

FEATURES:

- Control systems + automation
- Drives, motors + switchgear
- Measurement + instrumentation
- Transformers, substations + cables

09/2023



TRANSFORMER &
MEDIUM VOLTAGE
SUBSTATIONS
MANUFACTURING

ON SITE
TRANSFORMER &
MOTOR MAINTENANCE

TRANSFORMER &
MOTOR FACTORY
REPAIRS



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High standardisation rate



The LV MCCs are designed for various market segments, fulfilling quality and performance requirements compared to the best products available internationally. Highly standardised, these products were designed to provide easy assembly, installation, maintenance and future extensions.

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ZEST
WEG Group





In the field of power distribution, ArmCoil's MV substations, designed in line with the IEC and SANS780 specifications, offer the additional attributes of versatility, reliability, safety and sustainability.

(Read more on page 3.)

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The full costs of loadshedding

As we manage our way through loadshedding, do spare a thought for your own electrical infrastructure.

Let's not forget that this has been our worst year to date with regard to loadshedding. And we know why there is loadshedding – I mean in the context of doing all we can to stave off a complete collapse of the utility system.

And of course, we know the real reason for loadshedding...

We also need to pause to appreciate the consequences of running plant into the ground. There is no system on the planet that does not need to be shut down and maintained. It may be 'cute' to run the plant past its planned maintenance period – but we can all see the consequences.

And this is the primary message of this comment.

It is obvious that, in many cases, we are imposing unusual supply and operating conditions on our own equipment. This applies specifically to our transformers and switchgear. Why is that?

Well, switchgear, like any other equipment, must be maintained and serviced. It is very likely that we all are now needing to service our switchgear far more frequently than ever before. And this is not negotiable at all. Failure to do so can result in catastrophic failure of the equipment – often with serious consequential damage.

I have found myself in discussions about the substantial cost increases we therefore face under loadshedding conditions – precisely because we need to service kit more frequently. Very often there is a tendency to try rather to stick to those old 'ordinary' regimes, or to pretend that loss of production and the cost of alternative supply sources are the only costs of loadshedding.

The reality is that loadshedding has expensive consequences for our regular plant and equipment. And that cost is significant.

Similarly, if we have installed diesel generators, or possibly solar or wind solutions – none of these options is by any means cheap. We could also discuss whether any of them is much better than the others, with regard to a sustainable green future.

(I shudder at the thought of huge piles of PV panels, or huge piles of batteries, that have reached their end of life; as we rush to optimise the development of new technologies and new generation capacity, the safe – and sustainable – disposal of the byproducts of those technologies presents an enormous challenge.)

But the main message this month is to appreciate that our plants are being hammered by loadshedding – and that means we need to take particular care of our electrical equipment. The hammering is, as noted above, most likely simply a result of far more frequent operation. And the more frequently we use our equipment, the more frequently it needs to be serviced.

The second message is that we need to begin to appreciate the full cost implications of loadshedding. These are driven by the cost of the alternatives to the utility supply and those ever-increasing maintenance costs on our plant.

In this issue of *Electricity + Control* we feature topics that are hugely impacted by the realities of our electrical energy environment. These include transformers, substations and cables, and drives, motors and switchgear. And in respect of all of these, as we have noted, service intervals are linked to frequency of operation.

It seems almost trite to note that control and automation systems suffer as well. No energy means no operation. But those other impacts on our plant cannot be ignored.

Ian

Ian Jandrell

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



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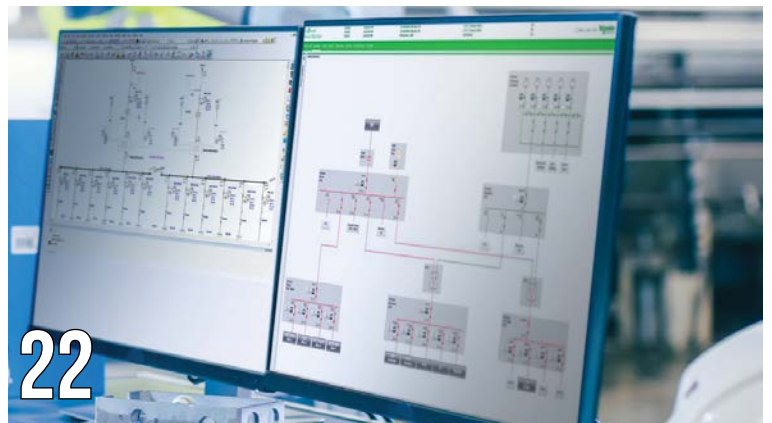
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ArmCoil's MV substations: Setting the standard for performance and sustainability

In the field of power distribution, ArmCoil has consistently risen to prominence with its groundbreaking solutions. Among its impressive lineup, the MV substations, crafted in adherence to the IEC and SANS780 specifications, stand as a testament to the company's commitment to innovation, reliability, and sustainability. These versatile substations are engineered to excel in both underground and on the surface installations, making them an indispensable asset in modern power infrastructure.

Versatility and flexibility

ArmCoil's MV substations demonstrate an exceptional level of adaptability. Built to cater to various power distribution scenarios, their modular design allows for easy customisation and expansion as the need arises. This adaptability ensures that the substations can integrate seamlessly into existing grids or serve as the cornerstone for new installations, offering unmatched flexibility in addressing diverse energy distribution demands.

Reliability and performance

IEC and SANS780 specifications set rigorous benchmarks and ArmCoil's MV substations not only meet but exceed them. Engineered with precision, the substations ensure uninterrupted power supply, minimising downtime and maximising operational efficiency.

ArmCoil's unwavering commitment to quality guarantees consistent performance, establishing its substations as the go-to choice for critical power distribution networks.

Safety

Safety is paramount in any power infrastructure, and ArmCoil prioritises it with utmost diligence.

The MV substations are equipped with advanced safety features, including state-of-the-art insulation systems and fault protection mechanisms. These features not only safeguard personnel and assets but also contribute to the overall stability and reliability of the power grid.

Space optimisation

In urban landscapes where space is at a premium, ArmCoil's MV substations truly shine. Their compact design allows for efficient use of available space, making them a perfect fit for densely populated areas. Whether installed underground or on the surface, the substations provide a minimised footprint and maximised impact.

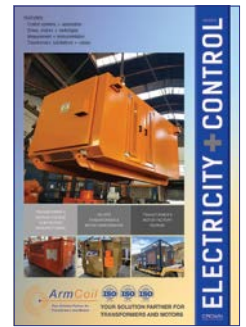
Ease of installation and maintenance

ArmCoil understands the importance of minimising downtime during installation and maintenance. With their user-friendly design, the MV substations are engineered for streamlined installation and hassle-free maintenance. This reduces operational disruptions and translates into significant cost savings over the lifespan of the substation.

Sustainable excellence

ArmCoil's dedication to sustainability is evident in its products' performance and in its environmental stewardship. Holding three prestigious ISO certificates – ISO9001, ISO45001, and ISO14001 – the company demonstrates its commitment to quality management, occupational health and safety, and environmental responsibility. These certifications underscore ArmCoil's holistic approach to manufacturing, ensuring that its products are technologically advanced and produced with the highest ethical and environmental standards.

ArmCoil's MV substations represent a pinnacle of engineering prowess, offering a combination of versatility, reliability, safety, and sustainability. By adhering to the rigorous IEC and SANS780 specifications, the substations cater to a wide range of power distribution needs. ArmCoil's dedication to excellence, demonstrated by its ISO certifications, further solidifies its position as an industry leader. As the global demand for efficient and sustainable power distribution solutions continues to rise, ArmCoil's MV substations stand ready to pave the way for a brighter energy future. □



ArmCoil's MV substations, manufactured locally, offer versatility, reliability, safety and sustainability.

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Packaging high-volume consumer goods, fast

Shane Novacek, Beckhoff USA

The CP-30 case packer developed by US machine builder RA Jones is an excellent example of customised machine design. It is a high-performance case packer for a large, multinational manufacturer of coffee products. In the application, high-volume products are fed in at such speeds that a high level of automation was crucial for continuous operation. This was implemented using EtherCAT and PC-based control and drive technology from Beckhoff.

Best known for a wide range of standard packaging machines for aerosols, cup filling, chub packaging, multi-packing, pouching, case packing and cartoning, RA Jones also offers completely customised machinery. The company is part of the Italy-based Coesia Group of packaging machine builders and serves many of the world's biggest brands in consumer products with highly automated primary and secondary packaging machines. The machines are used to package food and beverage products, over-the-counter medications, and other high-volume consumer products. RA Jones leans on its over 100 years of packaging industry experience to back up the support given to every installation in the field.

Highly automated packaging

When RA Jones was contracted by a manufacturer of coffee products to develop a case packing machine, the sheer volume of customised equipment was a tall order, with 12 machines to be produced in a tight timeframe, and so was the high level of automation required by the end user. "With coffee products coming in as fast as 1 200 per minute, the machines had to run continuously, even in the event of a jam," said Bob Burkhardt, Product Portfolio Manager for Cartoning, Robotics & Pouching at RA Jones. "So we

sought a machine control platform that could automatically diagnose and correct machine stoppage without needing an operator to make manual adjustments. This eliminates the burden on workers to stop production and pull reject boxes and is crucial in such a fast-paced production environment."

The CP-30 machine automates all aspects of case packing, including jam clearance and packaging changeovers via more than 70 dynamically controlled servo axes. It can automatically eject cases that don't open correctly under the magazine, without stopping the packaging process. The machines feature a case feed robot inside to move flat corrugated cardboard into the case erecting segment.

"We worked with Beckhoff application engineers to create customised kinematics software for this specialised robot," Burkhardt said. "While similar to a SCARA, this robot is completely customised to provide a high degree of rotation for the pick head as it pulls cardboard out of the magazine." If the case fails to open, sensors will automatically detect this, and the pick head will reject the case. Afterwards, the case feed robot will pick a new case. The automated reject handling is a key benefit for the end user, as is the high throughput and flexibility in carton handling.

Automation from a single source

"The processing power we get from PC-based control is impressive," said Nick Werner, Custom Controls Group at RA Jones. "Practically speaking, this means the difference between implementing one Beckhoff controller and having to juggle multiple controllers from a traditional PLC vendor to handle machine automation." A Beckhoff C6030 Industrial PC (IPC) with Intel® Core™ i7 processor provides ample power for all the computationally intensive functions in case packing.

Austin Rismiller, Electrical Project Engineer, Research & Development/Innovation at RA Jones noted, "One of the things we observed with the Beckhoff IPC was impressively low scan times – around 1 millisecond scan time for more than 70 servo axes." Another enabler of low scan times is the fast communication over the EtherCAT protocol connecting all drives and I/O on the CP-30.

"EtherCAT provides an outstanding level of speed in our



© RA Jones

RA Jones developed the CP-30 case packer for a large, multinational manufacturer of coffee products for the consumer market.

machine communications,” Werner added. “And the ease of setup when automatically scanning devices into the network helped significantly with startup, commissioning and troubleshooting. This and built-in EtherCAT diagnostics make it easy to quickly localise and correct any wiring mistakes or breaks that may have happened – down to the exact I/O terminal.” The EtherCAT I/O system also provides direct connectivity to other industrial networks, such as IO-Link, and thus to various third-party devices, such as RFID readers, programmable stack lights and smart photo eyes.

With the servomotor terminals in the EL72xx series, RA Jones also uses compact drive technology from Beckhoff for space-saving control of the AM8100 series servomotors. EL9576 terminals add brake chopper functionality in the same 12 mm wide format. “Beckhoff directly addressed the small motor and drive sizes required for CP-30, which is a major benefit,” said Paul Schuster, Product Portfolio Manager, Coesia Digital & Aerosol, RA Jones. “Combining the power and feedback cables into one line using one cable technology (OCT) added to our space and wiring savings.” The machine’s footprint is smaller than comparable case packers and its electrical cabinets fold down, so the entire machine can be shipped in a normal semitruck.

Machine safety is integrated into the standard control platform and EtherCAT network via the TwinSAFE system. TwinSAFE I/O terminals connect to guard doors and e-stops throughout the machine and safety data is sent via Safety over EtherCAT (FSoE). The servo drives in the application also communicate via FSoE to provide a variety of safe motion functions. The system is divided into two safety zones with dedicated TwinSAFE logic in each. A cartoner-side zone is on the operator side, where the case feed robot picks all the cases. A second zone is on the transfer side where the cartons come in from the infeed and go to the upstacker. This provides the ability to stop the appropriate zone during safety events, instead of stopping the whole machine.

Modern PLC programming standards

On the programming side, TwinCAT 3 as an engineering environment and runtime for machine control also demonstrated major advantages. The universal TwinCAT platform handles all aspects of machine control, including PLC, safety, motion control and more. “I’m a fan of how TwinCAT XAE is presented in a standard Microsoft Visual Studio shell,” Rismiller said. “That’s refreshing, compared to traditional PLC vendors’ software offerings. TwinCAT 3 integrates all computer science standards in programming, like C++ and Python, which meshes into my programming knowledge from college. Providing these options in addition to PLC programming standards such as structured text is a key benefit.”

As part of the project, RA Jones used the existing Coesia Automation Framework Library (AFL) in TwinCAT. “TwinCAT offers the ability to protect Coesia and RA Jones software and function blocks as intellectual property,” Werner said. “Even better, end users never have to trouble themselves



The highly automated packaging machine features a case feed robot inside to move flat corrugated cardboard into the case erecting segment.

with the PLC code for troubleshooting and maintenance as these interactions are handled via the HMI.” Assisting in this user-friendly approach is a CP3918 Control Panel in 18-inch widescreen format with multiple push buttons selected for machine control functions – all designed into the panel.

The timeline for critical electrical design and installation of the CP-30 machines was compressed into a rigorous six-month period to enable RA Jones to stay on schedule for the end user’s plant upgrade. This required close and constant teamwork among engineers at RA Jones and Beckhoff to meet a tight delivery window. “Our effective collaboration and local support resources were up to the challenge of these development milestones,” said Mark Ruberg, Packaging Industry Manager at Beckhoff USA.

For the changeover of the future

The flexibility of the machine is boosted by the Acc-U-Change Plus™ solution from RA Jones which allows users to handle changeovers with the push of a button, ensuring a vertical startup and high case quality during production. The removable components are RFID-enabled, so operators can verify that the right equipment is installed in the right place for all case sizes and patterns. “Where changeovers to a different sized case often take 20 to 30 minutes in other case packers, we’ve been able to reduce changeover time to around five minutes or less on the CP-30,” Werner said. “Using automation from Beckhoff, we’ve taken 19 manual moves out of the equation – with one touch on the HMI, the automated changeover can move from largest size to the smallest size and vice versa.”

Following this positive experience, RA Jones has at least two new machine projects in development which will have Beckhoff as the standard machine control platform to boost throughput, reduce machine footprint and shorten changeover times similarly. □

For more information visit: www.beckhoff.com

Enabling smooth control of automatic milking

On most commercial dairy farms today, the process of milking has changed from the times when farmers would sit on a stool to milk the cows. The quantity and quality of milk are influenced by stress-free milking and by timing. If the milking process is not completed promptly, contamination can set in, so modern dairy farms tend to be highly automated with nothing left to chance.

As well as optimising productivity, the well-being of the animals is an important consideration and automatic milking systems that serve the herd need to ensure both. Furthermore, the application is typically in dark, humid and hot or cold places, all factors that present additional challenges.

For one of its customers, an international original equipment manufacturer and plant builder for the food industry which also produces automatic milking systems that are used around the world, ifm supplies its 3D sensor technology to support the systems' precise operation.

A sophisticated milking system using modern 3D sensor technology from ifm ensures an animal-friendly milking process – it is said that the cows in the barn voluntarily go to the milking station. A radio chip identifies each cow, and the arm of the milking robot moves from the side, under the cow, towards the udder. The most important element of this milking arm is the 'electronic eye' – ifm's 3D camera. It is mounted to the milking arm and detects the 'scene' under the cow in a fraction of a second, determining the exact position of the teats. The four milking cups can then be positioned accurately, one after the other, from below, onto the four teats.

The more precise and gentler this process is, the less stressful it is for the cow. And this has a direct effect on the quantity and the quality of the milk. Before the milking cups are applied, the teats are cleaned with a disinfect-



ifm's compact 3D camera enables a smooth and precise automatic milking process.

ing spray. Here as well, the 3D camera of the controller provides an accurate 3D image with all required spatial information to ensure the cleaning nozzles approach the teats with precision.

The compact 3D camera detects scenes and objects at a glance, in their spatial dimensions, and presents them as a 3D image. The operating principle, the time-of-flight measurement (ToF), can be compared to that of a laser scanner. However, instead of only one receiving element, the PMD camera has 23 232 receiving elements, which are positioned like a matrix on the chip. Four high-powered LEDs illuminate the entire field of view of the O3D over a range of 0.3 to 5.0 metres. A particularly advantageous feature of the PMD technology is that the measurement will work irrespective of the colour and type of the surface. It is unaffected by ambient light sources, reflective or wet surfaces, or very dark objects.

With the use of ifm's compact 3D camera the automatic milking system operates smoothly and precisely to ensure increased milk quantity and quality and a more efficient milking process.

For more information contact ifm South Africa.

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Email: info.za@ifm.com, visit: www.ifm.com

Control applications – streamlining industrial processes

Industrial processes can be complex, time-consuming, and require significant resources. To stay competitive, companies look for ways to streamline their operations while maintaining quality and efficiency. One way to achieve this goal is by using advanced control applications.

Prei Instrumentation's advanced control applications are designed to improve the performance of industrial processes by providing real-time data analysis, monitoring, and control. The applications are customisable and can be tailored to meet each client's specific needs. They can be implemented as standalone solutions or integrated with existing systems.

One of the key benefits of using Prei Instrumentation's advanced control applications is improved efficiency. The applications use advanced algorithms and predictive modelling to optimise processes, reduce waste, and improve productivity. By analysing data in real-time, they can detect and respond to changes in the process, ad-

justing as necessary to maintain optimal performance.

Another advantage of using advanced control applications is increased safety. Industrial processes can be dangerous and, if proper safety measures are not in place, accidents can occur. In monitoring processes, control applications can detect potential safety hazards, alerting operators to take corrective action before an accident occurs.

Furthermore, advanced control applications can improve product quality and productivity. By monitoring and controlling the process, the applications can ensure the product meets the required specifications. In addition, they can detect any deviations from the norm and make adjustments to bring the process back into compliance.

For more information contact Prei Instrumentation.

Visit: <https://prei.co.za>

Multimillion-rand contracts for furnace control

Engineering, systems integration and manufacturing company, Iritron, has been awarded two internationally based, multimillion-rand furnace drying projects.

With its extensive expertise in furnace drying control systems and as a solutions provider in the fields of electrical, instrumentation, control and decision support systems, Iritron has been appointed by an original equipment manufacturer (OEM) for a project in Canada and one in Angola.

The OEM is a global specialist supplier of bulk material handling and separation equipment for mines, and high-tech engineering for the drying and processing industries.

"We have collaborated with the same OEM on a number of projects and provide specialist in-house engineering expertise as well as products specific to these complex drying projects. Designing an intelligent thyristor control system, we can provide immediate savings for the customer by reducing the cost of expensive, high-maintenance capacitors and freeing up transformer capacity, making the plant more cost-effective," says Andre Roeloffze, Managing Director at Iritron.

Iritron has been appointed to supply the control system using Eurotherm's award winning EPower™ which offers a patented predictive load management control technology with a high-speed CanBUS network. It continually samples data that enables the main drive to distribute furnace zone firing cycles, keeping energy demand as low as possible, while maintaining product quality.

In addition, through advanced diagnostics, the resistance of each element is measured continually for possible local failure, giving maintenance teams pre-emptive warning to correct a specific element phase where necessary and remediate an unbalanced load on the star connection. All communication protocols are supported, including ProfiBus, ProfiNet, DeviceNet and others, for early warning to PLC, DCS and SCADA systems.

The system will include machine learning and artificial intelligence, statistical process control and special cause variation, and smart alarms. It will detect and predict anomalies and indicate trends in operational areas, all focused on optimising overall equipment efficiency and supporting predictive maintenance.

In the mining, minerals and metals cluster, processes using kilns, ovens, glass lehr baths and furnaces for extracting, drying, melting and heat treatment, are big users of electricity.

Roeloffze says, "The energy crisis currently facing many countries around the world makes it increasingly critical to implement energy-efficient systems and processes. Digital transformation can result in improved efficiencies and, in turn, energy savings."

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Iritron will supply the furnace drying control systems incorporating Eurotherm's EPower™ technology.



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Find us on social media: tme.eu tme.com

Versatile rail-mounted terminal blocks

Rail-mounted terminal blocks are isolated components that facilitate the creation of complex electrical systems, primarily those intended for power supply and control. They are used in power connections and distribution boxes, in households, industrial plants and automation systems, machines, and many other wide-ranging applications. Users can choose what they need from the diverse products available. TME offers, among many other products, a series of rail-mounted terminal blocks by Degson. These are set out below in four series, each with its specific range of applications and parameters.

DC series

The DC series of terminal blocks is distinguished by the highest electrical parameters. They can operate at a voltage as high as 1 000 V and current of up to 125 A. In order to ensure connection safety, the blocks feature copper screw terminals adapted for wires with a cross-section of up to 35 mm². The products range in height from 40 mm to 58mm and in width from 5.1 mm to 16 mm. They are designed for mounting on a standard DIN rail (35 mm). All models available at TME are 1-way products. They are supplied in colours typical for single-phase systems (blue, grey, and protective – yellow-green).



PC series

The PC series includes terminal blocks intended for voltage of up to 800 V, with operating current ranging from 24 A to 57 A. All products have a height of 46 mm and a width of 5.2 mm to 10.2 mm. Apart from the colours available in the DC series, the PC series additionally includes models with red bodies. Like most Degson products, these solutions also hold the appropriate certifications: CE, EL and VDE.



DS series

The DS terminal blocks, in contrast to the above models, are equipped with push-in terminals, which are spring

clamped and released by a special pin. This allows for cores to be mounted/connected without using specialist tools. This feature speeds up the work considerably, especially in complex systems, not only power supply systems but also those applied for control or signalling purposes as used in automated production and distribution systems. The connectors offer a slightly lower current capacity (up to 57 A), but still meet the needs of most industrial applications.



WS series

The WS connectors are the most compact of the products presented here, with a width of 5 or 6 mm and a height of up to 36.5 mm. They can operate at a voltage of up to 800 V and current of up to 32 A and are equipped with automatic spring cage clamps intended for cables with a cross-section of up to 4 mm². These products are designed primarily for complex power supply and control systems and their small dimensions make it possible to enclose the wiring in a relatively small space, in a single distribution box, for example.



Accessories

TME also offers a range of Degson accessories that further facilitate the development of electrical systems. Key products here include separating plates, which are used for mutual isolation of terminal blocks placed on the rail. The end plates terminate the line of connectors and, in this way, provide additional protection for electrical engineers and maintenance workers. Screw and comb bridges are also available. These are used to connect consecutive blocks together to create a multi-terminal block linked to one of the conductors of a power supply cable (they are also used for common earth connection).

Transfer Multisort Elektronik – or TME – has its home base in Poland and operates globally, offering an online service to supply electrical and electronics products and components.

For more information visit: <https://www.tme.eu/en/>

Partnership to deliver PLC-based control solutions

Referro Systems, which specialises in the supply and support of industrial electrical and automation software and hardware brands, has announced a new partnership with Advanced Micro Controls, Inc. (AMCI), a leading US-based manufacturer and global supplier of PLC-based control solutions, position sensing and motion control solutions.

Referro Systems provides pre- and post-sales support on some of the world's leading brands, and now extends its industrial reach in the African market with the AMCI product range. This includes advanced, specialised PLC-based control solutions, position sensing and motion control technology.

For more information visit: <https://referro.co.za/>

AMCI's NR60E2
EtherNet /
IP Resolver
Transducer.



Electrical equipment for Kipushi refurbishment, DRC

Ivanhoe Mines is driving the rebirth of the historic Kipushi zinc-copper mine in the Katanga Province of the Democratic Republic of Congo (DRC) and Zest WEG is contracted to supply a range of electrical and energy solutions for the mine's refurbishment. Ivanhoe Mines acquired its 68% interest in the Kipushi project in November 2011; the balance of 32% is held by the DRC's state-owned mining company, Gécamines.

Luveshen Naidoo, Business Development External Sales Engineer for Mining and Industrial at Zest WEG, says the equipment on order includes a 14 MW power plant, motor control centres (MCCs), WEG medium voltage (MV) variable speed drives (VSDs) and a WEG 1 200 kW MV motor for the mine's ball mill. The company is also the preferred supplier of low voltage (LV) motors and will supply these to a range of mechanical original equipment manufacturers (OEMs) servicing the mine. Delivery of the equipment is expected to begin in the third quarter of 2023.

"Our diesel-powered plant, which will provide the mine with backup energy, has been designed to comprise 12 generator sets – each rated at 1 587 kVA and 400 V," says Naidoo. "Assembled at Zest WEG's specialised Cape Town facility, the plant includes MV switchgear, six 3 150 kVA ONAN type 400 V / 6.6 kV step-up transformers, a 40 000-litre fuel tank and an automated fuel system."

He highlights that the design of the plant, split into smaller generating units, ensured engines and alternators were readily available, securing a quicker delivery time. The configuration of the plant in this way also gives the mine greater energy security in the case of maintenance or breakdown. And it has the further advantage that the gensets can be transported to site using conventional trucking, without the need for abnormal load vehicles.

The MCCs are being supplied for use in an established substation on the Kipushi zinc-copper mine, as well as for a containerised substation on the site. To accommodate space constraints, the MCCs are designed for a back-to-back configuration with a compact bucket size, Naidoo says. "This ensures the equipment will fit in the available space and it still meets the client's specification and stringent IEC standards," he says.

For the mine's SAG mill, Zest WEG is providing the WEG W60 MV motor rated at 1 200 kW – a robust unit for the demanding applications and aggressive environments in the mining sector, Naidoo notes. He adds that the reduced motor weight has distinct benefits, including a compact base plate or plinth onto which it is mounted – and lower installation costs. The IP55 rating ensures the motor is well protected against dust and water ingress.

Zest WEG is also supplying the MV VSD to drive the ball mill motor: here, WEG's MVW3000 unit offers a compact design with an integral dry-type transformer.



Zest WEG is supplying a range of electrical and energy solutions to Kipushi zinc-copper mine in the DRC.

Additionally, to facilitate the dissipation of heat, Zest WEG designed a ducting system for this 1 200 kW VSD, which will reduce the need for cooling of the substation.

As the client's preferred brand of LV motors, the WEG W22 motor is being made available to Kipushi's mechanical supply OEMs. One of the key benefits of this WEG IE3 motor is its energy efficiency, Naidoo notes. The preferred brand strategy makes it more cost-effective for the mine to keep the necessary consignments of spares for maintenance and servicing.

In preparing its proposals for the client, Zest WEG worked closely with the engineering consultant, METC Engineering, in the detailed design stage.

First-line support for Zest WEG's equipment will be provided by Panaco, the company's Value Added Reseller (VAR) in the DRC. The Panaco team can conduct site visits and technical investigations and has a substantial in-country stockholding to ensure ready availability of key equipment.

"Our partners at Panaco can generate technical reports to share with Zest WEG to ensure we provide accurate and specialist support when necessary," Naidoo says. "We have an after-sales team who can deliver support and solutions remotely or by travelling to site."

He highlights that Zest WEG's ISO9001 quality management systems underpin the high quality standards in all its products, and the company is audited annually to maintain this compliance.

"We also constantly work at reducing the environmental impact of our production processes, with regard to our usage of natural resources and the generation of waste and emissions," he adds.

For more information contact Zest WEG.

Visit: www.zestweg.com

Power packs for Kamo-Kakula, DRC

Since its initial development more than five years ago, Ivanhoe Mines' Kamo-Kakula Copper Complex in the Democratic Republic of Congo (DRC) has relied on engineered X.e series power packs from SEW-EURODRIVE. With well over 100 units already in operation, SEW-EURODRIVE will be supplying several more units to the mining complex this year to drive conveyors, as well as planetary gearboxes for feeder applications.

The Kamo-Kakula Copper Complex is a joint venture between Ivanhoe Mines and Zijin Mining of China. Willem Strydom, Business Development Representative at SEW-EURODRIVE, says the power packs – which are integrated units comprising gearbox, coupling and motor – will be part of the Phase 3 expansion. Through all phases of the mining complex development, SEW-EURODRIVE has worked closely with Ivanhoe Mines and the engineering, procurement and construction (EPC) contractor.

“As in previous phases, our robust, high quality power packs will provide reliable solutions in on-site applications such as conveyors, agitators, and slurry pumps,” Strydom says. “The size range in the order makes use of our ability to provide a total solution, ranging from 55 kW units to 500 kW units.”

The latest order includes several X.e Series power packs for conveyor applications, planetary gearboxes for feeder applications, and spare gearboxes. The equipment will be delivered in a sequence of shipments this year. Although the mine usually undertakes the installation of the equipment, SEW-EURODRIVE sends technical teams to site to check final alignment and overall installation parameters.

Over recent years, the company has expanded its after-sales service teams, enabling it to support the growing base of its equipment throughout Africa. Its projects and engineering teams have also grown – developing a depth of experience to assist customers from the design phase onwards.

In addition, Strydom notes that SEW-EURODRIVE has developed its infrastructural foundation in South Africa significantly and, going forward, plans to develop physical representation in over 23 other African countries. As the DRC is a priority country for the company, it plans to have a representative office there this year. Field service teams from South Africa are often on site at Kamo-Kakula to assist with servicing of the power packs already in operation there.

“Our local assembly capability at our new facility in Johannesburg – combined with our ability to source from the group's other global operations – has allowed us to meet the tight delivery deadlines for this substantial order of equipment,” Strydom says. “We have the capacity to deliver faster than most players in our field, and this is often an important factor for our market.”

Until recently, SEW-EURODRIVE imported the larger X.e Industrial gearboxes from Germany – and it can now assemble these at its expanded South African facility.



The tropical climate and high levels of sun exposure led to specific features being incorporated into the equipment.

As part of its service for the project, the company will also handle the logistics of getting this large volume of equipment to site. It has provided training on the equipment and its maintenance at its Johannesburg Drive Academy.

Andreas Meid, Head of Engineering at SEW-EURODRIVE, highlights some of the specific requirements for the equipment supplied to the Kamo-Kakula project. He notes that the tropical climate was an important factor in the design. This required the inclusion of certain cooling and paint specifications in the contract. In addition, special breathers were incorporated into the design to address the high humidity levels – and serve to ensure moisture is excluded from the gearboxes. In outdoor applications where sun exposure is high, covers are included to reduce heat build-up. Cooling fans are also optimised in certain cases to ensure optimal performance.

He highlights that Kamo-Kakula is one of many projects in Africa where the installation of monitoring equipment on the power packs has been requested. This facilitates real-time monitoring, using specialised sensors to measure key indicators like vibration and temperature from anywhere in the world.

“It allows the operator to monitor the equipment remotely, receiving early warnings of any issues in performance,” says Meid. “The operator can then respond in good time to prevent serious damage or unplanned downtime.”

As a preferred supplier for the mine, SEW-EURODRIVE delivered the first X.e Series power packs between 2019 and 2021 for the initial development phase. Motors ranging from 7.5 kW to 500 kW as well as planetary gearboxes were supplied for feeder applications, together with several spare gearboxes.

For the Phase 2 expansion of the mining complex, which doubled capacity of the concentrator plant, SEW-EURODRIVE supplied standard X.e Series power packs for the conveyors as well as planetary gearboxes for the feeders.

For more information contact SEW-EURODRIVE South Africa.

Visit: www.sew-eurodrive.co.za

ABB invests in localisation of MV switchgear

ABB's Longmeadow campus in Modderfontein, Johannesburg, spans 43 520 m² with offices, manufacturing, and logistics centres. As part of the company's strategic plan to strengthen local manufacturing, ABB has invested over R10 million to complete additional technology transfer that brings the manufacture of UniGear ZS1 medium voltage switchgear to South Africa.

Previously, the product was fully imported from the Czech Republic, or other countries when needed. As a result of the latest investment, 60% to 70% of the technology will now be locally manufactured and assembled. The company's customers will benefit from greater design flexibility, faster availability, and decreased costs due to reduced import costs and delivery times.

Commenting on this development, Yunus Hoosen, Head of InvestSA, an agency of the Department of Trade, Industry and Competition, said: "The South African switchgear market is expected to grow, driven by increasing investments in sustainable power generation as well as the growing population. This investment by ABB illustrates the importance of the domestic market to multinationals and the strategic location of South Africa to serve a rapidly growing African market."

Hoosen added: "The ABB investment further signifies that South Africa remains an attractive investment destination across all sectors, including the advanced manufacturing sector."

The Distribution Solutions factory within the campus now employs around 120 people, ten of whom have been newly employed due to this investment. ABB plans to increase these numbers, employing more permanent engineers, contractors, and graduates – through its graduate programme, for example, in which over 70 graduates are currently participating. In this way, ABB South Africa is playing its part in creating jobs in the country.

The company has also started the process of increasing the localisation of its Compact Secondary Substations (CSS), due to be completed by October 2023.

For more information visit: www.abb.com



Wiring the switchgear is typically the most time-consuming aspect of production.
(Photo: Electricity + Control)

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ACTOM MV Switchgear has introduced its new SBV4XE switchgear to the market.

Advanced switchgear for enhanced performance

MV Switchgear, a division of ACTOM (Pty) Ltd and provider of innovative electrical solutions, recently launched its SBV4XE switchgear. Developed as a successor to the SBV4 and SBV4E models, the

SBV4XE represents a significant advance in switchgear technology, incorporating a range of features to deliver superior performance, functionality, and cost savings.

Since the early 1990s, the SBV4 and later SBV4E withdrawable pattern switchgear ranges have been widely used in southern Africa, appreciated for their low profile, compactness, robustness, and adaptability, which make them ideal for applications with limited space. Building on these features, MV Switchgear began developing the SBV4XE in mid-2017, to enhance the switchgear's capabilities.

Rhett Kelly, MV Switchgear's Design & Development Manager, said: "In developing the SBV4XE, we sought to retain the outstanding features of our previous models and to introduce a host of significant improvements. Drawing on our extensive experience in switchgear manufacturing – over 50 years – we have reimagined the SBV4E product, to incorporate advanced technologies

and cost-effective solutions."

With these new features the SBV4XE sets a new standard for switchgear performance and efficiency.

New features include: enhanced mechanisms, improved energy efficiency, reduced maintenance needs, cost-competitive assembly, emissions reduction, streamlined manufacturing, lighter weight and durability, improved circuit breaker carriage, enhanced gears, user-friendly design, and advanced current transformers.

Donovan Stevens, CEO of the ACTOM Switchgear Division said, "The SBV4XE represents a significant leap forward in switchgear technology. Its innovative features and cost-saving enhancements offer customers unparalleled value, reliability, and ease of use."

Mervyn Naidoo, Group CEO of ACTOM, added, "At ACTOM, we are committed to delivering cutting-edge electrical solutions that address the evolving needs of our customers. The SBV4XE is a testament to our dedication to innovation and excellence, and we are confident it will set a new benchmark in the industry. "

For more information contact ACTOM MV Switchgear

Tel: +27 (0)11 820 5111

Visit: <https://www.actomswitchgear.co.za/>

New coil production machines for coilshop upgrade

To advance its already strong standing in the marketplace as a repairer and refurbisher of large and medium-sized rotating electrical machines, Marthinussen & Coutts (M&C) has acquired four new state-of-the-art coil production machines for its Johannesburg coilshop.

The new machines, purchased from a manufacturer in Europe, are: an automated CNC coil spreader machine, an automated looping machine, a CNC hydraulic coil heat press, and an automated high-speed taping machine.

"The automated CNC coil spreader machine represents a major advance on the manually operated hydraulic spreader machines we've been using up to now," says Shawn Teixeira, M&C's Coilshop Manager.

"It is a game-changer for us in terms of serving the market more effectively. With this new machine, the speed of production and the product quality are hugely improved. The production rate is much faster and because the process is fully automated, the product is now consistently of the highest possible quality, reliability and uniformity," he adds.

The nine-tonne eight-metre-long new machine, which M&C started operating at its

Cleveland, Johannesburg, workshop in March this year, can form coils at the rate of one a minute. "This is almost 30 times faster than the rate at which we can form a coil with one of our six old labour-intensive machines. Production on the old machines is also subject to human error and therefore more prone to inconsistency in quality," says Teixeira.

The new machine, one of only a few fully automated coil spreaders in operation in South Africa, has been specially modified by the manufacturers to protect it from the potentially damaging effects of local loadshedding conditions.

"In addition to protecting the machine from sudden loss of power supply when loadshedding occurs, this modification ensures that the spread sequence as it was at the time of the power interruption is retained in the memory, so when the power is restored, the machine can carry on operating from where it left off," Teixeira says.

Like the new coil spreader machine, the other three newly acquired machines are faster and more efficient than their respective predecessors. They include specific features that present key benefits.

"All the advantages improve quality and efficiencies in the production of the coils, ensuring faster turnaround times for customers' machines," Teixeira says.

For more information contact M&C.

Visit: www.mandc.co.za

Coilshop Manager, Shawn Teixeira (left) and Operator, Mbukeleni Musibuko, with the new automated CNC coil spreader machine.

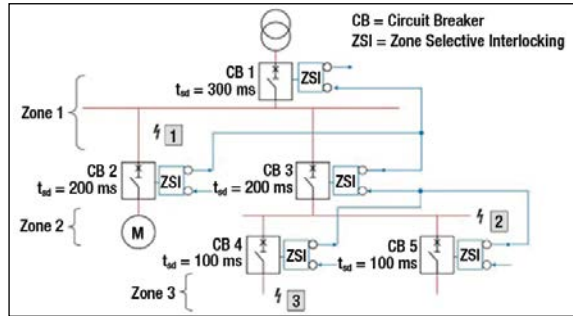


No unnecessary downtime with ZSI

When a fault occurs in a power distribution system, time is of the essence. Circuit breakers must react quickly and accurately if they are to limit service interruption, prevent equipment damage, and safeguard people. Zone Selectivity Interlocking (ZSI) goes beyond time selectivity and current selectivity to ensure faults are isolated instantaneously, where they occur. So, the rest of the system – and the business – keeps running. ZSI is a key feature of Eaton's NZM line of digital circuit breakers.

Zone Selectivity Interlocking serves to speed up tripping for some faults without sacrificing the coordination of the system or interjecting nuisance trips. Zone interlocking devices can communicate across distribution zones to determine whether or not a device sees a fault condition. The ZSI function is optional on PXR 25 electronic trip units and can be enabled or disabled through the menu system or Eaton's Power Xpert Protection Manager software.

When ZSI is enabled, a fault within the zone of protection will immediately trip the breaker and send a signal to upstream trip units to restrain them from tripping immediately. The restraining signal causes the upstream circuit breakers to follow their expected set coordination time delays, so the service is interrupted to the isolated fault area only and the fault is cleared in the shortest time possible.



The drawing shows the principle of zone selective interlocking with three zones.

The advantage of the zone selectivity feature, compared to standard time-delayed selectivity, is the significantly reduced delay time before tripping. This reduces the thermal and dynamic load, also protecting the system. For additional safety of maintenance staff, Eaton recommends combining ZSI with maintenance mode ARMS™ (Arcflash reduction maintenance system™) to further reduce the amount of energy released.

In cases of a signal wire damage the standard time-delayed selectivity function ensures the selectivity of the system.

For more information contact Eaton SA.
Visit: www.eaton.com/za/en-gb

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Ready-made cables for drive applications

Global manufacturer of motion plastics, igus, is leading the way in cabling for drive applications with the introduction of a full range of ready-to-use cabling solutions to fit all commonly used drive systems.

igus Sales Executive, Edwin van Niekerk, says the company aims to speed up cable installation by providing the right fit for specific systems, eliminating excessive cable lengths, and reducing the risks of damage or tangling. Understanding that each application is unique, igus has the flexibility to supply cables in custom lengths, providing technical teams and installers with cables that enable precision Integration.

igus ready cables are designed to work seamlessly with a range of drive systems from different manufacturers, making them a versatile solution. "Whether the customer relies on Allen Bradley/Rockwell, Harting, Baumüller, Beckhoff, Fanuc, SEW or any other leading brands, igus has them covered," says van Niekerk.

The company has a catalogue of about 4 600 harnessed motor, servo, signal and encoder cables, which ensures customers can find the right cable for a specific application. "What's more," van Niekerk says, "igus continues to expand its offerings, introducing new cables regularly.

"In terms of cost, it provides a balance between cost-effectiveness and uncompromising quality, with a choice of seven cable qualities so users can select the most suitable option to meet their performance needs and budget.

"Cabling systems are assembled with advanced machines for connectors and

cable harnessing, ensuring precise and reliable connections every time. Each cable also undergoes crimp force and crimp depth monitoring during the harnessing process, which guarantees consistent quality and minimises the risk of faulty connections," van Niekerk adds.

He says the cables are made at any one of the company's 14 production sites worldwide, all of which adhere to standardised processes, ensuring consistent quality across all igus products. This global approach enables igus to meet the demands of customers around the world, efficiently.

Before cables leave the igus test lab, every cable undergoes 100% function testing. The tests involve digital and logic testing to verify the performance and reliability of each cable. Additionally, each cable is sealed, assuring customers of its quality.

Van Niekerk also highlights that the company does not impose a minimum order quantity. Whether a customer needs a single cable or a bulk order, igus allows customers to source the quantity they need. This flexibility eliminates unnecessary costs and inventory concerns.

In South Africa, igus' Midrand-based operation ensures fast delivery for customers. This helps customers reduce downtime and keep projects on schedule.

In addition to its ready cables, igus provides a comprehensive range of energy chains (E-chains), connectors and other products; it offers customers a single source for cables, protection devices and related components.

For more information contact igus South Africa.

Tel: +27 (0)11 312 1848

Email: ihewat@igus.net

Visit: www.igus.co.za

igus ready cables are designed to work with a range of drive systems from different well-known manufacturers.



Minimising harmonics in small loads

Power quality specialist, CP Automation, has expanded its range of active harmonic filtering technologies to include the REVCON Low Harmonic Supply (LHS) Active filter. Unlike many existing units, the new filter is specifically designed for small variable speed drives (VSDs) and is pre-configured to obviate the need for extra programming during setup. It is also highly efficient and compact, providing for plant operators to maintain power quality while making the most of the space available in their facilities.

The new REVCON LHS-Active filter is specifically designed for small applications and can support VSDs of up to 5.5 kW. It is equipped with pre-set internal software, so the current transformers (CTs) and load are already built into the unit. Following installation, the operator needs only to input a power connection and take the output. As well as this, it sits in series without the load, so there is no need for extra wiring, cabling and programming, which

would normally be required in most filtering systems.

With installation in series, operators can set up multiple units across a site and distribute the harmonic reduction capability, rather than relying on one large filter. The filter's compact build means it takes up minimal floor space.

"The new LHS-Active filter is groundbreaking in that it tackles harmonics in loads far smaller than any existing solution," says John Mitchell, Global Sales & Marketing Director at CP Automation. "The new filter is also 99% efficient and its power losses are extremely low at around 120 W, helping businesses keep energy costs under control without compromising on power quality."

While many mitigation technologies use insulated-gate bipolar transistors (IGBT), the REVCON LHS-Active uses a silicon carbide (SiC) power metal-oxide-semiconductor field-effect transistor (MOSFET) with Schottky diodes. This improves the filter's low-loss capabilities and enables a switching frequency of 50 kHz, reducing total harmonic distortion (THD) from 35% to below 5%.

For more information visit: www.cpaltd.net

The REVCON Low Harmonic Supply (LHS) Active filter is designed specifically for small variable speed drives.



New circuit breakers lead next generation electrical distribution

Siemens has launched two new additional versions of its Sentron 3WA Power Circuit Breakers, alternatively known as air circuit breakers (ACBs). Series 3WA3 meets the requirements of UL 1066 and IEC 60947-2 standards, which means customers can use it worldwide. This is particularly advantageous for switchgear manufacturers and OEMs producing systems for both standardisation areas – IEC and UL. The 3WA2 Series is designed exclusively for the UL 489 market.

The two new ACB series complement the 3WA1 version for IEC markets, which was launched in 2020. Siemens offers a full range of ACBs which are based on a consistent system and offer great flexibility for applications around the globe. The Sentron 3WA Power Circuit Breakers are part of the Siemens Xcelerator portfolio. Siemens Xcelerator is an open digital business platform that enables customers to accelerate their digital transformation more easily, more quickly, and at scale.

As a core element of low voltage switchboards, ACBs protect electrical installations in buildings, infrastructure and industrial facilities from damage caused by short circuits, ground faults or overload faults. This is essential also for critical infrastructure, such as hospitals or data centres.

The Sentron 3WA circuit breaker follows the Siemens tradition of high reliability ACBs that are built to perform over the lifetime of a facility. The circuit breakers also support software-based planning and engineering, digital testing and monitoring, and allow for seamless integration in automation and IoT systems. Upgrades can be completed digitally: users can simply download new features from the Internet and add them using an app.

Andreas Matthé, CEO of Electrical Products at Siemens Smart Infrastructure said: "Our highly flexible ACB series addresses the needs of switchgear manufacturers and panel builders in an environment characterised by increasing complexity, digitalisation, and cost pressures."

When technological requirements change, it is easy to add new features to the electronic trip unit (ETU600) installed in the Sentron 3WA air circuit breakers using the Sentron 'powerconfig' commissioning software and a USB or communication port. The features are available online and are expanded continually by Siemens. Users benefit from high investment protection. For applications without a need for measuring functions or scaling options, the Sentron 3WA ACBs can now also be configured with an ETU300 for easy standard protection.

The Sentron 3WA ACB trip units include other additional standard features, such as the integrated arc energy reduction feature (Dynamic Arc Flash Sentry, DAS+), which ensures the ACBs trip more quickly in the event of a fault during work being carried out in the immediate vicinity of live parts. In this way, the arc energy, and thus the energy released in the power distribution equipment room, is reduced. This technology complies with the National Electric Code (NEC) for the US market; it is designed to protect service technicians from serious injury resulting from arc flash hazards.

The Sentron 3WA ACB UL Series 3WA2 and 3WA3 are available in three frame sizes with rated current ranges from 800 to 5 000 A.

For more information visit: www.siemens.com



In the Sentron 3WA family of ACBs, 3WA1 (IEC), 3WA2 (UL489), and 3WA3 (UL1066+IEC) offer worldwide compatibility.

An integrated ac drives solution

OMRON, a global leader in industrial automation, recently launched its M1 Integrated Global AC Drives Solution. This new technology offers machine designers advanced flexibility, greater efficiency, and space-saving advantages.

Introducing a new level in motor control for manufacturers, the Omron M1 includes a range of new features in machine drives technology. It expands motor options, supporting standard induction motors, permanent magnet motors (PM), direct drive PM motors (up to 128 poles), and special motors like drum motors. Autotuning in OMRON's Sysmac Studio enables effortless adjustment of the motor parameters. In addition, the M1 boasts 200% torque even at 0 Hz.

The M1 solution includes a number of key benefits.

Built-in support for Modbus and EtherCAT communication protocols enables seamless connectivity and interoperability with a wide range of industrial automation systems. Flexible configuration options for EtherCAT, with support for ring topologies, provide for

seamless integration and efficient data transmission. Sysmac Studio Integrated Development Environment (IDE) offers an intuitive, user-friendly software tool for easy configuration, monitoring, and management of the system. Versatile motor control capabilities include speed control, torque control, precise position control, and a master-follower function. The M1 solution supports ac induction and permanent magnet synchronous motors in both Open Loop Vector (OLV) and Closed Loop Vector (CLV) modes, providing for efficient operation across a wide range of motor applications. A built-in encoder and pulse counter input with high-speed position capture through digital input provide for accurate motion control.

The solution incorporates Safe Stop functionality, featuring Safe Torque Off (STO) capability compliant with Safety Integrity Level 3 (SIL3) Performance Level e (PLe). It offers both wired and Fail-Safe over EtherCAT (FSoE) safety options.

For more information visit: www.industrial.omron.co.za

A duo of ceramic and metallic measuring cells

Claudia Homburg, VEGA Grieshaber KG

Meeting the highest safety standards in all process steps is a critical requirement in the chemical industry. For BASF, at its production site in Kaisten, Switzerland, there is a small but important building block in its highly efficient safety management procedures. It's in the form of a guarantee that all processes are completely free of silicone oil.

This is why traditional differential pressure transmitters can reach their limits when monitoring the levels during the production of additives for paints and plastics. They work by means of capillary lines filled with silicone oil, which – in the unlikely event of an accident – could come into contact with the medium. In contrast, VEGA's electronic differential pressure measuring systems provide the safety required – with the innovative combination of ceramic and metallic measuring cells.

Plastics have been produced on an industrial scale for over 100 years. But anyone who spent their childhood in the 1970s or 80s knows that the plastics of yesteryear have little in common with today's special plastics. The plastic toy figures quickly turned yellow and some of the Lego bricks became brittle. Plastics age due to thermo-oxidative degradation, that is, under the influence of heat and oxygen. That plastics today can be colourfast and elastic, crystal clear, high gloss, abrasion-resistant or even heat-resistant, is due to a variety of specialist additives.

The eye in the storm

The vapour pressure of liquids plays a decisive role in the production of such additives. Precise measurement is key: it contributes to BASF's highly efficient control of special processes and provides additional information on how process components can be optimised and plant availability



In this BASF application, the combination of ceramic and metallic measuring cells meets the different challenges in the upper and lower reactor areas.

increased. The more precise the values, the clearer the processes and the higher the potential for optimisation. In the production environment, conditions are extreme; there are aggressive substances and acids, which can adhere to vessel walls forming deposits, as well as high vacuum and steam levels. Through all this, the reliable measuring results of VEGA pressure transmitters are essential.

Silicone oil-free measurement

Although previously conventional differential pressure transmitters were used for level measurement, the measurement and control engineers in BASF's team at Kaisten decided to replace the instrumentation. They switched the process control over to electronic differential pressure, which is silicone oil-free, without capillary lines and therefore without mechanical pressure diaphragms. Due in no small part to the ceramic measuring cell, this system is ideal for vacuum applications and high temperatures. "The decision to switch to electronic differential pressure on the basis of ceramic CERTEC® measuring cells was obvious, in view of their reliability in withstanding abrasive substances. Our plant is completely automated and operates 24 hours a day, 7 days a week," says Markus Stoll, BASF's Head of Specialist Workshops EMSR, who, together with his team, is responsible for ensuring the highest possible plant availability.

Strong demand for additives

BASF is one of the leading manufacturers of plastic additives, with production sites around the globe. At the Kaisten site in Switzerland, some 260 employees are involved in



Electronic differential pressure measurement with VEGABAR is silicone oil-free, without capillary lines and requires less installation effort.

the production of these large-volume substances which then find their way into plastics and lubricating oils.

Under precisely defined pressure conditions, the raw materials are converted into additives in several chemical reaction steps. A fully automatic process control system continuously records each measured value and ensures the exact dosing, as well as the highly efficient operation of the plant. Reliability is crucial because the end product is an essential intermediate for BASF. Downtime in this section has far-reaching consequences. Stoll notes: "Even the smallest failure interrupts a complex process. In practical terms, this means weekend work and overtime for us." Complex readjustments and meticulous analysis would then become necessary.

No experiments, please

Measurement and control engineers standardly work according to the principle: 'Never change a running system'. For processes to run smoothly, all production parameters must be coordinated precisely. It was only with the introduction of the new, oil-free pressure measurement technology that some specific features became apparent at BASF during the course of the changeover.

Distillation, including that of a reaction mixture under vacuum, is based on different boiling points of the liquids involved and their different vapour pressures. The required separation effect depends on the composition of the liquids and the steam. For each differential pressure measurement, the pressure transmitters are precisely matched to the media to be monitored. In addition, special separating diaphragms are installed between the measuring cells and the process to protect the cells from high temperatures or moisture.

One system for two extremes

The robust ceramic CERTEC® measuring cell in the BASF vacuum reactor suits the perfectly flush application in hot, aggressive solvents in the lower reactor section. In the upper reactor area, however, completely different conditions prevail: here, the extreme steam caused condensation in the measuring cell and led to inaccuracies. Initially, the obvious solution was to use the differential pressure system based on metallic METEC® measuring cells instead of ceramic measuring cells. Condensate and humidity no longer had any negative influence.

"The upper measured value remained acceptable and highly accurate in all situations," says Stoll. However, the high temperature of the solvent in the lower reactor area repeatedly caused measured value drifts.

The ideal duo for heat and condensate

It took expertise, a willingness to experiment and above all, hand-in-hand work between the team at BASF's Measuring and Control Technology department and Jürgen Feser, the Key Account Manager at VEGA, to get everything running smoothly. The surprising solution was to use an innovative electronic differential pressure measurement system – with a combination of a ceramic and a metallic measuring cell. Both pressure transmitters record their respective values separately and calculate the differential in the master sensor. This is made possible by structurally identical instrument electronics behind



Plastic additives, including many customer-specific mixtures, are produced at BASF's Kaisten site, east of Basel in Switzerland.

the two very different measuring cells. They work smoothly, even in a mixed team.

"For this application, this combination is a real 'dream team'," says Feser. "As far as I know, only VEGA offers this combination capability." The result is 'one' solution for two challenges: the ceramic measuring cell easily handles the high temperatures and aggressive substances in the lower reactor area (HP side) and in the upper reactor area, or LP side, the metallic measuring cell performs as required in the presence of condensation.

Why is silicone oil-free important?

In the 1970s, all major car companies declared their painting lines "silicone oil-free zones". This was because time and again, mysterious paint defects occurred in the vehicle painting process. Finally, the unlikely cause was determined to be the hairspray used by some employees! Nowadays, it is probable that considerably less hairspray is being used than was the case in that decade. However, since then, the regulations for silicone oil-free production have become a standard requirement in many industrial production areas. They cover mechanical equipment, components such as pipes, pumps, valves or hoses and suppliers are required to provide guarantees and documentation of their silicone oil-free production. BASF prohibits silicones in many production processes and areas at the Kaisten site.

Conclusion

Even the most ingenious manufacturing process for additives is only as good as the equipment of the production plant. In the case of BASF's distillation reactors at Kaisten, the sensors of pressure transmitters get the job done, even in the most inhospitable conditions: in the lower part of the vessel under the high temperatures of the aggressive, adhesive liquid and, at the same time, in the upper part of the vessel, with steam and heavy condensation. The solution for the differing process conditions in a single vessel turned out to be a simple variant of electronic differential pressure measurement from VEGA: the combination of a ceramic CERTEC® and a metallic METEC® measuring cell. □

For more information visit: www.vega.com



PicoTech's compact PicoScope 6000E Series mixed-signal oscilloscopes can fit on any test workbench easily.

1 GHz mixed-signal scope with active probes

Pico Technology, represented locally by Comtest, has announced a further development in its PicoScope 6000E Series mixed-signal oscilloscopes (MSOs) with the launch of four new 4-channel models, each of which can be configured with 16 optional digital channels. With bandwidths of 750 MHz or 1 GHz, 8-bit or 8/10/12-bit flexible

resolution and up to 4 GS deep capture memory, the MSOs enhance the existing PicoScope 6000E portfolio, adding to the 350 MHz and 500 MHz models which were introduced in 2020.

The award-winning PicoScope 6000E Series compact oscilloscopes deliver a cost-effective test and debugging solution for engineers, developers and scientists working on high-performance digital and mixed-signal designs.

The optional A3000 Series high-impedance active probes are designed for use with the PicoScope 6000E intelligent probe interface. The interface provides power to the probe and enables the oscilloscope to sense when an A3000 probe is connected, automatically switching the oscilloscope input impedance to 50 Ω and setting the correct attenuation and scaling.

With an input capacitance of just 0.9 pF in parallel with 1 M Ω resistance, the probes deliver the full 750 MHz or 1 GHz scope bandwidth to the probe tip.

"The extension of the 6000E Series addresses high-performance debugging and design verification

requirements faced by engineers developing advanced electronic systems. The PicoScope 6000E Series, coupled with the popular and proven PicoScope 6 application software, provides advanced debugging tools to accelerate the development of high-end embedded systems, signal processing, power electronics, motor drives, and automotive designs," said Trevor Smith, Business Development Manager at Pico Technology. "The new series includes a number of unique features as standard, such as a four Giga sample capture buffer, 21 serial protocol decoder/analysers, spectrum analysis capability, a 50 MHz arbitrary waveform generator, and user-defined maths and alarm functions for in-depth analysis and long-term unattended testing. With starting prices for 1 GHz bandwidth, the products are affordable, fully capable waveform analysis solutions supported by Pico's world class technical experts."

Dimensions of 245 x 192 x 62 mm mean the PicoScope 6000E Series oscilloscopes can fit on any workbench easily, whether in a laboratory or a home office. The PC-based instruments are ideal for engineers who need professional-grade test equipment.

A free-of-charge software development kit, PicoSDK, is available to download, enabling users to write their applications around the PicoScope 6000E hardware.

For more information contact Comtest.

Tel: +27 (0)10 595 1821

Email: sales@comtest.co.za

Visit: www.comtest.co.za

Dynamic inclinometers with switching output

Turck Banner's inclinometers with a combined micro electro-mechanical system (MEMS) and gyroscope signal for moving applications are now also available with a switching output, well suited for use in the automotive industry, machine building, logistics and mobile equipment.

The QR20 inclinometer generates its signal from the combination of two measuring principles: a gyroscope signal and a MEMS acceleration measurement. In this way, the sensor combines the benefits of both measuring principles. The QR20 can mask out shocks and vibration more effectively than conventional signal filters. The B1NF and B2NF single and two-axis inclinometers thus provide a previously unknown degree of dynamic measurement for moving or vibrating machines.

The new QR20 variants switch when a threshold value or switching window is reached. Two switching windows can be set and used in NO or NC operation. The QR20 with switching outputs is particularly suitable for applications in which a simple switching signal in a PNP or NPN logic circuit is suf-

ficient to indicate that a specific inclination angle has been reached and where a measuring inclination angle sensor would exceed requirements.

LED spirit level simplifies commissioning

The 'spirit level function' simplifies device installation. The flashing of an LED is used here to indicate the horizontal position of the sensor. This enables error-free and reliable installation of the sensor without any accessories. The use of translucent plastic for the LEDs eliminates potential weak points in the housing arising from LED lenses.

The devices can also be used for positioning and lifting applications. Turck Banner is adding four more devices to the existing portfolio of the four IO-Link inclinometers: the B1N single-axis and B2N two-axis inclinometers for static applications and the B1NF and B2NF for dynamic applications.

For more information contact Turck Banner.

Tel: +27 (0)11 453 2468

Email: sales@turckbanner.co.za

Visit: www.turckbanner.co.za

Range, zero point and window function can be adjusted to the user's needs, via IO-Link or teach pin, depending on the device.



Interference-resistant pressure transmitters

Instrotech, the local representative for Keller, has available in the recently approved 21Y Series, a pressure transmitter for temperature compensation and protection from electromagnetic fields. With measuring ranges between 2 bar and 1 000 bar, the 21Y Series transmitters can be used at temperatures ranging from -20°C to +100°C in industrial applications, even in immediate proximity to frequency converters.

Particular attention has been given to providing low-cost calibration that guarantees a maximum Total Error Band of $\pm 1.5\%$ FS over the standard temperature range of -10°C to +80°C.

Extensive data collection, such as that required by polynomial correction schemes, is replaced by a more straightforward, cost-effective method. The temperature range is divided into as many as 120 subdivisions, of 1.5 Kelvin each, by an integrated temperature sensor and an additional digital circuit. The compensation values for TK zero point and TK amplification for each of these subdivisions are calculated individually following a mathematical model and stored in the transmitter. These values are fed into the analogue signal path during operation, depending on the temperature, without reducing the 2 kHz bandwidth.

Keller 21Y Series transmitters are highly resistant to electromagnetic fields. The verified values for conduct-

ed and radiated fields are significantly below the limits of the CE standard. The transmitters are also immune to external voltages between the housing and the electrical connection of up to 300 V.

The scope of the vertical range of manufacture, the modular design, and the programmable electronics mean that large-scale customer-specific batches can be easily accommodated. Keller manufactures and stocks large quantities of pressure transducer measuring cells. They are welded into the transmitter head with the required pressure connection, equipped with electronics, and individually calibrated over the temperature and pressure ranges in large, purpose-built test systems.

2-wire (4 to 20 mA) and 3-wire (Vdc) output signal versions are available, and an extensive selection of pressure and electrical connections can be supplied as standard.

For more information contact Instrotech.

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Smart in sensing





60 kV surge tester, one of the largest in southern Africa

Wilec, a leading supplier of motor and transformer input materials in Africa, recently announced the sale of a 60 kV surge tester to a major supplier of rotating electrical machines. Manufactured by Risatti

Instruments, a prominent Italian company represented exclusively by Wilec in Africa, the surge tester marks a powerful advance for the region's electrical equipment industry, especially in ensuring a reliable end-product.

As the demand for equipment reliability continues to rise, the 60 kV surge tester stands as one of the largest and most advanced in southern Africa, enabling the end user to conduct high-voltage tests with accuracy and precision.

Paul Senior, Business Development Executive at Wilec said, "This sale advances the capability of electrical equipment testing throughout Africa. Equipping this customer with a 60 kV surge tester will provide the company with the critical competitive edge it needs, enhancing the accuracy and efficiency of its testing processes."

Stefano Risatti, Technical Sales Manager at Risatti Instruments, commented, "We are proud to have this groundbreaking 60 kV surge tester chosen by a major supplier of electrical equipment in Africa. This milestone sale reaffirms our leadership in manufacturing cutting-edge testing equipment and speaks volumes about the trust our customers place in our products."

With the introduction of this state-of-the-art surge tester and its capacity for testing high-voltage electrical equipment, suppliers in the industry can be confident of delivering safe and reliable rotating equipment to end users in southern Africa and around the world.

The 60 kV surge tester heralds a new era of technological advances in the region, driving progress and raising industry standards. Wilec and Risatti Instruments remain committed to fostering the growth of Africa's electrical equipment sector, providing innovative solutions that enhance reliability, efficiency, and safety.

For more information contact Wilec.

Visit www.wilec.co.za

The new 60 kV surge tester marks a new era in testing of high-voltage electrical equipment, raising industry standards to support safety and reliability.



In-line process transmitter for sterile processes

Lower energy consumption, less cleaning effort and more safety: the new model DMSU22SA in-line process transmitter from Wika helps to optimise sterile processes in the pharmaceutical and food industries. The instrument communicates via HART® protocol and is 3-A- and EHEDG-approved.

The core of the transmitter is an elliptical tube sensor with a Wheatstone measuring bridge. Its hygienic design features good flow behaviour – when compared to a hygienic case, for example. The DMSU22SA thus enables time- and cost-saving CIP and SIP processes. It also means operators need to use less energy to maintain process pressure.

Depending on the requirements of the application, the tube sensor is made of at least 0.45 mm-thick stainless steel and is therefore many times more resistant to process impacts than conventional in-line solutions. Should damage nevertheless occur, the user is informed, as that happens, via the alarm function. Active temperature compensation is also integrated into the transmitter, which makes process control more precise.

For more information contact WIKA Instruments.

Tel: +27 (0)11 621 0000

Email: sales.za@wika.com

Visit: www.wika.co.za

The new DMSU22SA in-line process transmitter is made of stainless steel.

Manufacturing valves and more: an inside view

The GEMÜ Group develops and manufactures valves, measurement and control systems for liquids, vapours and gases. It is a global market leader in providing solutions for sterile applications. In its recently introduced virtual factory tour, it offers behind-the-scenes insights into its operations, providing those interested the opportunity to explore its advanced production plants, assembly areas and fully automated logistics handling.

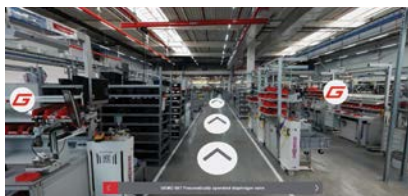
Participants in the virtual factory tour can follow the journey of a GEMÜ valve from the incoming goods department to quality assurance and assembly, to the final dis-

patch process. Along with a personal guide, anyone interested can take part in a virtual 3D tour, share thoughts, ask questions and gain insights – almost as if they were visiting the GEMÜ facilities in person.

The focus and scope of the tour can be decided according to individual preferences. The visit could include, among other locations, stainless steel manufacturing at the headquarters in Ingelfingen-Criesbach, assembly in the GEMÜ Production and Logistics Centre and clean-room manufacturing in Emmen, Switzerland. The Virtual Factory Tour is being expanded gradually to include other GEMÜ sites as well.

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

In its virtual factory tour GEMÜ offers those interested the chance to visit its advanced production plants virtually.





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Dwibin Thomas,
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SCADA system helps manage municipal electricity distribution

Drakenstein Municipality is working with global energy management leader, Schneider Electric and system integrator Altek, to upgrade its 25-year-old SCADA (supervisory control and data acquisition) system to ETAP, a model-driven electrical SCADA software solution.

The Drakenstein Municipality is located in the Cape Winelands District in the Western Cape. It awarded the upgrade project to Schneider Electric and implementation partner, Altek, following a rigorous tender process.

The ETAP SCADA solution meets the requirements of the municipality, which is aiming to improve fault finding, predictive and preventive maintenance on equipment, and overall customer service delivery significantly. The system also needed to integrate with the Drakenstein Municipality's existing infrastructure and the GIS (geographic information system) mapping solution.

System-ready

Before starting on the implementation of the ETAP SCADA solution, Drakenstein Municipality completed an eight-year communication network upgrade, which now sees all its substations communicating through a wireless ethernet or a fibre backbone. The previous SCADA system allowed only for radio frequency (RF) communication.

"We couldn't embark on a SCADA upgrade before implementing a new communication backbone," says Herman Rossouw, Senior Engineering Technician at Drakenstein Municipality. "Now, with our communication network fully operational, we have started deploying the new SCADA system. As a municipality, we will be well ahead of our peers – and as ETAP's software continues to evolve it will readily meet our ongoing system needs."

Feature-rich

Dwibin Thomas, Cluster Automation Leader at Schneider Electric, notes, "The ETAP SCADA offering is software-neutral, which allows it to overcome integration and interoperability issues, thus saving on costly equipment upgrades and project delays.

"The system offers a range of features, such as live insight into switching operations, which provides us with valuable information on current loads and what you can and cannot move or implement on the system in order to safeguard equipment," says Leon Laing, Manager: Planning and Customer Services (Electro-Technical Services Department) at Drakenstein Municipality.

"Also, as it integrates with the GIS, the ETAP system will be able to pinpoint accurately which customers are being affected by power failure and that will allow us to cut down on fault finding and turnaround times significantly. The ETAP solution will also make use of Drakenstein Municipality's communication backbone to provide remote access to operators, again improving on system monitoring. Moreover, it will provide preventive maintenance schedules, which will mitigate potential equipment failure and costly repairs."

Rossouw also highlights the ETAP system's digital twin technology: "This will enable us to simulate maintenance processes. The solution uses historical and current data to simulate maintenance and upgrades to the system. This means that when we perform maintenance, we can prevent unnecessary and unplanned system tripping."

The Drakenstein Municipality ETAP SCADA project is scheduled for completion by 2025. "When the project is complete, we hope to benefit from a sophisticated SCADA system that will deliver a sound return on investment, as well as enabling us to react more quickly to outages and failures, reducing fault finding times and improving the customers' experience," says Laing. □



ETAP is an energy management software platform to design, operate, and automate power systems.

For more information visit: www.se.com

Innovative solutions for grid resilience

Together with clients, partners, governments and other key stakeholders, Hitachi Energy is pioneering new technologies to enable the digital transformation required to accelerate the energy transition – moving towards a carbon-neutral future.

“As a global technology leader in its field, Hitachi Energy provides utilities, industry and infrastructure sectors with innovative solutions and services across the value chain,” says Malvin Naicker, company MD for Sub-Saharan Africa.

“South Africa is seeing significant transformation in its energy system,” he says. “It encompasses generation, transmission, distribution, storage, monitoring and control. As renewables, over time, replace fossil fuels, power grids need to remain resilient and become more flexible to adapt to fast-changing demands.

“This places the spotlight on new technologies in the energy sector,” says Naicker. “The focus on renewable energy and microgrid solutions with battery energy storage systems (BESS) can contribute to stable and sustainable power, harnessing solar and wind energy for a clean-energy future.”

He says although coal continues to play a dominant role in South Africa’s power mix, the country can leverage the opportunity of harnessing renewable energy and distributed energy resources. Here, Asset Performance Management (APM) is important, to monitor the health of assets continuously, predict potential failures and prioritise maintenance accordingly.

He says Hitachi Energy’s Lumada APM enables more effective maintenance management and supports improved productivity in the technical teams carrying out the work.

He also highlights Hitachi Energy’s e-mesh™ digital ecosystem, which provides software management for distributed generation at local and fleet levels, with built-in predictive maintenance for performance management. The e-mesh portfolio offers end-to-end distributed energy solutions, combining advanced analytics, software and hardware systems.

PowerStore™ BESS enables a high penetration of renewables, supporting increased grid stability and reliable power provision as well as reduced CO₂ emissions.



Hitachi Energy is a technology and solutions provider – meeting the needs of the changing energy system.

The company’s BESS solutions focus on grid support functions and are designed to work with third-party batteries. Currently, the technologies deployed in high-energy projects include Lithium iron phosphate (LFP) and Li-ion chemistries. Other battery chemistries may be considered in future.

Another new technology from Hitachi Energy is Network Manager, an integrated network operations platform that includes advanced distribution management system (ADMS) capabilities to extend grid control and optimisation. It provides functionality for the safe and efficient operation of sub-transmission, medium- and low-voltage distribution networks.

“Hitachi Energy is a technology and solutions provider,” Naicker emphasises. Its award-winning energy trading & risk management (ETRM) solutions are well regarded in the industry and this is supported by its proven record in this field.

The company assists organisations to meet sustainability targets, minimise market risk, maximise profitability and comply with changing industry regulations and standards, Naicker says. Its ETRM solutions support the ‘three Ds of energy’: Decarbonisation, Digitalisation and Decentralisation.

“These are driving the energy transition and the commodities that enable renewable energy technologies. Serving producers, utilities and trading companies around the globe, Hitachi Energy’s ETRM solutions are purpose-built software systems designed to automate complex tasks that support the trade cycle from the front to the back office,” he says.

**For more information contact Hitachi Energy.
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Selecting the right cable cleats

The international standard governing cable cleats used in electrical installations is IEC 61914:2015. In this standard cable cleats are defined as "devices designed to provide securing of cables when installed at intervals along the length of the cables". Simply put, cable cleats are used to secure, fix and route electrical cables in the positions required in an electrical installation. They can consist of single or multiple parts, plastic or metal material and include some sort of provision for securing them to a surface or structure. Mounting surfaces that may be specified include: ladder, tray, strut, rail, and beam.

Cable cleats should be designed to ensure that cables are fixed, supported, and routed in a manner that provides safe operation and reduces the risk of damage or injury in the event of a short circuit fault, emergency, or accident. Improper clamping of cables can result in loss through unnecessary downtime or for personnel through injury and death. Cable cleats should at a minimum:

- Be rated for the specified cable OD (overall diameter)
- Provide a means of securely fixing the cable
- Have adequate strength to secure the cable
- Prevent excessive cable movement and damage
- Avoid chafing and undue stress in the cable.

Selecting and specifying cable cleats

■ Cable arrangement

Primarily, the cable arrangement/configuration will dictate the type of cleat required. Cable arrangements for 3-phase installations using single conductor cables are typically flat spaced, flat touching or trefoil. A parallel or flat arrangement of single core cables can be completed with a range of single or two-part cleats, whereas a trefoil requires a trefoil type cleat.

■ Cable type

The type of cable being used, single or multi-core, as well as its voltage levels and construction, low voltage (LV), medium voltage (MV) or high voltage (HV), should be considered.

■ Cable diameter

Knowing the overall diameter of the cable (measured across the entire cross-section) is essential in ensuring the correct size of cleat is selected. It is also required to calculate the short circuit forces to which the cleat may be subjected; this can be used to determine correct cleat spacing.

■ Performance

A range of factors will dictate the level of performance an installation requires. The size, weight and length of run of the cable and spacing will usually influence whether polymer or metallic cleats are required. Aspects such as the support structure material and environmental conditions (potential for corrosion) can also affect the decision on cleat material. Other factors such as project specification may require special provision for performance in



Cleat installation: securing, fixing and routing electrical cables.

the event of a fire, such as Low Smoke or Zero Halogen.

In summary, to select the correct type of cleat for a specific application, the following information should be taken into account:

- Calculate the system peak fault current
- Confirm cable type and arrangement, including the overall diameter and manufacturing tolerance
- Confirm the type of support structure and the material used
- Consider any other environmental conditions and project specification requirements.

Stainless steel single and trefoil cleats

CCG's range of stainless steel cleats is designed to restrain single or trefoil cables onto ladder, tray or strut systems. The cleats are manufactured from corrosion-resistant, magnetic-free, 316 stainless steel with LSOH and UV protected polymeric linings for cable protection. CCG's cleats are designed to withstand mechanical forces caused by fault currents of up to 180 kA.

The cleats have an open-hinge single-bolt fastening system, allowing for ease of installation for a wide range of cables from 13 mm to 128 mm.

Since being launched worldwide, CCG's new, simple to use robust cleats have already been specified by customers in South Africa, Australia and elsewhere for projects in mining, renewable energy and other sectors.

For more information contact CCG.

Tel: +27 (0)11 394 2020

Email: info@ccgcablegland.co.za

Visit: www.ccgcablegland.co.za

Protecting substation transformers from fire

Continuing loadshedding has brought into focus the vulnerability of critical electrical infrastructure such as transformers at substations. Michael van Niekerk, CEO at ASP Fire says this means local authorities need to implement specific measures to manage the fire risk.

Substations, by their nature, do not have personnel on site, which means there is no one to raise an immediate alert in the event of any incident. In addition, where there is a lack of maintenance, this leads to an increased likelihood of such incidents.

“The situation is exacerbated by loadshedding, which results in current inrushes when the power is restored. This can damage components such as ageing electrical insulation, and increases the risk of transformer fires,” says van Niekerk.

In national and local supply networks, substation transformers are used to step down the electricity from 33 000 V to 11 000 V or 6 000 V. Some substations are in remote areas or in locations difficult to access outside of normal business hours. ASP Fire recommends the installation of a standalone fire-detection system to protect high-risk items like transformers. In addition, a fire-suppression system using foam mist can be highly effective.

“The dangerous combination of loadshedding and a lack of preventive maintenance can result in arc flashes,” van Niekerk notes. These are like mini lightning bolts and can cause the insulation in substation transformers and other equipment to start burning. If the cooling oil in a transformer is not adequately maintained, hot-spot temperatures can result in bubbles in the oil which, combined with high temperatures, increase internal tank pressure and may cause an overflow or tank rupture.

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

Van Niekerk says the major problem 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



If aging substations are not well maintained, there is a higher risk of fire in transformers and other electrical equipment.

well-maintained to begin with are increasingly vulnerable to loadshedding,” he says.

Although the installation of suitable fire detection and suppression systems offers a simple solution, the necessary funds are not always available. In such cases, consistent preventive maintenance should ensure that substations are robust enough to cope with loadshedding, and also allow local authorities to save on capex costs.

According to van Niekerk, local authorities have to adhere to strict regulations in terms of electrical safety, but the installation of fire detection and suppression systems is not mandatory – as it is the mining industry, which operates its own substations and marks the exception. Here electricity is essential to ensure life-critical equipment such as ventilation shafts and personnel lifts are operational at all times.

“The impact of damaged transformers and substations is severe,” says van Niekerk. “And the cost of replacing a single transformer can be prohibitive. To establish a regular maintenance schedule, local authorities must conduct some kind of fire-risk assessment and take steps to safeguard electrical infrastructure from fire.”

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



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Growing demand for modular substations

Having built a name for itself in the field of dry-type transformers, Trafo Power Solutions has extended its scope of supply into modular substations – also called E-houses. Managing Director David Claassen says the company is today servicing a growing need for the versatile and cost-effective modular solutions. It has supplied customers locally and in remote locations around Africa.

“Since our entry into the market supplying dry-type transformers, we have noticed an increasing demand for complementary systems related to their application,” Claassen says. “As customers recognised the level of our in-house expertise, we received requests for packaged solutions which included our dry-type transformers.

“Customers needed a reliable supply partner with the competence and experience to understand the specific demands of each project and application,” he says. “Trafo Power Solutions has proven itself in this role, from the concept and design stage of a project to facilitating the manufacture, delivery and on-site commissioning.”

Modular substations, or E-houses, are prefabricated or modular structures that house electrical equipment and systems. They are designed to provide a centralised and secure environment for critical electrical components and infrastructure. Often used in industrial settings, power plants, mining operations, oil and gas facilities and other applications where reliable and efficient electrical power is essential, an E-house will house electrical equipment such as switchgear, transformers, motor control centres, distribution panels, and other power distribution and control devices.

Claassen highlights that modular substations are built and tested in controlled workshop conditions, a significant factor which makes the process more streamlined and cost-effective and ensures optimum quality.

He adds, “Dry-type transformers are well suited to the concept of modular substations, as they can be safely accommodated inside the compact structure – contrib-



Trafo Power Solutions has extended its scope of supply into modular substations – also called E-houses.



Modular substations, or E-houses, are prefabricated or modular structures that house electrical equipment and systems.

uting to the benefits that modularity brings. The attraction of the modular structure is that it can be more easily transported and installed on site – and having a built-in transformer just makes sense.”

Traditional oil-cooled transformers need to be installed in a purpose-built structure, for safety, as there is a risk of oil leakage, fire or explosion. This often means additional civil engineering and construction is needed on site, increasing the time and resources entailed in a project. The cabling arrangement between the external transformer bay and the substation also needs to be accommodated.

“The inherent safety of the dry-type transformer allows it to be installed close to the switchgear inside the modular substation, so there are shorter cable runs and installation is easier,” Claassen says. “The extra cost and management of on-site civils work are then also avoided.”

Increasing its solutions offering has bolstered the standing of Trafo Power Solutions in the market, as it no longer supplies only transformers. The company now provides a packaged and integrated solution that reduces the points of contact its customers need to deal with in their projects – whether they are run by the end-user or an engineering, procurement and construction management company.

“This saves them time and it reduces the risks associated with integrating the different aspects of electrical projects considerably,” Claassen says. “Customers are looking for more integrated solutions, which allow for better quality control and easier installation.”

He says he expects the trend towards modular substations across a diverse range of industrial sectors to continue strongly.

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

Choosing only a professional-grade generator

Choosing only a pro-grade generator makes sense for any backup power application. There is no merit in choosing low quality where the generator itself will need a backup within a few months.

This is the view of generators specialist Renier Potgieter of Smith Power Equipment, a leading supplier of generators to the trade. He adds that in all but the smallest applications the purchase of a generator is a major investment that requires careful thought and planning to meet the current and future needs of the customer – whether a household or business. In all instances the output needs to be carefully matched to the demand and the overall longevity of the equipment should be near the top of priorities.

This is why only a pro-grade generator is good enough to meet users' requirements. "To make the choice easier, Smith Power Equipment stocks only pro-grade generators using among the best generator motors available in the world right now, from either the long-established Japanese manufacturer Kubota, or the world's bestselling large diesel engines from John Deere or Cummins.

"Paired with French-made Leroy Somer alternators to produce single-phase household current or three-phase industrial power efficiently and reliably, Smith Power

Generators are premium pro-grade generators," says Potgieter.

He says the engine and alternator combination needs to be perfectly matched to the alternator to ensure it delivers the specified output without over- or under-stressing the engine. This ensures optimum fuel consumption and the long-term reliability of the engine. Similarly, the electrical interface, mountings and assembly contribute to the durability of the equipment in the field for years to come.

"That means when you buy a Smith Power Generator it will last for decades, with the required services and maintenance to keep it running at its original capacity. Having reliable power available when you need it during planned or unexpected power outages should never be an issue with pro-grade generators.

Smith Power Generators pro-grade generators are available in a comprehensive range from 12 to 2 500 kVA, offering single-phase generators for residential use and custom-built industrial generators with standard 400 V and 525 V options.

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NERSA approves NTC licence to operate

At the end of July 2023, the National Electricity Regulator of South Africa (NERSA) approved the issuing of a licence to the National Transmission Company of South Africa (SOC) Limited ('NTC') to operate a transmission system within the national borders of the Republic of South Africa.

NERSA Chairperson, Thembani Bukula said: "This is a milestone decision by the energy regulator and marks a significant step forward in Eskom's planned unbundling."

It should be noted that the trading licence and import/export licence, which Eskom's Transmission Division had applied for in a bundled application, are still to be processed and approved separately. While this has raised some concern, it is understood to be based on the energy regulator's administrative procedures rather than any objections to the further licence applications.

In the 2019 State of the Nation Address, President Cyril Ramaphosa announced that Eskom Holdings SOC Ltd would be unbundled into three wholly owned entities: Generation, Transmission and Distribution. As this process progresses, the NTC, as the Transmission entity, is taking the lead.



The NTC will operate as an independent transmission system operator, wholly owned by Eskom Holdings.

"The NTC is envisaged to be an independent transmission system operator incorporating, inter alia, the currently non-licensable but integrated functions of network provision, system operation and system planning.

"The independence of the NTC is an important signal to all stakeholders, including investors, that they will have non-discriminatory access to the transmission system," NERSA said.

Furthermore, the NTC is responsible for ensuring grid stability and is allowed to buy and sell power, though not for profit, to meet this responsibility.

"However," NERSA noted, "in terms of section 15(1) of the Act, the NTC will be afforded the opportunity to recover its efficiently incurred costs and a reasonable return on its assets. The energy regulator understands that these provisions are within the ambit of the Act and will enable the NTC to be operationalised as an independent and reliable transmission system operator."

The NTC is a wholly owned subsidiary of Eskom, which has been established in line with the government's objectives and the Department of Public Enterprises' (DPE's) 'Roadmap for Eskom in a Reformed Electricity Supply Industry' (the 'White Paper'), issued on 29 October 2019.

The NTC will operate the transmission system and fulfil the following key roles to ensure the integrity of the interconnected power system (IPS):

- Transmission network service provider (TNSP)
- System operator (SO)
- Transmission system planner (TSP)
- Grid code secretariat.

The NTC's licence application was processed following due regulatory process, including a public hearing which was conducted on 11 April 2023. "All presenters that made oral presentations during the public hearing supported the application. NERSA analysed the application to assess whether it meets the minimum requirements for licensing, as contained in section 10(2) of the Electricity Regulation Act, 2006 (Act No.4 of 2006), and it was found to meet the licensing requirements," the energy regulator said.

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

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Employed learnerships can support business development

Anton Visser, Chief Operations Officer, Alefabet Learning

Many South African corporate organisations spend millions of rand on learnerships as a tick-box compliance exercise to gain BBBEE points and without aligning the learnerships to the business strategy. This is a major lost opportunity to leverage the real power of employed learnerships – which can and should be customised for the needs of the business and employees. In this way, learnerships can support the business to achieve a real competitive advantage through productive career and skills progression that takes the business – and its people – forward.

The foundation of a learning culture

Employed learnerships help to meet the specific requirements of the workplace and the career ambitions of employees, creating well-rounded candidates who have a good grasp of all the work processes. Having a pool of talent coming through and building the skills and succession pipeline is a business success story.

Regarding employed learnerships, many employers are not aware that learnerships can and should be customised for the needs of the business and its people. With the right partner, every learnership can be customised to the business strategy, as long as it meets the requirements in terms of notional hours and the formative and summative assessments. Employed learnerships benefit the company and the employees' personal growth and development, and enable the achievement of respective NQF-registered qualifications.

Benefits for employers and employees

For employees, an employed learnership is an opportunity to earn an income while learning new skills and gaining valuable workplace experience, in order to earn a recognised qualification, adding to their value and employability, and leads to improved morale, self-esteem, personal development and confidence.

For employers, employed learnerships raise the skills levels of current employees and heightened skills generally lead to greater productivity and more engaged employees. Skilled employees tend to work more independently and need less supervision, and they develop greater problem-solving capabilities. They will also be more engaged and committed to a business and employer that invests in their professional development. The more skilled a business's employees become, the more meaningful their contribution to the business's competitiveness and that of the country as a whole. And employers also gain all the added benefits of tax incentives and an improved BBBEE scorecard.

Learnerships have evolved

One of the challenges with learnerships is the time the employees need to take off work to complete the theoretical/lecture-based component of the learnership, although this is not supposed to impact on their productivity.

SA Business School, part of Alefabet Holdings, has addressed this challenge by taking its learnership programmes online, revolutionising the way learnerships are delivered in a rapidly changing organisational training and education environment. The online learnership is about interactive, online learning in combination with practical work experience. A key benefit is for companies that have learners geographically dispersed around the country, as they can now bring them together on one online learning platform where they get to interact with their trainers and content, at their own pace. It also means that employees embarking on learnerships don't compromise their productivity and can better manage their work and study demands. The flexibility and modernisation that this brings to the employed learnership process is groundbreaking in South Africa.



Anton Visser, COO, Alefabet Learning.

Learnerships as strategic enablers

It is time to abandon the tick-box approach to learnerships and skills development, and to invest in them as the strategic enablers they were intended to be to address critical skills shortages, create jobs, progress careers and deliver a competitive advantage for businesses and our economy.

For a business, any efforts to unlock the potential of its workforce start with this being part and parcel of the business strategy, with a clear plan that outlines the skill sets and knowledge needed to meet business goals and objectives. Learnership programmes should receive due credit and more employers need to realise their power and value. Learnerships have been one of the most significant catalysts for long-term employment in South Africa for the past 20 years. They need to be recognised at the boardroom table for the sustainable competitive advantage they can help businesses achieve in a world where the skills needed by the employees and the business are constantly evolving.

For more information visit: www.sabusinessschool.com

Cybersecurity in industrial operations

A common misconception in industry and generally is that cyberattacks and cyber security controls are sophisticated and complex. However, Charles Blackbeard, Business Development Manager, ABB Ability™ Digital Solutions, warns that the methods criminals use to infiltrate industrial networks are often relatively straightforward.

It follows that protection measures also often do not need to be overly convoluted, he says, especially when implemented in line with a defined strategy based on a risk assessment and managed by a user-friendly application that enables everyone to be part of cybersecurity efforts.

Cyber criminals may gain access to a facility through insecure remote login software, by exploiting disclosed vulnerabilities in the software, or sending phishing emails to employees, who open them on a system connected to the plant network. Attackers may then take control of the mouse at an individual workstation and take malicious steps undetected, in the guise of a control system engineer, for example, performing his or her usual job, but remotely.

“Although controls such as patching, malware protection and system backups offer essential protection from cyberattacks, they need a solid foundation,” Blackbeard emphasises. If an industrial system is built on a poorly designed, indefensible network, where all devices are separated from the internet by a single firewall, for instance, additional risks are added to the mix and may offset the benefit from the implemented security controls.

Combining this with an ageing distributed control system relying on unsupported Windows computers makes it much easier for attackers to find and infiltrate the operation without using sophisticated methods.

Blackbeard says implementing and maintaining even the most basic security controls built on a solid architecture significantly reduces the risk of the system being compromised. Over time, when the assessed threat changes, more security may be needed to stay ahead and aligned with the company’s strategy and risk management approach.

According to the SANS 2021 OT/ICS Cybersecurity Report, 48% of organisations surveyed did not know whether their industrial control system (ICS) had been compromised. “That statement by itself is rather disturbing,

but more so when considered with the evidence that most systems already are or have been compromised,” Blackbeard notes.

This illustrates the urgent need to secure operational environments and, at the same time, the need for cultural change. Leadership needs to understand and support OT cybersecurity efforts and instigate an organisational cultural shift to prioritise training and action. Blackbeard argues that without a culture and behavioural change, it is unlikely that any investment in technology or software will lead to long-term protection.

The threat posed by cyberattacks on industry regarding financial loss, production downtime and reputational damage should not be underestimated. Research shows that a total of 61% of factories report that they have experienced a critical cybersecurity incident, and 75% of those say an incident has halted production. The average cost of OT-specific malware attacks for organisations is reported at \$2.6 million.

Ransomware attacks carried out by criminals for financial gain account for around eight out of ten attacks. Industrial companies are viewed as easy, high-value targets where OT systems may be outdated, unprotected and exploitable, possibly via the internet, making an attack easier.

In terms of business criticality, protecting internal systems from hackers is now a business priority, particularly for critical public infrastructure such as electricity or fuel and water supplies.

Defining ROI from cybersecurity is never easy because a company is, in effect, buying risk insurance, rather than tangible increases in revenue and production. However, Blackbeard says, companies are increasingly aware that security is not just about protecting critical assets: it is also about answering to investors and protecting their right to operate by complying with international best practices and standards.

The annual cost of implementing a robust cybersecurity strategy and controls – which can be upgraded to respond to evolving threats to OT production assets – in partnership with a trusted service and technology provider works out at far less than the cost of an insurance policy. Furthermore, a well-implemented cybersecurity strategy may reduce the insurance premium to fund these efforts partly or fully.

ABB Ability™ Cyber Security Workplace (CSWP) simplifies the process of monitoring and maintaining foundational security controls by collecting security-relevant data from implemented cybersecurity solutions and forwarding it into a consolidated application. Operators can seamlessly monitor the status of basic security controls such as patching, malware protection and system backup; perform standard security tasks and receive alerts with actionable insights to remediate weaknesses and reduce risks – all from a single, easy-to-use dashboard.



ABB Ability™ Cyber Security Workplace (CSWP) simplifies monitoring and maintaining foundational security controls.

For more information visit: www.abb.com

Pioneering hydrogen fuel cell technology

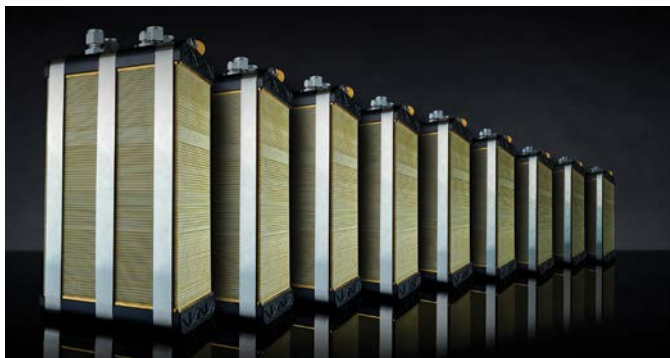
Bramble Energy, an innovator in fuel cell technology, recently announced the opening of its new state-of-the-art headquarters in Crawley, West Sussex in the UK. The expansive new facility, which includes a world-leading hydrogen innovation and development hub, is a multimillion-pound investment and marks the company's significant growth since it was launched in 2016.

Founded as a university spin-out, then developed in the garage of co-founder and CEO Dr Tom Mason, Bramble Energy has rapidly gained momentum with its revolutionary fuel cell technology based on cutting-edge printed circuit board (PCB) technology. The business's growth led to the need for a larger facility that can accommodate Bramble Energy's projected expansion and support the scale up of its technology to transform the hydrogen fuel cell industry.

The new facility, Atrium Court, spans almost 34 000 square feet, more than three times the size of its previous premises. It is designed to accommodate Bramble Energy's growing workforce, which has increased tenfold from just eight staff in 2020 to over 80 today.

Central to Atrium Court is the Hydrogen Innovation Hub, a research, development, and testing facility dedicated to hydrogen fuel cells, electrolyzers and sensors. The facility can support every element of Bramble Energy's technology development and, critically, scale it up. Concepts can be taken from the research and development phase through to production-ready technology, and into test fuel cells producing single digit Watts up to multi-kiloWatt sizes required to service the heaviest of mobility industries.

Mason commented: "We are proud to move into our new, state-of-the-art headquarters, which represents a major milestone for Bramble Energy. Our success and growth have been phenome-



The company has developed the world's first printed circuit board fuel cell (PCBFC™) stack technology.

Bramble Energy is powering a Net Zero world, today, and solving key challenges in the production of hydrogen fuel cells including: lead times, upfront investment, manufacturing cost and scalability.

Co-founded in 2016 by Dr Tom Mason in the research labs at Imperial College of London and University College of London, Bramble Energy through its revolutionary fuel cell design and manufacturing techniques, has developed the unique printed

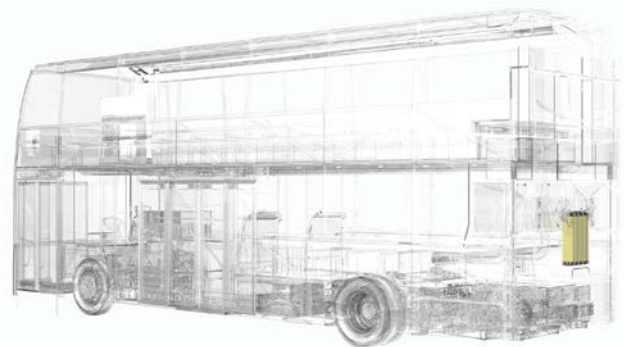
nal in a very short time, which is attributable in no small part to our technology, but also to the support we have received and having a talented and dedicated team.

"Our world-leading Hydrogen Innovation Hub at Atrium Court will contribute significantly to levelling up the UK's hydrogen and fuel cell testing capability. It will play a crucial role in our future development as we revolutionise the shift towards cleaner and sustainable energy solutions."

Bramble Energy's breakthrough innovation in hydrogen fuel cell technology and design using its PCB-X™ Platform, is solving the key challenges in the production of hydrogen fuel cells and accelerating the hydrogen mobility industry with the world's first printed circuit board (PCB) hydrogen fuel cell. The patent-protected solution means the company can design, manufacture, test, and ship a PCB fuel cell in a matter of weeks, at a game-changing significantly lower cost than the typical industry standard.

Financial support has been instrumental in Bramble Energy's growth trajectory. As well as raising equity finance through venture capital investors, UK government-funded initiatives have been well received. Bramble Energy successfully secured £5 million in funding in July 2020, raised an additional £35 million in February 2022, and in May 2023, was awarded £12 million in funding from the Advanced Propulsion Centre to provide its fuel cell technology to a hydrogen bus project.

For more information visit: www.brambleenergy.com



At its new Hydrogen Innovation Hub, concepts can be taken from the research and development phase through to production-ready technology, and into test fuel cells producing single digit Watts up to multi-kiloWatt sizes to service heavier mobility industries.

circuit board (PCB) fuel cell – the PCBFC™. This is a patent-protected fuel cell that can be manufactured in almost all PCB factories worldwide.

Bramble aims to be a leading hydrogen fuel cell provider for a cleaner and more sustainable world. At its new premises it has launched its portable power product range and is developing its high-power density, liquid-cooled fuel cell systems under the same scalable low-cost technology platform.



Dr Tom Mason, co-founder and CEO of Bramble Energy.

Reducing stormwater impacts in renewable energy schemes



Jennifer Meneghelli,
Senior Civil Engineer
at SRK Consulting.

In South Africa, renewable energy projects are being developed at a time of equally urgent focus on the country's water resources. This is therefore a good time for developers to begin applying low impact development options in stormwater management plans on renewable energy sites.

Jennifer Meneghelli, Senior Civil Engineer at SRK Consulting, says solar farms that generate energy from arrays of photovoltaic panels present a good example of where the low impact development (LID) approach can add value. Often occupying many hectares of rural land, solar panels can create a large impervious surface area that channels stormwater in a new way. Rainwater runs off the panels in sheets, falling from a height and can thus cause scouring and soil erosion – leading potentially to water contamination.

Soft engineering

"A common response to this water flow is hard engineering, using concrete channels to direct water away from the panels to a drain or watercourse," says Meneghelli. "However, this approach is more applicable to an industrial site, where the aim is to keep clean water separate from dirty water; it is not an optimal strategy for solar installations."

Rather than concentrating and collecting the flow of water running off the panels, the objective should be to dissipate and distribute the flow – as it would have run before the panels were installed. A more sustainable response, based on LID, thus looks to maintain the natural infiltration of stormwater into the soil as far as possible.

Driplines

PV plants are generally located in arid areas with a high number of sun days per year, in order to achieve maximum performance. Here, it seldom rains, but when it does, storm events in these areas tend to be brief and intense and rainfall must be managed

"Solar arrays are usually at some height above the ground, so the 'dripline' where water cascades off the panels is often where most damage or gouging may be caused," Meneghelli says. "The lower the dripline can be – the closer to the ground – the better, to reduce the erosive force. Gravel can then be used to dissipate the force of the flow and prevent erosion."

Scarifying of the ground under the panels, and the planting of deep-rooted indigenous vegetation underneath the panels, can help to maintain the health of the local ecosystem and enhance biodiversity. Rather than just planting grass, a variety of vegetation can create a meadow-type environment where natural pollination is encouraged.

Interestingly, despite the heat emanating from the panels, the area beneath the panels is cooler as it is shaded from the sun, so the soil holds more moisture which fosters vegetation growth. Thus, a micro-climate develops within the area of the PV plant and biodiversity can be supported.

Construction impacts

Meneghelli notes that most of the impact of renewable energy developments occurs during construction – "and there are many opportunities to mitigate this impact," she says. "Keeping excavation to a minimum is a good start, as well as minimising any changes to the topography. This is usually quite easily manageable, as solar panel installation generally does not require earthworks or terracing."

Construction can also be conducted in stages, to limit the extent of areas being disturbed at any one time – as soil erosion has a direct effect on water quality. Sediment control traps can be established to help reduce erosion.

Although South Africa has no established practice yet on stormwater management in solar farms, some states in the USA have made progress in developing guidelines. These frameworks encourage the use of the LID approach.

"As local practitioners in this country, we have developed sustainable drainage systems for the urban environment – and this approach could be valuably extended to the renewable energy space," Meneghelli suggests. "The need for LID guidelines is becoming more pressing as more renewable energy projects are developed in South Africa."

Wind farms

On wind farms, a relatively limited impervious surface area is created – amounting to only about 2% of the project site. Nonetheless, there are ways to optimise stormwater management. Again, most of the impact occurs during construction, when there is considerable soil disturbance for elements such as deep foundations and numerous hardstands. Meneghelli says, "It is advisable to create erosion protection measures around the large concrete base of the wind turbine towers. Burying the tower foundation below ground level will also allow a layer of topsoil to be placed over the concrete, and then revegetated to enable better infiltration of stormwater."

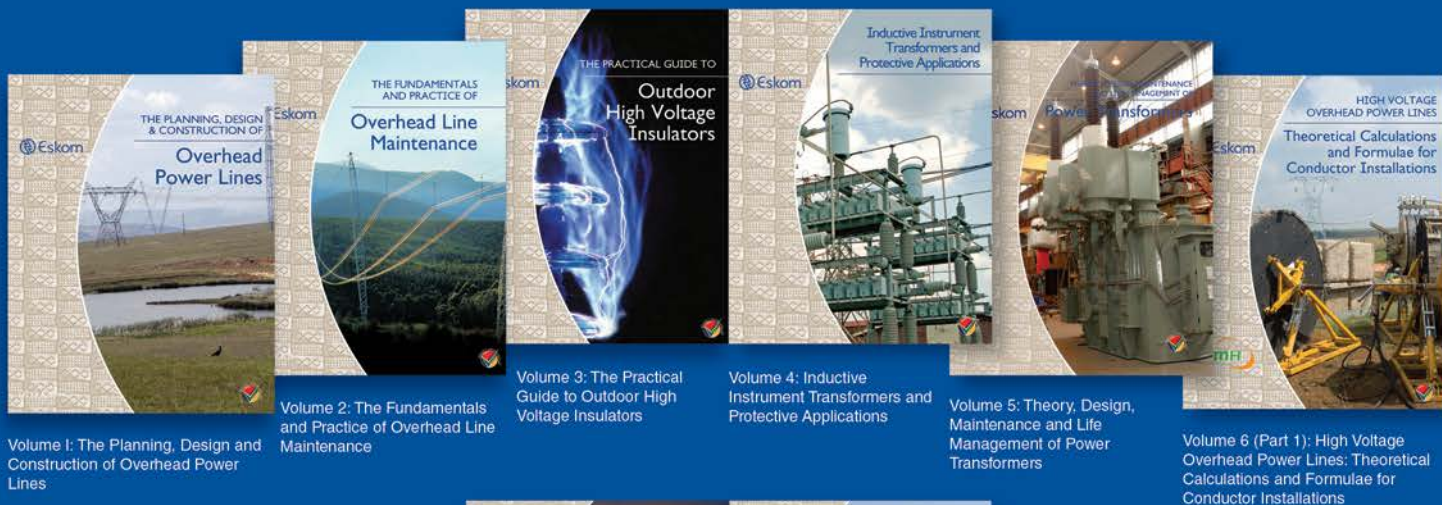
SRK's approach

For SRK, approaching this type of project would typically include a site visit to assess the soil, vegetation, surface water features and existing infrastructure – followed by a hydrological assessment. The layout of the site and the positioning of PV panels or wind turbines would be assessed, along with their supporting infrastructure. This would indicate how well the site is laid out for the application of LID principles in the project's stormwater management.

A key factor in LID is to maintain the gross infiltration rate of the sub-catchment, by retaining gentle catchment slopes and dissipating run-off rather than concentrating it. This approach eliminates the need for hard infrastructure such as large drainage channels and energy dissipation structures.

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

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



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



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

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

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