the European Directive on Efficiency and are the lowest-loss dry-type transformers available," Claassen says. "This was the customer's specification, as the company places high priority on energy efficiency worldwide."

Medium voltage switchgear was also included in the scope of work which called for two ring-main units (RMUs), one a three-way and the other a four-way unit.

"We modified the RMUs in line with the customer's requirements, including a battery-tripping unit (BTU) on each," Claassen adds. "This ensures there is power available regardless of the condition of the circuit breaker."

As a brownfield project, there was considerable adaptation of design to suit the plant configuration. Instrumentation was located on a raised base, for instance, where voltage transformers and current transformers were installed for monitoring each RMU.

"We also supplied three specialised distribution boards (DBs) between the low voltage transformers and the new sections of the plant and new brew-house," he says. "This non-standard design has a modular type assembly conforming to IEC 61439 and IEC 61641."

This provides the highest level of safety and can be supplied by only a few manufacturers in South Africa.

Claassen highlights Trafo's in-house capacity to provide complete solutions within tight deadlines. In this case, the design, manufacture, delivery and commissioning were achieved in just three months. Installation was coordinated with plant shutdown schedules to avoid costly downtime.

"We develop non-standard solutions where these are required, and take responsibility for integration, compatibility, quality and timeframes," he says.

For more information contact Trafo Power Solutions. Visit: www.trafo.co.za

Open Africa Power 2020 – a partnership for energy education

In early February, Enel Foundation, together with the University of Cape Town's Graduate School of Business (UCT GSB) as this year's host, launched the third edition of Open Africa Power (OAP), which ran its first training module from 10th to 14th February. The programme is aimed at empowering a new generation of leaders to drive Africa's clean energy transition. During the inauguration at UCT GSB's newly built Academic Conference Centre, Enel Foundation and the Nelson Mandela Foundation also announced a new partnership which will see them working together to increase the impact of OAP training in promoting a more just society in Africa through education.

Open Africa Power, started by Enel Foundation in 2018, aims to share information and increase knowledge regarding all aspects of electricity generation, distribution and regulation among participating African PhD, Masters and MBA students and alumni. In addition, the education programme aims to empower a new generation of leaders to contribute to the transition to clean energy in their countries and establishes a networking platform for participants to support the achievement of the United Nations Sustainable Development Goals (SDGs) striving for: Affordable and Clean Energy, Gender Equality, and Climate Action.

The partnership announced on the sidelines of the opening of OAP 2020 includes the launch of the Nelson Mandela Foundation OAP Prize. This is to be granted annually from 2020 onwards to the best student of each edition of the programme, based on academic merit as well as the student's social commitments to giving back to the community. The Nelson Mandela Foundation OAP Prize will highlight this commitment and the first recipient of this distinction will be announced this year on Mandela Day, celebrated every year on July 18th.

The 2020 edition of Open Africa Power was dedicated to Madiba in recognition of the programme's promotion of sustainable solutions to critical social problems and its contribution to the vision of a just society, capable of learning from its past and listening to all its members.

Carlo Papa, Director of Enel Foundation, said: "We are proud to join forces with the Nelson Mandela Foundation as both our organisations recognise that education in the clean energy transition has great potential to accelerate sustainable development in Africa, and share the view that Open Africa Power convenes young leaders on a valuable learning and dialogue process around critical social issues for the just transition."

Speaking for the Nelson Mandela Foundation, CEO Sello Hatang said: "Madiba's teachings on how we pursue a more just society recognise that sustainable development is as important as freedom in the context of developing nations. And a clean energy transition is critical to realising that vision of development of the African continent, hence our association with Enel Foundation for Open Africa Power."

Held in South Africa for the first time, after past editions in Kenya and Ethiopia, OAP 2020 involves a record number of 61 students from 16 African nations; close to half the participants are women. This confirms the initiative's focus on international as well as gender diversity, and presents a concrete demonstration of African women's emerging role in the clean energy transition.

Each edition of OAP includes a residential training module in a different African country, followed by an e-learning module, followed by two weeks of residential training in Italy. Altogether the programme is designed to enhance the participants' technical, regulatory and business skills as needed to work in the private or public sectors towards the electrification of Africa.

An articulated training programme

With Africa's population expected to more than double by 2050, from 1.2 billion currently to 2.5 billion, there is an urgent need for investments, regulation and human capital to address the decarbonisation and modernisation of power generation, transmission and distribution grids across the continent, at the same time striving to ensure that the 600 million Africans who do not yet have access to electricity are not left behind.

Anton Eberhard, Emeritus Professor and Director of the Power Futures Lab at the UCT GSB, who presented the opening lecture of this year's OAP programme, said: "2020 is a crucial year for Africa's energy security. If we don't act now, we risk being left behind as the world's transition from fossil fuels to renewable sources gains momentum. We therefore urgently need more African clean energy leaders who understand these shifts and are capable of providing the private and public sectors with the expertise needed to benefit from, rather than be disadvantaged by, them."

During the week, participants learned from local and international academic leaders from the UCT faculty, senior industrial and institutional experts.

Partner universities for the training since OAP's inception include Strathmore University in Kenya (implementing partner), the University of Nairobi (hosting partner 2018) and the University of Addis Ababa in Ethiopia (hosting partner 2019). The programme's Italian training module involves leading Italian institutions such as Politecnico di Torino, Politecnico di Milano, Bocconi University, Florence School of Regulation and Venice International University.

For more information visit: https://www.enelfoundation.org/

Simple, solar-powered water desalination

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

A completely passive solar-powered desalination system developed by researchers at MIT and in China could provide more than 1.5 gallons (about 5.7 litres) of fresh drinking water per hour for every square metre of solar collecting area. Such systems could potentially serve off-grid arid coastal areas to provide an efficient, low-cost water source.

The system uses multiple layers of flat solar evaporators and condensers, lined up in a vertical array and topped with transparent aerogel insulation. It is described in a paper published in February in the journal Energy and Environmental Science, authored by MIT doctoral students Lenan Zhang and Lin Zhao, postdoc Zhenyuan Xu, Professor of Mechanical Engineering and Department Head Evelyn Wang, and eight others at MIT and at Shanghai Jiao Tong University in China.

The key to the system's efficiency lies in the way it uses each of the multiple stages to desalinate the water. At each stage, heat released by the previous stage is harnessed instead of wasted. In this way, the team's demonstration device can achieve an overall efficiency of 385% in converting the energy of sunlight into the energy of water evaporation.

The device is essentially a multi-layered solar still, with a set of evaporating and condensing components like those used to distil liquor. It uses flat panels to absorb heat and then transfer that heat to a layer of water so that it begins to evaporate. The vapour then condenses on the next panel. That water gets collected, while the heat from the vapour condensation gets passed to the next layer.

Whenever vapour condenses on a surface, it releases heat; in typical condenser systems, that heat is simply lost to the environment. But in this multi-layered evaporator the released heat flows to the next evaporating layer, recycling the solar heat and boosting the overall efficiency.

"When you condense water, you release energy as heat," Wang says. "If you have more than one stage, you can take advantage of that heat."

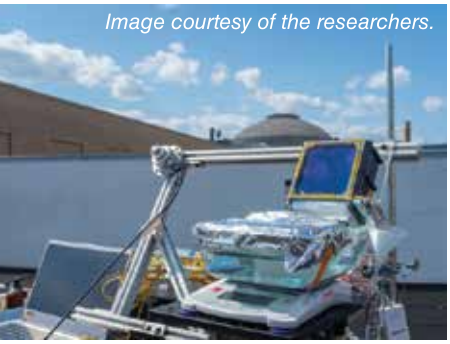


Image courtesy of the researchers.

Adding more layers increases the conversion efficiency for producing potable water, but each layer also adds cost and bulk to the system. The team settled on a 10-stage system for their proof-of-concept device, which was tested on the rooftop of an MIT building. The system delivered pure water that exceeded city drinking water standards, at a rate of 5.78 litres per square metre (about 1.52 gallons per 11 square feet) of solar collecting area. This is more than two times as much as the record amount previously produced by any such passive solar-powered desalination system, Wang says.

Theoretically, with more desalination stages and further optimisation, such systems could reach overall efficiency levels as high as 700 or 800 percent.

Unlike some desalination systems, there is no accumulation of salt or concentrated brines to be disposed of. In a free-floating configuration, any salt that accumulates during the day would simply be carried back out at night through the wicking material and into the seawater, according to the researchers.

Their demonstration unit was built mostly from inexpensive, readily available materials such as a commercial black solar absorber and paper towels for a capillary wick to carry the water into contact with the solar absorber. In most other attempts to make passive solar desalination systems, the solar absorber material and the wicking material have been a single component, which requires specialised and expensive materials, Wang says. "We've been able to decouple these two."

The most expensive component of the prototype is a layer of transparent aerogel used as an insulator at the top of the stack, but the team suggests other less expensive insulators could be used as an alternative. (The aerogel itself is made from cheap silica but requires specialised drying equipment for its manufacture.)

Wang emphasises that the team's key contribution is a framework for understanding how to optimise such multistage passive systems, which they call thermally localised multistage desalination. The formulas they developed could likely be applied to a variety of materials and device architectures, allowing for further optimisation of systems based on different scales of operation or local conditions and materials.

The research team included Bangjun Li, Chenxi Wang and Ruzhu Wang at the Shanghai Jiao Tong University, and Bikram Bhatia, Kyle Wilke, Youngsup Song, Omar Labban, and John Lienhard, who is the Abdul Latif Jameel Professor of Water at MIT. The research was supported by the National Natural Science Foundation of China, the Singapore-MIT Alliance for Research and Technology, and the MIT Tata Centre for Technology and Design.

For more information visit: http://news.mit.edu/2020/passive-solar-powered-water-desalination-0207

New ICS threat intelligence service

Kaspersky has released its ICS Vulnerabilities Database, offering a new threat intelligence service for industrial organisations. The service will provide customers with access to a constantly updated database containing information on vulnerabilities in industrial control systems (ICS) and industrial IoT (IIoT) products, along with rules and algorithms to detect possible attacks. With this service, asset owners will be able to perform vulnerability assessments and patch management, and ensure they are protected from possible targeted attacks.

As in any computing system, vulnerabilities in industrial components are inevitable. Each year, Kaspersky Industrial Control Systems Cyber Emergency Response Team (Kaspersky ICS CERT) finds no less than 60 new vulnerabilities in IIoT components and industrial control systems[1], potentially affecting hundreds and thousands of ICS or IIoT products. These can lead to system failure or give malware access to the product's management and critical manufacturing data. For customers, it is important to be aware of these vulnerabilities, understand how critical they are and learn what can be done to patch or mitigate them.

In addition to being aware of the vulnerabilities in a product they may be using on their ICS networks, industrial organisations need to have the ability to detect and prevent possible attacks that can occur if any of these vulnerabilities are exploited. The difficulty is that intrusion detection systems commonly have attack detection signatures and rules focusing primarily on IT asset protection. This can mean that network attack vectors that could specifically target vulnerable ICS components may not be uncovered.

The Kaspersky ICS Vulnerability Database will include continually updated information about the most critical vulnerabilities contained in widely-used ICS products from a variety of vendors. Each record will contain detailed technical information for industrial organisations to check whether their assets are vulnerable. Users can then prioritise and plan vulnerable system updates or other actions to mitigate the risks of possible exploitation by a malicious actor.

The information is delivered in a directly readable and machine-readable format via REST API, so customers can integrate it into their existing cybersecurity tools and decide on the remediation actions needed.

The second component of this Kaspersky service – the Network Attacks Signatures Database — provides signatures of ICS threats. It can be integrated with third party intrusion detection systems to help customers minimise the risk of cybersecurity incidents in their industrial infrastructure.

Georgy Shebuldaev, Head of Kaspersky Industrial Cybersecurity Business Development, says, "With this new service we aim to help customers enhance their vulnerability management and incident detection with Kaspersky expertise. Penetration testing and periodic vulnerability assessments of an industrial enterprise can provide a good picture of its current cybersecurity state and motivate operation technology (OT) or security teams to make improvements.

"Continuously assessing vulnerability is one of the most important aspects of planning remediation to reduce the possible attack surface. This can typically be implemented only in a passive way, due to the nature of the related environments. Publicly available ICS or IIoT vulnerability information sources generally lack much of the required information, consistency and clarity to be useful for effective continuous vulnerability assessments. I believe that the ready-to-use intelligence and guidance that the ICS Vulnerabilities Database provides will solve this problem."

[1] Kaspersky ICS CERT identified 75 vulnerabilities in 2016, 63 in 2017 and 61 in 2018, many affecting hundreds of products by different vendors.

For more information contact Kaspersky at ics@kaspersky.com or visit: www.kaspersky.co.za

Kaspersky Industrial Control Systems Cyber Emergency Response Team (Kaspersky ICS CERT) was launched by Kaspersky in 2016 as a global project to coordinate the efforts of automation system vendors, industrial facility owners and operators, and IT security researchers to protect industrial enterprises from cyberattacks. Kaspersky ICS CERT focuses primarily on identifying potential and existing threats that target industrial automation systems and the Industrial Internet of Things. Since its inception, the team has identified over 200 critical vulnerabilities in products by major global ICS vendors. Kaspersky ICS CERT is an active member and partner of leading international organisations that develop recommendations on protecting industrial enterprises from cyber threats.

AI-powered problem solving for global impact

Ten years remain to achieve the United Nations Sustainable Development Goals (SDGs). Leaders in AI and humanitarian action will convene at the 2020 AI for Good Global Summit – to be held 4-8 May 2020 in Geneva, Switzerland – with the intention to ensure that AI for Good solutions achieve a scale matching that of the ambitions expressed in the SDGs.

The AI for Good Global Summit is the leading United Nations platform for inclusive dialogue on AI. The summit identifies practical applications of AI to accelerate progress towards the SDGs and builds collaboration to assist these applications in achieving global impact.

Now in its fourth edition, the 2020 AI for Good Global Summit will continue to connect AI innovators with public- and private-sector decision makers with the aim of stimulating the discovery and delivery of AI for Good solutions for all.

The 2020 summit is co-organised by the International Telecommunication Union (ITU) – the United Nations specialised agency for information and communication technologies – and the XPRIZE Foundation, in partnership with Switzerland, the Association for Computing Machinery (ACM) and a number of sister United Nations agencies.

The 2017 summit marked the beginning of a global dialogue on the potential of AI to act as a force for good. The action-oriented 2018 and 2019 summits gave rise to numerous AI for Good projects including an AI for Health Focus Group led by ITU and the World Health Organisation, an ITU Focus Group on AI for Autonomous and Assisted Driving, and an open framework for collaboration in AI Commons. The pursuit of global impact will be the defining feature of the 2020 summit.

ITU Secretary-General Houlin Zhao said, "Three editions of the AI for Good Global Summit have recognised the significance of the leap from AI promise to global impact. We see renewed resolve within the AI for Good community to create the conditions necessary to make this leap and accelerate progress towards the achievement of the SDGs."

Noting the only 10 years remaining to achieve the United Nations SDGs, XPRIZE Foundation CEO Anousheh Ansari said, "AI is sure to be an invaluable technology to accomplish these critical goals that are designed to ensure a more sustainable and equitable future for all. At XPRIZE, our mission is to facilitate radical breakthroughs for the benefit of humanity, and our ongoing collaboration on the AI for Good Global Summit is one way we hope to accelerate safe and ethical development of AI and machine learning technology."

The summit attracts a cross-section of AI experts from industry and academia, global business leaders, Heads of UN agencies, ICT ministers, non-governmental organisations, civil society and artists.

The summit is designed to generate AI for Good projects that can be enacted in the near term, guided by the summit's multi-stakeholder and interdisciplinary audience. It also aims to ensure trusted, safe and inclusive development of AI technologies and equitable access to their benefits.

The 2020 summit will generate AI breakthroughs in climate and environmental action, the elimination of hunger, gender equality, healthcare, smart and safe mobility, the preservation of cultural heritage and the protection of access to trustworthy information. An AI Innovation Factory will showcase new AI for Good ideas, crowd-sourced AI challenges and promising AI start-ups. A partner day will offer potential AI adopters an audience with leading AI experts and educators. A dynamic show floor will feature innovations at the cutting edge of AI research and development.

For more information visit: https://aiforgood.itu.int/

DIARY DATES

Power & Electricity World Africa 2020

31 March-1 April 2020
Sandton Convention Centre, Johannesburg
Focusing on innovation, investment and infrastructure in the power and energy sector, the conference and expo attract speakers, exhibitors and delegates from utilities, government, IPPs, large end-users and suppliers active in the industry.
Visit: www.terrapinn.com/exhibition/power-electricity-world-africa/index.stm

Hannover Messe 2020

20-24 April 2020,
Hannover, Germany
The world's leading industrial technology show will focus on key trends in industrial transformation: Industry 4.0, industrial security, artificial intelligence, lightweight construction, logistics 4.0, platform economics, carbon-free production.
Visit: www.hannovermesse.de/home

PowerGen Africa 2020
Co-located with African Utility week

12-14 May 2020,
Cape Town International Convention Centre
African Utility Week is Africa's meeting place for the power, energy and water value chain. PowerGen Africa focuses on generation technologies, alongside transmission, distribution and metering, as well as new technologies including energy storage, mini and micro grids, IoT and ICT systems.
Visit: www.powergenafrica.com/

Machine Tools Africa 2020

12-15 May 2020,
Expo Centre, Nasrec, Johannesburg
High performance machine tools. Endorsed by Machine Tools Merchants' Association of South Africa (MTMA).
Visit: www.machinetoolsafrica.co.za/

AI for Good 2020

4-8 May 2020,
Geneva, Switzerland
The AI for Good Global Summit is the leading action-oriented United Nations platform for inclusive dialogue and global collaboration on AI. This 4th edition will focus on practical applications of AI to accelerate progress towards achieving the UN's sustainable development goals.
Visit: https://aiforgood.itu.int/

Electra Mining Africa

7-11 September 2020
Expo Centre, Nasrec, Johannesburg
A shared exhibition platform for the African mining, industrial, construction and electrical sectors.
Visit: www.electramining.co.za/

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