

Radar steps into new dimensions

FEATURES:

- Analytical instrumentation
- Cables + accessories
- Earthing + lightning protection
- Pressure + level measurement
- Energy + enviroFiciency: Control systems + automation

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Well, Moody's says 30% likelihood of a downgrade. Whereas it's not 0%, as a colleague said, it's not 50% ... (oh, joy).

The challenges facing our industry remain immense. Notwithstanding the fact that there seems to be a growing positive sentiment out there (although you do need to look quite hard to find it), many hurdles to growth and development remain obstinately in place.

Over the years I have made similar 'cautioning' comments – because, just as things seem to turn, the effort exerted to get something back on the road is swept aside by individuals (generally) who swing things by either their actions (or lack thereof).

What encourages me is the deeper sense that many ordinary business people are fast losing their patience in this space. It makes one realise that we need to move forward irrespective of the support we get from laws and policies and national, local and city leadership. This sounds rather droll, but the fact is we need to take responsibility for our own success – and let that, and that alone, guide the way we do business.

Which brings me to the issue of ethics. When I engage with young people, I describe ethics as our guide in the absence of rules. I consider this to be a fair description.

The question, then, is why do we have rules to guide ethics – if ethics, we say, guide our behaviour in the absence of rules?

(We will get there!)

In essence, an ethical approach to anything means a fundamental commitment to do the least harm. Interestingly, sometimes harm is done (think, for example, of a medical experiment) but the test is: Is the good greater than the harm?

Secondly, an ethical approach entails honesty in everything one does.

Nothing can be clearer: Do least harm; and be honest.

Now, in business, in research, in industry – ethics are governed by rules, and forms, and committees – and not just by what is in our heads. It is not easy to articulate the reason for this – but I guess a clue would be that an armaments company might well be

ethical ... but it is an armaments company. I have no problem with that. It can be an exciting environment in which to work. Though not everyone would agree.

And there it is. We formulate ethical rules and rules of common behaviour to try to capture the best approach we can, because not everyone necessarily shares the same ethics. There are many examples of this in business and in our own lives.

But, in essence, we need to be ethical in what we do and how we do it; and always ensure that our decisions are based precisely on our desire to be ethical.

As this comment has been prompted by recent developments in the LV protection industry, I cannot avoid the elephant in the room: At no point should business interests override issues such as human safety, protection of property, and the like. I simply cannot imagine how those who should know better do not consider these things.

Frankly, if you are marketing and selling products into our industry, best you fully understand those products – what they are and what they are not.

And if a simple test can make the case – then do the test.



Ian Jandrell

Pr Eng,
BSc (Eng) GDE PhD,
FSAIEE SMIEEE

Ian





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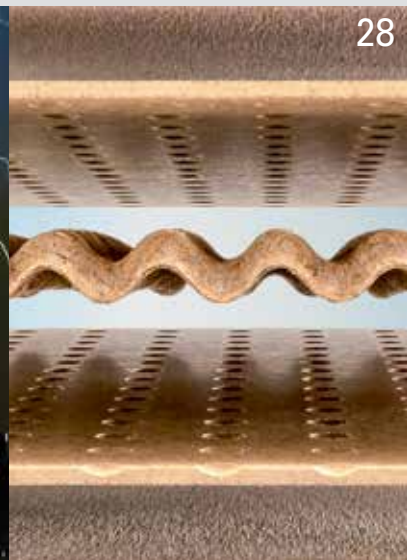
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Creaming profits with instrumentation for the dairy industry

Natlee Chetty, Endress+Hauser

Sustainability initiatives and production loss reductions can be achieved by applying innovative in-line quality control points.

Earlier this year, figures revealed that although more than 237 449 tonnes of milk were purchased in South Africa during February 2016, this number had shown a decline over the prior 12 months. Two months later, it was realised that milk would soon be added to the country's list of costly staple foods. Paul Makube, senior agricultural economist at FNB, stated: "Dairy farmers are facing production shortages and will likely run into supply issues in the coming months. Consequently, some dairy processors are already paying commercial farmers 60c more per litre on average for milk to ensure a consistent supply in winter. Poor pasture conditions due to the drought and the sharply higher grain prices have squeezed margins at farm level."

Added to this woe is the rise of electricity costs, further affecting the bottom line of local dairy process plants. Sustainability initiatives and production loss reductions can be achieved by applying innovative in-line quality control points. In addition, production time can

be shortened, plant capacity increased and off-specification batches reduced. There is a real need for sophisticated instrumentation, and highly accurate, reliable hygienic measurements. Endress+Hauser instruments provide more information such as percentage milk fat, brix, viscosity, massflow and phase separation.

For any business to run at an optimal level it needs to be able to accurately manage its products. "We offer best-in-class measurement technology so that process plants know exactly how much milk is received – be it in small tanks and vessels, silo tanks or plant mass balance."

Level measurement in small tanks and vessels

The level in air eliminators, intermediate storage, balance and mixing tanks are reliably controlled with Endress+Hauser's capacitive level probe, Liquicap M. Quick changes in temperature and pressure do not

CIP – Clean In Place
SIP – Sterilisation In Process

Abbreviations/Acronyms

affect the accuracy. The sensor is factory calibrated to ordered probe lengths and thereby easy to install. With a response time of 0,3 seconds, it is the ideal solution for small balance tanks and in filling applications. For reliable point level, Liquipoint is an ideal option.

”

For any business to run at an optimal level it needs to be able to accurately manage its products.

Level measurement in silo tanks

The company's Deltapilot has been perfectly adapted to harsh, fast changing process conditions. This hydrostatic pressure sensor shows best performance with long-term stability and excellent accuracy even following CIP/SIP cycles. The hermetically sealed Contite measuring cell is condensate and climate proof. Remote electronics are available for extreme washdown or hard to reach areas. With a measuring range down to 25 cm H₂O, the Deltapilot is ideal for balance tank level measurement. Equipped with linearisation tables, it converts the process data to level or volume. There are minimal temperature effects and fast recovery after CIP cleaning.

Mass flow and density measurement with highest accuracy

Milk that has been received contains a significant amount of air that impacts all following processes. After elimination, the receiving temperature effects need to be considered. The company's Proline Promass Coriolis flowmeter directly measures the mass of the recovered milk, calculates the fat content and is temperature compensated. Using this technology in the internal handover supplies a most accurate picture of the milk inventory. Volumetric measurement with the Promag H electromagnetic flowmeter is another option to achieve a temperature compensated volumetric flow balance.

The company's high accuracy instrumentation offers incalculable value within the critical milk standardisation and homogenisation process. Proline Promass F is ideal for virtually all fluids and, in a dairy, measures several process parameters directly in the pipeline. The fully drainable measuring tubes are stimulated with high frequency and therefore are immune to plant and system vibrations. The Promass F offers the highest accuracy and process available for flowmeters measuring the valuable fat content of milk products. This high per-

- Milk will soon be added to South Africa's list of costly staple foods.
- The reasons include farm conditions (drought, poor pasture) and rising electricity tariffs.
- Sophisticated instrumentation and best in class measurement technology are required to achieve sustainability and reduce production loss.



formance instrument can be reliably used to control the standardisation processes in cream and whole milk.

Detecting and phase change between CIP and the product in the line

The Promag H sensor was especially designed following the requirements for hygienic applications in the dairy industry. It is thus ideal for batching, plant mass balance, receiving and feed lines of products or CIP flows. Because it was designed for operation in dairies, it handles pulsating flow compensation and empty pipe detection. The integrated conductivity measurement allows for continuous monitoring of phase changes and product identification.

Increasing efficiency with faster response time

The company offers 'Sensor on Tip' technology which provides a seven times faster temperature response and ensures accurate information of exactly how safe a product is – all whilst saving on energy costs and increasing quality. The technology is found in the following products:

- **Quicksens:** The fastest sensor on the market (t90 of 1,5 seconds) for best performance in heat exchanging applications
- **Strongsens:** The most vibration resistant sensor that also helps improve long-term performance and reliability
- **Quickneck:** The ideal temperature integration for critical control calibration

Conclusion

The products described meet the safety, reliability and uptime requirements of dairies, literally ensuring that 'there'll be no tears shed over spilt milk'.



Natlee Chetty is currently employed as an Industry Manager for the Food & Beverage Industry at Endress+Hauser South Africa. She started her career at South African Breweries (SAB). Her experience in this Industry has instilled in her a broad-based knowledge of the field. She has been in the Instrumentation & Automation Industry for the past 14 years. Natlee has completed her Instrumentation Trade test as well as a Diploma in Electronic Engineering (Process Instrumentation and Control). She has a Bachelors degree in Commerce which she achieved Cum Laude. Enquiries: Tel. +27 (0) 11 262 8000 or email natlee.chetty@za.endress.com

Winning safety laser scanner sets new standards

The Leuze RSL 400 safety laser scanner has been recognised by end-users and experts as an innovative product that has set new safety standards.

The product was recently voted the winner in the 'Safe Automation' category of the most important readers' choice award in the automation world – the GIT Award.

The Leuze RSL scanner succeeded in convincing both the readers of the magazines 'GIT_ Sicherheit', 'GIT Security', 'messtec drives Automation' and the online community of the industry platform www.PRO-4-PRO.com that it was worthy of winning the GIT Security Award 2016.

This award follows its previous accolade from the publishing house 'HuberVerlag für Neue Medien GmbH' when an independent jury comprising industry experts, professors

and specialist journalists awarded the Leuze RSL 400 the title 'Best of Industry Prize 2016'.

It is not often that users and experts agree with one another about new products, but the recent recognition of the Leuze RSL 400 safety laser scanner, available from **Countapulse Controls**, underscores that this high quality safety scanner met both the innovation criteria of the judges as well as the usability requirements of users in the field.

Significantly, the Leuze RSL 400 safety laser scanner has set a new standard in the discipline of safety sensor technology. With its two autonomous protective functions, a scanning angle of 270° and an operating range of 8,25 metres, the device is not only a more powerful alternative to existing standalone systems but can even perform two tasks at the same time. This not only

saves space but, in many cases, also makes a second device unnecessary.

Enquiries: Gerry Bryant. Tel. +27 (0) 11 615 7556 or email bryant@countapulse.co.za



Customer support is available through the Countapulse Controls' technical advisory service hotline 24/7.

Innovative HV transducers for railway applications

Transducers of the new ProLine P50000 series from Knick Elektronische Messgeräte were specially developed for voltage and current measurement in main and auxiliary power circuits of locomotives and multiple units. They are used, for example, for short circuit detection as well as for monitoring of traction

motors and inverters, auxiliary inverters and accumulator batteries. The devices comply with all applicable railway standards and thus meet the high demands of fire protection (HL3 according to EN 45545-2, 2016), electrical safety, mechanical robustness

as well as insensitivity to extreme environmental conditions and electromagnetic interferences.

Compared to conventional sensors used in railway vehicles, ProLine P50000 transducers stand out due to their calibrated range selection feature and integrated universal power supply unit. Calibrated range selection allows different input ranges up to $\pm 4\ 200\ V$ to be selected quickly and flexibly. After the switchover, the specified high accuracy ($< 0,1\ %$ measured value $+ 0,1\ %$ full scale) is maintained without readjustment. Combined with a shunt resistor, the device is suitable for precise current measurement up to the kA range. A new, patent-pending design with covered high-voltage terminals ensures contact protection.

Knick offers a five-year warranty on these high-precision and long-term stable transducers. **Mecosa** is the sole agent for Knick Elektronische Messgeräte in Southern Africa.

Enquiries: Tel. +27 (0) 11 257 6100 or email measure@mecosa.co.za



More oil analysis laboratories open in southern Africa

South Africa-based condition monitoring company WearCheck has opened two more cross-border laboratories, bringing to 13 the number of laboratories operated by the company, in nine countries. Electrical operations and other industrial concerns in Zimbabwe now have a **WearCheck** laboratory, right on their doorstep.

WearCheck, recently acquired the long-established oil analysis laboratory in the form of Harare-based Tribology Services, and brought it into the WearCheck fold.

The Zimbabwean laboratory has been operating for 27 years, and already services a wide range of clients. Now, as well as traditional oil analysis, WearCheck Zimbabwe also conducts thermography, vibration analysis, balancing, laser alignment, motor current analysis and milling. WearCheck Zimbabwe offers on-site sampling, as well as a 24-hour sample turnaround.

In addition to the new laboratory North of the border, WearCheck headed West, and recently opened an on-site condition monitoring laboratory in Namibia, at the Husab Uranium Project. Swakop Uranium, owners of the mining operation, awarded WearCheck a five-year contract to supply and operate an on-site laboratory for the mine.

The Namibian laboratory was set up as part of a joint venture with sister company, Set Point Laboratories, which built and supplied the assay side of the laboratory.

Enquiries: Tel. +27 (0) 31 700 5460 or email support@wearcheck.co.za



At the WearCheck laboratory in Harare are lab technicians Nikanori Chikati, Talkmore Siyengi, Admire Katanda, Frank Chakonda (Lab Manager), Rangarirai Mlambo, Emanuel Mhari and Victory Dumbura.

New scope offers top signal visualisation

TEKTRONIX represented in South Africa by **Comtest**, has launched the TBS2000, a next generation basic oscilloscope featuring the longest record length and largest display in its class for faster signal evaluation and troubleshooting. This latest addition to the Tektronix portfolio puts expanded capabilities, including the ability to use a wide range of Tektronix probes, into the hands of budget-constrained design engineers and educators.

Building on the success of their TDS2000 Series, the most widely used oscilloscope in the world, the new TBS2000 gives users a level of design insight previously not available in this class of instrument. The new instrument also sets a new standard for usability with features like a large display for easy signal visualisation and a comprehensive set of automatic waveform measurements that are coupled with graphical explanations to help engineers better understand their measurements.

Design engineers use general-purpose oscilloscopes to prototype, debug and validate designs of new products and for general troubleshooting. In education, such oscilloscopes give students hands-on experience in electronics engineering and educators need to efficiently mentor and monitor large groups of students.

Enquiries: Tel. +27 (0) 10 595 1821 or email sales@comtest.co.za



Vibration and temperature monitoring in one

Vibration and temperature are the most common parameters used for machinery protection. Of these, temperature has been used longer, probably because it was available first and was better understood than vibration analysis. However, it is now stated that vibration is the better measurement over temperature because it gives an earlier warning and more information as the vibration signal contains many frequencies and many amplitudes, each pertaining to some moving part of the machine.

The latest units available in the RC range, available from **R&C Instrumentation**, combine these two parameters and provide protection of critical plant from high temperature and high vibration levels. The unit consists of a 2-wire 4-20 ma output to monitor vibration levels and a dc voltage output that has a 10 mV per °C directly proportional to the measured temperature and not an inferred measurement of the vibration.



Different velocity (mm/sec) ranges, process connection and electrical connections are available. The standard unit, which covers most applications, would have a vibration range of 25 mm/sec RMS, an 8 mm stud process connector and a 3 m cable connection. The unit's environmental rating is IP 67 and it has a case material of stainless steel with a top cable entry.

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Source measure units

Keithley, locally represented by **Comtest**, has on offer a comprehensive range of voltage, current, and power units available. Recent innovations include the embedded TSP Test Script Processor, industry-first graphical touchscreen interface, and other performance enhancements. More than 20 models and systems have been designed for demanding applications in research labs, on the engineer's bench, and in high speed ATE systems. Instruments with dc

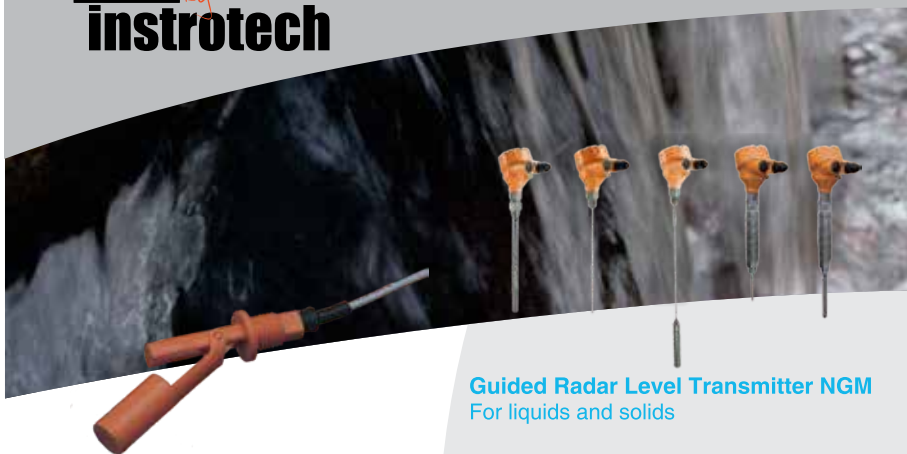
and pulsed output levels from 10 W to 2 000 W are available. Some more popular options:

- 2400 Graphical Series SourceMeter 1 channel; 20 – 1 000 W
- Optical SourceMeter 1 channel; <50 W
- 2600B SourceMeter – 1 or 2 channels; 30 W dc / 200 W Pulse
- 2650 High Power SourceMeter; 1 channel; 200 W DC / 2 000 W Pulse

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- Temperature range: -50...+250 °C
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- Output: 4-20 mA, switching output PNP



pressure



temperature



calibration



flow

Compact design plastic flowmeter

KOBOLD, represented locally by **Instrotech**, has on offer to industry their Model VKP flowmeter that works on the Variable Area principle, still one of the most-used measurement principles in flow engineering. Instead of the conical measuring pipe generally used, a conical mandril is placed inside a housing made out of robust, impact resistant polysulfone, on which there is a float with a sharp-edged orifice. The incoming medium flows through the float's orifice and lifts it up against the power of a stainless steel spring onto the flow depending height. The actual flow rate can directly be read off a scale affixed to the outside of the housing. With the combination of spring and conical mandril this series of meters is far more compact than other commonly used devices with a conical measuring pipe. They are therefore ideal for measuring flow rates in machines and aggregates.

Enquiries:
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A Comtest Group Company

Endress+Hauser Radar steps into new dimensions Micropilot FMR10/FMR20 – innovative and efficient Connect – set – ready!



Endress+Hauser offers perfect application fit devices for level measurement in the Water & Wastewater industry and utilities in all industries with the new Micropilot FMR10 and FMR20. Advantages include time saving and innovative commissioning, operation and maintenance via app, using *Bluetooth*[®] wireless technology as well as a perfect price-performance-ratio due to the unique radar chip design.

Micropilot FMR10 and FMR20 belong to the first non-contact radars with *Bluetooth*[®] commissioning, operation and maintenance app. Signal curves can be shown via app on every *Bluetooth*[®] enabled smartphone or tablet (iOS, Android). This increases plant availability due to fast access to maintenance information, and guarantees cost savings because of the usage of existing non-proprietary tool infrastructure. Furthermore FMR10 and FMR20 are the most compact radars in their class thanks to the unique radar chip design with integrated radio frequency components and a direct emission transceiver – invented by Endress+Hauser. With the compact design the devices fit within limited space applications, which means an extended application scope for the radar technology.

Micropilot FMR10 and FMR20 provide the best price-performance ratio. For the first time radar technology is available in the price range of typical water and wastewater level devices. The devices cater for the needs of the Water & Wastewater industry and Utilities in all industries – easy setup with just three main parameters and a remote indicator solution resulting in time saving and enhanced safety.

The full PVDF body of the device resists outdoor conditions and guarantees a long sensor lifetime. Sealed wiring and fully potted electronics eliminate water ingress and allow operation under harsh environmental conditions, which means enhanced availability. In hazardous areas or places that are difficult to reach, safe and secure wireless remote access via Bluetooth offers many advantages. There is no additional tool and adapter or wiring effort required. It is as simple as this: Connect – set – ready!

The communication is absolutely secure due to encrypted data transmission and password protected communication so that unauthorised access or manipulation is not possible.

Micropilot FMR10 and FMR20 form the beginning of a new generation of radar devices for the Water & Wastewater industry and utilities in all industries. Endress+Hauser as full service supplier offers a broad range of technologies to find the best fit for every application – be it ultrasonic, hydrostatic or radar.

Technical details Micropilot FMR10:

- Level measurement
- Wireless commission via *Bluetooth*[®] app
- 4 to 20 mA output signal
- Non Ex
- Measuring range: 5 m
- Accuracy: ± 5 mm
- Process/Ambient temperature: -40 to +60°C
- Ingress protection: IP66 / NEMA4x
- Fixed cable length: 10 m

Technical details Micropilot FMR20:

- Level and Flow (with open channels or weirs, via linearisation table)
- Commissioning via HART or optionally wireless via *Bluetooth*[®] app
- Optional with RIA15 remote display for commissioning
- 4 to 20 mA / HART output signal
- Gas Ex approvals
- Measuring range: 10 m or 20 m
- Accuracy: ± 2 mm
- Process/Ambient temperature: -40 to +80°C
- Ingress protection: IP66/68, NEMA4x/6P
- Cable length: up to 300 m

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Factors that influence cable protection

Morgan Havire, AMNS Consulting Engineers

The first in a series of articles on cable protection.



The principle of generating electricity through the conversion of the naturally abundant sun rays by solar cells is termed Photovoltaic. Solar cells located inside solar panels using special semi-conductor materials are capable of harnessing the solar energy producing the much needed electricity.

The electricity produced by the solar panels is termed direct current (dc) is transported through a system of cables to either storage rechargeable battery systems or onto the electricity grid as alternating current (ac) for use.

The system of cables used for the transmission of electricity are typically outdoor and are subjected to the harsh environmental factors which means that they require protection to guarantee proper functioning over a prolonged period and safety.

In order to adequately address the issues surrounding the protection of cables, we need to take cognisance of factors that affect cables and from these factors we can deduce the various and most humanly possible ways in which these can be mitigated.

The factors that affect cables can be categorised into 'Thermal' and 'External Influences'.

External influences: Any influences that are external to the cables which can affect the safe operation of the cable and also the design. These include factors such as:

- ◆ Ambient temperature - temperature of air or any other medium where the cables are installed
- ◆ Direct sunlight
- ◆ Animals and plants
- ◆ Rain or water vapour or water accumulation
- ◆ Chemicals
- ◆ Mechanical damage

Thermal effects: Thermal effects arise due to the operating conditions of cables such as:

- ◆ Voltage
- ◆ Method of installation
- ◆ Cable grouping
- ◆ Protective measures
- ◆ Current, and accessibility

Additional thermal effects could be due to over-current (overloads and short circuits).

NEC	– National Electric Code
PV	– Photovoltaic
PVC	– Polyvinyl chloride
TUV	– Technischer Überwachung-Verein
UL	– Underwriters Laboratory
UV	– Ultraviolet

Abbreviations/Acronyms

”

The factors that affect cables can be categorised into Thermal and External Influences.

Cable standards for PV cables

Standards by definition are ‘a quality that is considered acceptable or desirable’.

Two agencies which have approvals for solar cables in the USA are the Underwriters Laboratory (UL) and the National Electric Code (NEC). The two types of approvals for Photo-Voltaic cables are USE-2 and type PV. The Technischer Überwachung- Verein (TUV) – Germany and this has approvals based on the ISO 4892 [1], EN50395 [2] and EN50396 [3] all being tested according to IEC 60811 [4].

Only PV cables of a quality that is considered acceptable or desirable in accordance with the recognised standards can therefore be used in solar installations as a mere baseline requirement.

Concept of cable protection against external influences

For the purposes of this article, the external influences that affect the protection of PV cables are considered. The life of PV cables is generally twenty five (25) years or more, but being exposed to harsh environmental conditions can subsequently damage unprotected cables. The concept of cable protection starts with the cable selection in accordance with acceptable standards and the progress to the installation process in accordance with a recommended cable management standard.

Protection of cables from sunlight and heat

Cables that are used in PV installations are rated as Ultra Violet (UV) resistant or simply that they can withstand high temperature ranges from as low as -60°C up to as high as 90°C. Although the insulation and jacket materials that surround the conductors are extremely resistant to UV radiation, the underlying fact is that they must be kept from direct sunlight exposure as much as possible. With continuous direct sunlight exposure the cables suffer degradation causing damage. By also selecting the correct colour for the PV outdoor cable which is ‘Black’ (containing carbon black in its insulation), the cable will be provided with additional UV resistance. Unprotected PV cables from direct sunlight or high ambient temperature results in the cable becoming brittle or breakable.

Protection of cables from direct sunlight can be achieved by implementing a safe, reliable and code compliant wire management system. By conveniently using the available shade of the modules and other structural members, one can improve on the life of PV cables. The PV cables can be protected by being secured to the module frames, support rails and other racking system components. Where cables are exposed away from the panel covering (where inter row PV cable routing occurs), they can be provided with a special protective covering.

Protection of PV cables from heat sources can be achieved by not fixing the cables within six inches from the heat source. Another method to protect the PV cables from such a heat source is by adequately shielding the cable and its protective sheathing or properly selecting a PV cable of special design (heat resistant cable) to withstand the effects of such exposure.

Cable trays’ systems can also be used in lengths of the panel arrangements where PV cables run along the trays under the modules. All standard requirements must be adhered to when implementing these installations. In addition to trays, PVC or galvanised metal conduits can be used to protect the solar cables.

Protection of PV cables from water

PV cables should not be in constant contact with water as this may cause the cables to be saturated with water. Persistent water saturation can lead to insulation resistance damage and even rotting of cables causing short circuits and earth leakages.

Cables which can be subjected to such conditions must be carefully selected in accordance with the acceptable standards. The cable selection must ensure that the cable used is for outdoor use and can be used in wet conditions.

In order to prevent or protect cables from water damage due to constant water logging, shading and elevating of PV cables in sealed channels and conduits. For PV cables underground the same principle of sealing exposed ends of conduits or sleeves will alleviate the saturation of cables with water.

To protect the PV cables from water in general they shall not be fixed (if possible) where they will be exposed to the accumulation of water which might damage the conductor or its protective covering

unless the cable or its protective sheathing are adequately shielded or of a special design to withstand the effects of such exposure.

Protection of cables from physical damage

TUV approved PV cables are manufactured with mechanical robustness. These solar cables are insulated twice with an insulation around the conductor and an insulation outer jacket. If the outer jacket is damaged or cut, there is another layer providing the necessary protection for the conductor. The insulation for PV cables is also manufactured by using the electronic beam cross linking procedure which improves the shear and impact strength of the cable thus protecting the cable more effectively.

Notwithstanding the above, damage can still occur during PV cable installation if sharp edges and corners exist. Moreover, PV cables are installed through openings drilled in the structural metal work of the PV system creating sharp holes that can cut through the insulation of the cable.

PV cables and their insulation shall be protected by ensuring that every hole is bushed so as to prevent abrasion of the cable insulation or even compressed under the weight of modules. PV cables must be protected from possible movement by the fastening of cable ties, clips and other attachment tools ensuring that the electrical properties of the cables is not in any way compromised.

Protection of PV cables against corrosion

The insulation for PV cables is manufactured by using the electronic beam cross linking procedure. These cross linked insulation materials greatly improve the chemical resistance of the cable thus protecting the cable more effectively. The type of PV cable insulation must be selected to be able to protect the cable from corrosive chemicals.

The protection of PV cable can be provided by fixing the cable in positions where the cable or its protective insulation is adequately shielded or exposed to corrosive chemicals or as mentioned, of special design to withstand the effects of such exposure.

PV cables that are likely to be exposed to chemicals should have an insulation cover that has a high degree of resistance to chemicals.

The PV cables can be afforded protection by being kept or shall not be fixed within six inches from such corrosive materials the contents of which might damage the cable or its insulation unless the cable is adequately shielded or of a special design to withstand the effects of such chemicals.

Protection of cables from animals

Pests like rodents feed on PV cables resulting in a loss of production and extensive repair works if the issue is not addressed. Some of the existing technology on the market to mitigate this situation involves the use of barriers attached to structural members and rails. The two

- The lifespan of PV cables is generally 25 years.
- Continuous direct sunlight exposure causes cables to degrade.
- Protection of cables from direct sunlight can be achieved by implementing a code compliant wire management system.



technologies in the market are:

- ◆ Heyco's SunScreener
- ◆ Spiffy's Solar screening

Conclusion

It can be noted that compliance with the relevant standards will certainly achieve the code compliant and safe cable management for PV cables. As a result of adhering to the design and installation requirements, the entire PV cabling network can be adequately protected. The PV cable system will ensure reliability guaranteeing the much required rate of return on the capital investment for clients. maintenance of the installed system must follow to ensure that the investment does not deteriorate and this can be achieved by periodic inspections and verification of the soundness of all PV cables and equipment. The maintenance can be achieved by drawing up a maintenance management plan which can be agreed with the clients. With the evolving of new technologies, installers must advise clients on these new innovations and be able to advise on ways to improving the old existing plants.

Factors for consideration in selecting the right technology for protection of the PV cables should be based on code compliance, ease of installation and cost.

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Morgan Havire is a Chartered Electrical Engineer with experience that includes site surveys, design, supervision, testing and commissioning of new buildings and refurbishment of existing ones. He has undertaken major projects as a principal and lead design engineer responsible for all electrical and electronic services on projects in South Africa, Zimbabwe, Angola, Mozambique, Zambia and Equatorial Guinea. Morgan has undertaken design assignments within teams working on projects in South Africa, Zambia, Mozambique, Nigeria, Australia, United States, Nigeria and Equatorial Guinea. Morgan has experience in sustainable building design concepts that include photo voltaic solar power on projects. Enquiries: Email mhavire@gmail.com

Solar training and demo facility

As with any electrical installation, a solar power system should be inspected and the owner should be issued a certificate of compliance, either by the installer or by an independent electrician. "Power surges, lightning strikes, short-circuits and reduced product lifespan are some of the risks of a faulty installation," says Johann Wassermann, Sales and Marketing Manager at **KJION Energy SA**. "Then there's the risk of insurance companies refusing to pay out." Power surges and short-circuits will damage appliances if surge arresters have not been properly installed, potentially melting cables and posing a fire risk. "Dc power is dangerous. Aside from possible insurance issues, it's a powerful force. If you place a spanner across both battery terminals, it'll melt a spanner - that's some energy. These are extreme examples though, and from an efficiency perspective, it's important to start off with a well-considered design."

He says. "During our training, we touch on every aspect, from design to final installation, with focus on cost and efficiency. For example, if the solar panel plant is too small to charge the battery bank fully, you could cycle the batteries in way that affects them negatively. Surprisingly, it's the batteries which are the most ex-

pensive items, so it's important to be well-informed. Our demo and training set-up allows us to simulate a range of different scenarios, such as dc-coupled, ac-coupled and grid-tie solutions. We're able to tailor our training to a specific audience, be it installers, insurance assessors or electricians providing compliance certificates."

Enquiries: Tel: +27 (0) 12 880 0088 or email johann.wassermann@kjion.co.za



Open access telecommunications model in South Africa

"The Open Access Network (OAN) model has been adopted to a major extent in the telecommunications sectors of many parts of the developed world (European Union and the Americas). The advantage of this model is that it allows multiple service providers to compete over the same network, in so doing eradicating the monopoly of the telecommunication sector."

This is according to Muneer Adam, Project Engineer for EES Africa, who supports the implementation of the OAN model in South Africa. **EES** is an ISO 9001:2008 certified company providing management, engineering and auditing services to a range of industries throughout Africa. Adam says that the South African government is currently implementing the local loop unbundling process of the telecommunication monopoly holder, Telkom.

"In the context of an OAN model, the roles of the service provider and the network owner are separated. The service providers obtain access to the network and the end customers according to fair and non-discriminatory conditions," Adam explains. "The model promotes a high level of competition and maximises freedom of choice for the end users."

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10 Gig fibre backbone for 2 Military Hospital

The CapeTown branch of local infrastructure provider BT-SA has been awarded a contract to install all the Krone Category 6A cabling reticulation for 2 Military Hospital over the next two years.

The project also includes a 10 Gig fibre backbone cabling throughout the hospital and outlying buildings. Backbone cabling is the inter-building and intra-building cable connections in structured cabling between entrance facilities, equipment rooms and telecommunications closets.

Cabling reticulation will be installed in the main Military Hospital, the new admin and logistics building as well as the nurses and officers home. The installation will also include all cabinets, data point, voice points, email and internet points.

Donovan Snyders, who joined BT-SA nearly 10 years ago as general manager and now manages the CapeTown office in Montague Gardens, says the project is 100% on schedule.



"The 2 Mil project commenced in April this year and are we are currently busy in the main hospital and outside buildings. The roll-out is done in phases, floor by floor," he says.

BT-SA Infrastructure sales executive Nicole Dittrich joined the Cape Town team in January this year. She has been in the ICT industry for the past 22 years and oversees full data centre designs including backup power, air flows, construction, access control, fire detection and suppression and monitoring.

Dittrich currently heads up the fibre backbone roll-out together with the main contractor Superway Construction (Pty) Ltd. She says the standards of this particular project are very high. "Our client, SA Military, requires that we follow all SITA's quality and standards which includes many inspections and controls." "We have an exceptional team onsite which adjust to crisis and last minute expectations like professionals. They work long hours to make sure the client's expectations are achieved in the timeframes, even if they are under challenging circumstance," she explains.

Superway Construction's Mechanical and Electrical Site Agent André Fouchè says no other contractor besides BT-SA may install fibre backbones at 2 Military Hospital during the duration of the contract. "Only BT-SA may install fibre backbones due to their understanding of the quality and standard requirements onsite and have therefore installed all fibre reticulation requirements for all contractors that require fibre onsite."

Enquiries: Visit www.bt-sa.co.za

Cable protection technologies summit

27, 28 October 2016, Sunninghill, Johannesburg

Solar system is without a doubt the fastest growing power generation technology in the world. The advancement in the design of solar industry has increase dramatically. However, cable protection is often overlooked both during design and installation of solar.

The environments in which cable systems are being installed today are becoming more challenging. Cables are being exposed to extreme temperatures, chemicals, abrasion, and extensive flexing. In addition, lack of cable protection affect the performance of the solar, durability and increase the cost of maintenance. In light of this Mogorosi Communications is organising a cable protection technologies summit on the 27 and 28 October 2016 in Sunninghill. The summit will feature speakers from universities, researcher centres and industry experts to discuss solar cable technologies, financing of solar projects and solar industry in South Africa. The objective of the summit is to put emphasis on the use of available protection strategies as well as discover innovative cable protection products which can protect without hindering the carrying capacity of cables. The delegates will have an opportunity to discuss the effects of cable protection, challenges faced in the protection of in solar systems, technological solutions as well as the extent of their implementation.

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Marketing Director, Donovan Marks. The company's extensive product portfolio includes energy supply systems, motorised and spring cable reels, container handling systems as well as industrial and mining cables, plugs and sockets.

Powermite's range of electrical products are manufactured locally by Ampco and Proof Engineering in a new state-of-the-art manufacturing facility making it the largest plug and socket manufacturer under one roof in Africa.

First established in the late '60's, this pioneering company is responsible for introducing a number of firsts to South Africa including cable reeling drums, conductor systems, festoon systems, flat cables as well as a large variety of industrial plugs and sockets of various specifications. Powermite rapidly captured substantial market share in the materials handling sector and with ISO 9001:2000 accreditation secured, the company was soon positioned as a single source supplier of electrical crane materials and flexible cables to Southern African mining and industry.

Enquiries: Donovan Marks. Email donovan@powermite.co



New AS-I repeater for extended networks

Repeaters are used for AS-Interface to enable the network cable run to be extended beyond 100 m. Galvanic separation of network segments and independent voltage supplies ensure stability. The 62 participants are provided with a higher total current and the voltage drop decreases. The improved performance is packed into the new SmartLine housing. While conventional repeaters usually have a temperature range from 0...55°C, the new unit from ifm operates reliably across a broad range from -25...70°C. The improved operating temperature range makes the new unit from ifm a class leader. This results in a longer life time thus saving time and money.

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UPS systems: Threats, maintenance, management and winning designs

Jack Ward, Powermode

Call them what you will ...

regular power outages still plague businesses.

Despite Eskom's pronouncement that 'load-shedding is a thing of the past' most electricity users continue to experience regular power outages. Now under the banner of 'grid maintenance', these outages continue to plague businesses.

In order for a standby system – such as a battery-powered uninterruptible power supply (UPS) system – to take over the load on demand, the importance of regular inspections, service and maintenance regimes cannot be overstated.

UPS systems are constantly on standby, powering silently in the background. Imperceptibly, they face a number of threats to their wellbeing on a daily basis.

If a UPS system fails it is almost certainly to be at an inopportune moment - when a power outage occurs. In such instances, the computer system the malfunctioning UPS supports will shut down and valuable data could be corrupted or lost. The cost to the company in terms of downtime will be significant.

Probably the number one cause of UPS malfunctions is battery failure. Battery life is influenced by many factors including storage conditions, ambient temperature, battery chemistry issues and shelf-life. As a rule of thumb, a UPS battery has a life cycle of between three and six years.

MOV	– Metal Oxide Varistor
MTTR	– Mean Time To Repair
TCO	– Total Cost of Ownership
UPS	– Uninterruptible Power Supply

Abbreviations/Acronyms

”

Load shedding ... really a thing of the past?

The key to battery longevity lies in a thorough understanding of the status of individual batteries in a multi-battery pack in terms of their duty cycles and load factors.

Battery maintenance should be at the top of a UPS user's priority list. A good maintenance regimen will help prolong battery life while keeping a note of where the battery is in its life cycle will provide an indication as to when failure is imminent.

Battery balancing

The prevalence of unexpected power outages in South Africa – often longer than four hours – has exposed one of the Achilles' heels of standby power devices; the dramatically shortened lifespan of batteries (including deep-cycle batteries) when subjected to full depletion on a regular basis.

To help prevent premature battery failure, a new-generation, battery management harness is a necessity. The 'smart' battery technology in leading harness brands monitors and optimises the performance and efficiency of individual batteries in a battery pack on a 24x7 basis.

This is achieved by a dedicated, computerised battery balancing solution that automatically monitors data streams containing information critical to the wellbeing of individual batteries, including temperature, state of charge and depth of discharge. The tally of the number of discharge/ charge cycles is recorded.

Using this data, the system's battery performance is able to be balanced and equalised. Should an individual battery's operating parameters not meet design specifications or fail for any reason the battery is flagged for replacement – thus ensuring the integrity of the pack.

The technology featured in a battery management harness not only distributes and balances the battery load, but discharge and charge regimes across all batteries in the pack can be monitored on a minute-by-minute basis. Thus steps can be timeously taken to ensure that no battery is compromised through over-cycling or a malfunction of any kind.

UPS threats

Apart from battery failure, other serious threats to the smooth operation of a UPS system include a sudden 'spike' in the power supply. Called transient spikes, they are likely to inflict serious damage to

the input side of a UPS – the filter/rectifier siting. Regular maintenance regimens will most certainly be able to determine whether damage has occurred and remedial steps can be initiated. This applies to almost all elements of a UPS system,

The scourge of Highveld weather, lightning, can do serious damage to a UPS system and to the highly sensitive computer systems it is tasked to protect. A common misconception is that a UPS system constantly protects itself and the equipment load from lightning strikes. If the amount of energy in the transient (the lightning strike) is large enough, damage will occur. Surge suppression devices, if installed, including metal oxide varistor (MOV) devices are often compromised by lightning strikes.

As small as a two-rand coin or as large as a cool-drink can, capacitors, like batteries, degrade over time. The effects of time may not be apparent, but a single failure will have a domino effect, leaving the other capacitors to work harder and fail sooner. Most UPS systems contain as many as a dozen or more of these simple devices that store and release electrical energy.

Dust is the enemy, steadily advancing to block filters and cause progressive overheating of UPS systems. Regular monthly inspections are required to address this problem. Fortunately, filters are the least most expensive components of an effective UPS maintenance plan.

Contactors failure is another threat to UPS systems. Contactors, which are also prime collectors of fine dust and other resistive particles, require regular inspection and cleaning to ensure optimum performance and to guard against premature failures.

The failure-proofing of relays is not usually at the top of any maintenance schedule, however, technically-aware UPS owners understand that the sticking of welded relays may go unnoticed for long periods of time. The problem is revealed only when emergency change-of-state events occur. Appropriate inspection procedures are able to detect problems before they arise.

Total cost of ownership

Selecting a UPS system that matches an organisation's exact needs is vital to UPS longevity. Consulting a knowledgeable provider with experience in the UPS industry before making an investment is prudent as is selecting a system that can organically grow in tandem with the company's expansion plans.

In this light, when budgeting for a UPS system, it is crucial to consider the total cost of ownership (TCO) – rather than just the

original purchase price. When operating costs and upgrades are taken into account, a unit with an apparently cheaper initial purchase price can often prove to be more expensive in the long run than a better-technology solution at a slightly higher original price point.

In reality, a UPS featuring modern, modular technology can reduce the TCO significantly, while improving reliability and dependability.

To secure first class UPS protection, business managers should accept that the best-performing UPS technology – as found in the latest modular systems – will cost a little more, but within a year the cost difference could well be recovered in its entirety.

Before explaining how this is possible, the evolutionary path along which UPS technology has travelled needs to be examined.

Legacy UPS systems, featuring transformers, were large and heavy when compared to today's systems. For example, a data centre with a 120 kVA load could theoretically have been supplied by a single, cumbersome, floor-standing 120 kVA unit.

However, because fail-safe redundancy is a likely requirement to ensure availability, this would demand the fitment of two 120 kVA units sharing the load in a 1+1 redundant configuration.

For the organisation that the two UPS units served, it meant investing in substantially more capacity than actually necessary. It also meant that neither UPS unit could ever be more than 50% loaded, which for a transformer-based system results in a significant reduction in efficiency.

With the advent of transformerless technology has come much smaller and lighter UPS solutions which can easily be incrementally added to a racking frame to achieve an application's required power capacity and redundancy targets. Unwieldy, free-standing individual units are now the dinosaurs of the standby power world.

In a hypothetical scenario, the 120 kVA load can now be met by a single rack containing four, 40 kVA 'hot swap' plug-in modules. The load remains fully supported with n+1 redundancy, while the total UPS capacity has been reduced from 240 kVA to 160 kVA.

Although the purchase price per kVA for modular UPSs will be slightly higher than for legacy types, this difference will be partly offset by the reduction in purchased capacity – and in the floor space required for installation.

Moreover, significant savings in operating costs will also be made as the modular solution is more efficient than a transformerless implementation – especially one that cannot operate at more than 50% loading. Considering the 120 kVA example as discussed, over a five-year period, savings could be as high as R500 000.

And that's not the end of the story. A modern modular UPS system can slash operating costs even further by reducing the need to hold emergency spare parts. Instead of a slew of costly spares that might be needed, a single spare plug-in module will suffice.

This is true even when modules of different power ratings are

being used, because simply holding a module of the highest kVA rating installed will cover all eventualities. A trained technician can hot swap a UPS module in under five minutes.

Modular system upgrading is also far simpler, faster and cheaper as extra capacity can be added simply by plugging in additional modules without even interrupting power to the critical load. The lengthy building work, sizable increase in footprint and frustrating interruption to supply associated with extending traditional systems is completely eliminated.

Conclusion

One final point: A UPS system's availability is increased if its mean time to repair (MTTR) is reduced. An attractive feature of a modular UPS system is its almost zero MTTR figure. If a hot-swappable module does fail, it can be withdrawn from the UPS frame without interrupting power to the load. A replacement module can be plugged into the rack immediately.

By contrast, if a legacy system fails, it must be shut down, isolated from its mains' supply and repaired in situ; a process that typically takes five or six hours to complete. This means that, unlike a legacy transformer-based system, a modular UPS solution can provide 'six-nines' (99,9999%) availability which equates to just five minutes of downtime per year.

- If a UPS fails it is most certainly to be at an inopportune time.
- The number one cause of UPS malfunction is battery failure.
- A UPS featuring modern, modular technology can reduce the Total Cost of Ownership and improve reliability.



Jack Ward is the managing director of Powermode, a leader in the field of advanced power provisioning systems for medium to large corporations. The company designs, supplies and commissions a broad spectrum of innovative, turnkey power protection, management and generating solutions. He has more than 35 years of experience in the IT, telecommunications and power protection industries throughout Africa in senior executive roles. Enquiries: Email garrethj@powermode.co.za

DB – Distribution Board
 MCR – Measurement, Control and Regulation
 SPD – Surge Protection Device

Abbreviations/Acronyms

Brief guide to the selection of lightning and surge protection

Tony Rayner, Phoenix Contact South Africa

A basic explanation of what to consider when selecting lightning and surge protection.

I have just finished reading an article about 'lightning strikes and surges'. Even though I have been in the industry for many years, it was difficult to understand and rather boring. In this light, I have attempted to simplify surge and lightning protection dynamics, thereby, hopefully, making it easier for prospective users to make an informed choice when purchasing protection systems. To simplify my explanation I have divided Surges into two categories, namely Lightning strikes and Other Surges.

Why do we need protection?

Lightning strikes

Around the world there is lightning activity, some areas minimal, others moderate, and others extreme. Where ever there is lightning activity, huge amounts of energy may be induced into electrical reticulation, causing, in many instances, catastrophic damage. To protect systems against this phenomenon, lightning protection is required. It is also important to know that lightning protection should always be used in conjunction with surge protection.

Other surges

Surge (other) protection is another matter. In general surges are manmade and mostly generated by electrical switching operations. Examples of these (amongst many others) could be the starting of inductive loads or power failures. Obviously these transients are present 24/7 affecting electrical supplies. Therefore it goes without saying that surge (other) protection is an imperative. So, even if you are not situated in a lightning area, surge (other) protection is still necessary.

These extremely fast voltage and current disturbances, including lightning, which I prefer to call transients, cause hundreds of millions of Rands worth of damage to equipment every year.

What do we use for protection?

Protection is broken up into three categories, namely:

- **Type 1 (Class I) – Coarse protection.** These devices are used for protection against Lightning Transients. Normally situated in the primary mains supply DB (Distribution Board) and used in conjunction with Type 2 devices



- **Type 2 (Class II) – Medium protection.** These devices are used for protection against Other Surges i.e. switching transients. Normally situated in the secondary DBs supplied from a main DB which would consist Type 1 devices. Should there be only one DB servicing a facility with no secondary DBs, a combination Type 1 and 2 device should be installed in the DB
- **Type 3 (Class III) – Fine protection.** These devices are used for protection against Low Energy Surges which can damage sensitive equipment. These devices are normally situated as close as possible to the equipment to be protected. Type 3 devices may be used in all areas of electrical / electronic applications including:
 - Mains power supply ac and dc
 - MCR (Measurement, Control and Regulation)
 - Information technology and Telecommunications
 - Transceiver systems.

Type 3 devices should also be used in conjunction with Type 2 devices.

When do we use protection devices?

Around the world all electrical and electronic equipment will be exposed to some form of damaging transient activity. The cost of protection is almost always less than the cost caused by the consequences of surges.

It is therefore obvious that the use of SPDs (Surge Protection Devices) is an imperative and should always be considered in any facility.

What else?

It is also important to note that an effective structural earth system is not an option and must be part of a complete Lightning and Surge protection solution.

- Most protection devices rely on an effective earth system to divert excess energy away from protected equipment
- No earth system means no protection. A poor earth system means poor or no protection
- Beware of potential differences. A potential difference in an earth system is when you have two or more separate earth points connected to the same electrical system. At the time of a lightning strike the voltage rise in the earth will differ at each earth point

depending on their location in relation to the point of the lightning strike, thereby creating potential differences in voltage between earth points. This will cause voltage to find any path from the highest voltage earth point to equalise the other earth points via any cable it finds e.g. data lines, communication lines etc. To stop this phenomenon, make sure that all earth points are bonded together and in turn bonded back to the mains earth

- There are reputable companies in South Africa that specialise in the checking and installation of earth systems

Important to know!

Lightning and surge protection cannot be used for protection against extended over or under voltage conditions. These devices are used to protect against short duration interferences in the pico to micro second range which may be induced into and / or carried by electrical circuits.

Conclusion

Much time and money has been spent to understand the dynamics of lightning and switching transients. With this in mind, reputable manufacturers of lightning and surge protection devices are effectively able to protect equipment against damaging transients when the correct installation and earth procedures are adhered to.

Use a reputable manufacturer or supplier of lightning and surge protection to advise on what type of products should be used for required applications.

”

To prevent catastrophic damage in electrical reticulation, lightning protection is required.



Tony Rayner joined Phoenix Contact South Africa in 2006 as the national product manager for surge and lightning protection products. He continues to support the industry with seminars, technical support and training.
Enquiries: Email tonyr@phoenixcontact.co.za

- Lightning is a natural phenomenon ... occurring around the world.
- Surges are manmade, mostly generated by electrical switching operations.
- A reputable manufacturer should be consulted for advice on lightning and surge protection.



take note

CUI – Copper Insulated Conductor
 HVI – High-Voltage-resistant, Insulated Conductor
 LPS – Lightning Protection System

Sports ground lightning protection from touch and step potentials

Kirk Risch, DEHN AFRICA

Effective lightning protection should be installed for playing fields and sports grounds, as well as for the nearby spectator galleries.

The Rio Olympics 2016 serves as a reminder that sporting events can gather thousands of unsuspecting people from all walks of life together into one big space – an open sports field. Statistics show that the highest frequency (45%) of South African lightning strikes occur in open areas, including sports fields, and it is ranked the highest in the frequency of lightning strikes activity. As a recommendation, DEHN Africa advises that effective lightning protection is installed for playing fields and sports grounds, as well as in the nearby spectator galleries.

The damage that can be caused by increased thunderstorm frequency has resulted in greater emphasis being placed on protection measures against lightning strikes on floodlights, spectator galleries, fences or even playing fields, which can endanger sports persons and spectators. People who are directly hit by lightning, or stand next to lightning current carrying objects or who, as a result of a flashover may even be carrying partial lightning current themselves, could sustain serious injuries or possibly die. Moreover, those who are not directly hit by the lightning, but are standing next to the point of strike (potential gradient area) bridge a life-threatening voltage difference with their legs (step voltage) or by touching other people. This may result in injuries such as ventricular fibrillation, cardiac arrhythmia and injuries caused by fright. Hence the lightning protection installation requires that protection measures must be considered:

Structures that could easily be struck by lightning must sufficiently be equipped with permanent effective lightning protection systems. It is crucial to recognise these areas as hazards, so that dangerous areas can be evacuated and buildings or designated shelters can be sought in the event of a thunderstorm. Additional lightning protection measures reduce the risk of injuries in critical areas that contain floodlights, metal fences and escape routes.

Lightning protection for buildings or lightning equipotential bonding

Covered stands, locker rooms and clubhouses provide shelter in case of unexpected heavy rainfall and thunderstorms. A lightning protec-

tion system (LPS) according to Lightning Protection Level (LPL) III as per SANS 62305-3 [1] (IEC/ EN62305-3) is at least required for these types of structures. In the event of a lightning strike, partial lightning current may also flow through metal fences, parts of the spectator gallery and flagpoles or even the scoreboards. This could result in an uncontrolled flashover which may cause fire and jeopardise people and animals in close proximity. In order to prevent this, all conductive elements in the LPS, like railings down conductors, fencing, etc. should be equipotentially bonded to earth. After this, the installation of a LPS to the 230/400 V power supply system at the entry point of the main low-voltage distribution board, is required. In addition, the associated lightning equipotential bonding system for metal and electronic systems prevents fire in these structures.

Isolated air-termination system

According to the latest lightning protection standards, isolated air-termination systems can be used to protect metal floodlight pylons, parts of the spectator gallery, scoreboards and flagpoles against direct lightning strikes. These parts are conductively connected with sensitive electronics. Isolated air-termination systems can prevent flashover. Consequently, no lightning currents will travel through these structures, thus preventing dangerous lightning currents from flowing into sensitive electrical systems. The height of the air-termination tip depends on the relevant class of LPS, which must be determined in advance. The HVI conductor can be directly installed at the pylon in line with the installation instructions using system-specific accessories to prevent lightning currents from flowing through the pylon and the electrotechnical installation.

Lightning protection for floodlights

Floodlights next to the sideline or spectator galleries should also be provided with a lightning protection system. The earth-termination systems of the individual pylons should be connected to each other and to the earth-termination systems of the sports buildings (club houses, locker rooms or technical buildings). These additional con-

”

The highest frequency (45%) of South African lightning strikes occur in open areas, including sports fields.



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nections improve equipotential bonding and the efficiency of the individual foundation earth electrodes. If correctly installed, they form a protected volume in case of a direct lightning strike to the cable routes of the floodlight.

Standing surface insulation, touch and step voltage (potential control)

People standing directly next to lightning current carrying floodlight pylons, fences, flagpoles or cover stands during a lightning strike are exposed to high potential differences with their legs (step voltage) or may directly touch conductive structures (touch voltage). The potential risk and injury can be reduced by insulating the standing surface (standing surface insulation), and this measure reduces the risk of impermissibly high touch and step voltages following a lightning strike. According to SANS 62305 (IEC/EN 62305) [1], an insulating asphalt layer of at least 5 cm around these parts is sufficient. As an alternative, CUI conductors with dielectric strength of ≥ 100 kV (1,2/50 μ s) can be used.

Conclusion

Potential control also allows for step voltages to be reduced and additional earthing conductors are buried around the pylons or metal spectator galleries and they are interconnected. Consequently, the potential difference in the probable control area is reduced and the lightning current is evenly distributed in the ground. When the distance from the pylon increases, the depth increases as well by 0,5 m. The more evenly the earth electrodes are installed, the lower the potential difference (step voltage). Thus, the risk of injury is considerably reduced.

Reference

- [1] SANS 62305-3. 2011. Protection Against Lightning - Part 3: Physical damage to structures and life hazard.

- The highest frequency of lightning strikes activity occurs in open areas, such as sports fields.
- This often causes serious injury to people and damage to equipment and property.
- Effective lightning protection must be installed for playing fields, sports grounds and spectator galleries.



Kirk Risch joined the South African Air Force in 1988 as an apprentice, learning trade skills in radar technologies and electronics. He also holds a diploma in marketing. In 2010, Kirk joined Webb Industries, a specialist ancillary telecommunications company, becoming its lightning and surge protection expert. He joined DEHN Africa as sales and marketing manager in 2013, becoming sales and marketing director the following year. Enquiries: Email kirk.risch@dehn-africa.com



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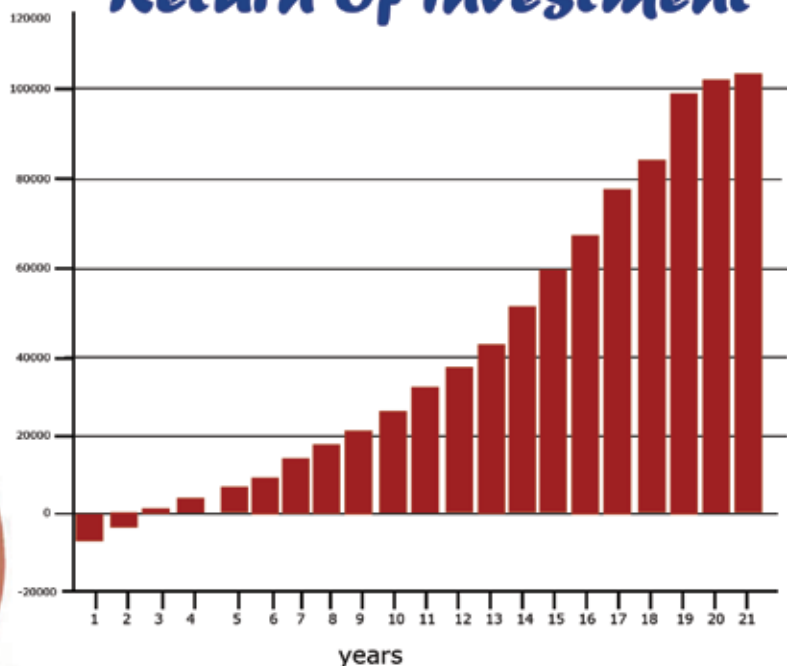
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Average Cost per kWh	Bussiness (payback period-yrs)	Individual (payback period-yrs)	Average Cost per kWh	Bussiness (payback period-yrs)	Individual (payback period-yrs)
R 1,30	5,7	6,6	R 1,30	5	5,8
R 1,64	4,8	5,5	R 1,64	4,1	4,8
R 2,05	3,9	4,6	R 2,05	3,4	3,9
R 2,28	3,6	4,2	R 2,28	3,1	3,5

EnergyBOX 2

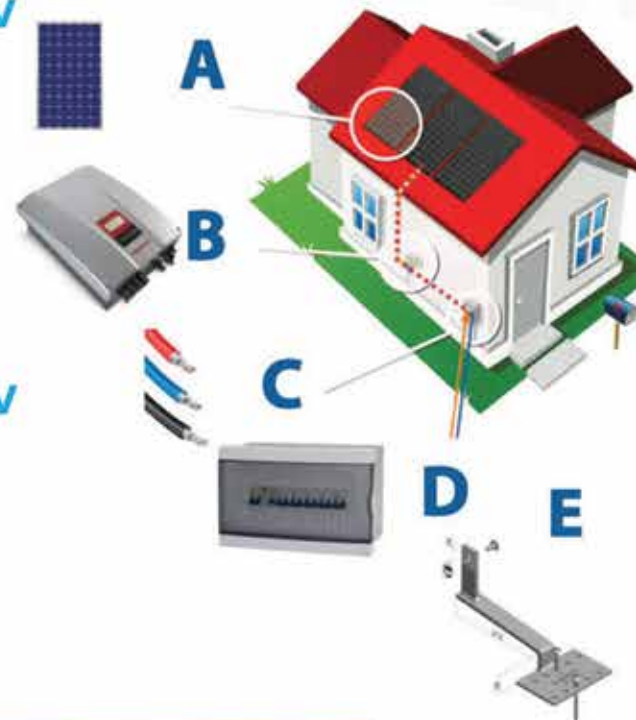
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HHK was established in 1976 by Helmut Hermann Kanwischer (HHK). Helmut emigrated in the late 1960's to South Africa and saw the potential in South Africa as having one of the highest ground flash density of lightning discharges in the world. From a humble beginning of having just a simple secretarial service and garage, he developed his business plan and through his vision, innovative thinking, unrelenting determination and will-power, forged the Company into what it has become today.

HHK has become the biggest lightning protection and earthing contracting Company in the Southern Africa region, which has never changed hands, Company name or logo, etc. for the last 40+ years. Their Head Office is in Johannesburg (Northcliff) with eight branch offices and approximately 160 people in their employ. The Company obtained the SABS Quality Management System listing on 16 October 1987 and thereafter has grown from strength to strength. Helmut is also a member on the various SANS/IEC committees/working groups for lightning protection, earthing and surge protection Standards.

HHK provides complete turnkey solutions including design, soil resistivity surveys, installation, final commissioning and certification, as well as 'as built' design drawings approved by SANS for any project from simple golf/bus shelters and residential houses to major structures and mining plants, etc. At present one of their biggest contracts ever is the Husab Mine Project in Namibia with a turnkey value of well over R35 million for the overall lightning protection and earthing installation.

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as modern and stylish design. 90 ReStart devices restore power supply quickly from automatic circuit breaker trips, but only after checking the system status. In addition, the Autotest function periodically tests the functioning of the residual current circuit breaker protection without disconnecting the system from the power supply. The range includes two pole and four pole versions.

The 90 RCD range includes the MDC monobloc compact residual current circuit breaker with overcurrent protection, the BD and BDHP add-on modular residual current devices for MT and MTHP miniature circuit breakers and the SD residual current circuit breaker.

The 90 AM range consists of auxiliaries for circuit breakers and many modular accessories for protection, command, programming, measurement and signalling in electric systems.

The LST surge protection range guarantees excellent protection of loads and power distribution systems. The 47 CVX range of distribution boards is available in both modular and monobloc systems from

160 A to 3 200 A. In both surface or flush mounting types, these boards are available in a variety of IP ratings to suit most applications. Thanks to the extractable frame and quick connection of brackets, rails and functional profiles, the 160 A board allows quick assembly. Because the 630 A boards are based on a 'completely open structure', board wiring operations are quick and easy.

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Flotation level measurement techniques

Richard Rule, eDART Slurry Valves

Considering the common level measurement options available in the flotation plant today.

The requirement for good level control of flotation machines is well established and documented. This article focuses on the more common level measurement options available in the flotation plant market today and the pros and cons associated with each one. All level control loops consist of essentially three main components:

- * Level measurement sensor
- * Level controller
- * Level control valve

In order to achieve good level control each of the components need to work well.

A well known expression amongst Control and Instrumentation engineers is 'the most reliable measurement will always be non-contact and have no moving parts'.

The reason for this is linked to the robustness and reliability of the instrument. Any instrument that is in contact with the measured medium and has moving parts is going to be far more prone to failure, more so, if that medium happens to be slurry.

Unfortunately this is not always achievable and in this case, we generally settle for as close to the ideal as is practically possible.

Level measurement of a flotation cell is not as straightforward as it first sounds. By 'level' we mean 'froth depth'. Of interest in a flotation cell is the depth of the froth above the slurry, as this determines the grade of the resulting concentrate. The typical range for a froth depth of a flotation cell is 600 mm from the top of the cell, the launder, down to the slurry interface. Here we are actually trying to measure the depth of a froth, or foam layer. As the level we are interested in is covered in froth, measuring it is a lot more challenging.

Measurement techniques

All the measurement techniques share a few common requirements, such as the ability to transmit the measured level back to the control room reliability, often through a hostile environment, resist EMI and

RFI, and update within an acceptable time frame. The loop powered current signal which works on a range of 4 – 20 mA is by far the most common way of transmitting a level signal to the control room. It has proven itself as being reliable, stable and has the useful ability to indicate a wire break or fault. As the current signal would then fall away to zero.

Modern digital bus technology is gaining popularity due to the minimising of signal cables required and even more recently wireless transmitters have been introduced, which eliminate signal cables altogether. Even though changes in level in the average flotation cell are relatively slow the signal needs to be updated frequently. For control, you always want your sample rate to be at least ten times faster than your loop update rate, and you need to refresh the level signal – at worst, once per second.

One of the oldest level measuring techniques is via a rotary potentiometer connected to a float arrangement. The float at the slurry or froth interface is connected to the rotary potentiometer by a set of mechanical linkages not unlike a pantograph. This is a simple instrument, but it has been so unreliable that it is seldom used in modern plants. The mechanical linkages become stiff and jammed with froth and eventually the instrument does not respond to the changes in level. These devices are maintenance intensive. In addition the conversion from the linear movement of the float to a rotary potentiometer introduces a non-linear error as well. With all float systems, if a cross current exists in the flotation machine it will be necessary to install a stilling well around the float.

An ultrasonic level measurement alone cannot be used as the froth absorbs the ultrasonic signals, likewise with infrared and radar.

Probably the most common, although not ideal, method of measuring level in a flotation cell is via a combination of an ultrasonic level transmitter and a target plate assembly. This technique involves connecting a 'target plate' to a float and then measuring the changes in height of the target plate using an ultrasonic instrument.

The ultrasonic transmitters are now a mature technology having been in the market for over 15 years and supplied by a number of

EMI – Electronic Measurement and Instrumentation
RFI – Radio Frequency Impedance

Abbreviations/Acronyms

”

Level measurement of a flotation cell is not as straightforward as it seems.

world class instrumentation suppliers. Generally they work well and are cost effective.

However, the problem with this technique is once again with the mechanical components that are in contact with the froth and slurry.

They suffer from coming into contact with the froth, causing them to stick or jam, and the slurry build-up changes the buoyancy of the float. All resulting in increased maintenance and wear rates and decreased reliability.

Guided wave radar is a step closer to the ideal instrument in that it does not have any moving parts. These instruments use a metal tube as the antennae, or wave guide, for the radar. The wave guide is extended into the slurry interface, the radar signal traveling along the wave guide is reflected back off the slurry interface to be detected by the instrument.

The time the signal takes to return to the instrument is directly proportional to the level. A slurry build up on the wave guide used to be a problem for this technique instrument, however the introduction of modern instruments that feature multiple frequency radar waves have virtually eliminated this problem. Even so these units are not popular for the simple reason that they are costly, when compared to the alternatives.

Understanding that flotation concentrators often have in excess of fifty flotation machines requiring level measurement, explains the customer's sensitivity to cost per level point.

Another approach, which is fairly common is based on the magneto-resistive principal. Here a magnetic sensor within a sealed pipe moves in relation the slurry level in the flotation cell, up and down, a wire sensor.

The signal transmitted down the wire is reflected by the induced magnetic field in the wire sensor and therefore indicates the level in the flotation machine. This type of sensor is accurate and repeatable and it also has extremely fine resolution, in the order of 0,5 mm. However as the magnetic sensor is coupled to a float on the slurry



interface, it is susceptible to slurry build up as in all float systems. Despite this, it is now one of the more successful techniques in the market.

Conductance type level sensors can also be found in this market. Here the sensors make use of the electrical conductivity to indicate the slurry level. As the slurry level changes so does the conductance of the sensor. Sometimes also referred to as resistivity type instruments as conductance is the reciprocal of resistance, or resistivity. As the ore is never consistent, these sensors suffer from the fact that ore changes, changes in the conductivity of the water, or reagent changes in type and strength will result in a change of conductance measured, resulting in frequent re-calibration requirements. More modern instruments include more than one measurement technique which has resulted in more reliable measurements.

There is a lot of exciting development work being done using this measurement principle. These instruments have been developed to the extent that they can give an output signal of 'froth density' over the length of the measured range and the froth or slurry interface as well as the froth height, other than the simple slurry interface point. Again, it is the sophisticated instruments that work fairly well, which come at a cost.

Theoretically, it is possible to use X-Ray to determine the slurry level interface however the costs and safety considerations make this an impractical option. Personally, I have never seen such an instrument in use in flotation.

Conclusion

As you can see there is no shortage of choice for flotation level measuring instruments out there but as yet none of them meets the full requirements for the ideal instrument, 'Non-contact and moving parts', so the search continues ...

- 'The most reliable measurement will always be non-contact and have no moving parts'.
- Any instrument that is in contact with the measured medium and has moving parts will be prone to failure... especially if the medium is slurry.
- There is not one flotation level measuring instrument that meets all the requirements for the ideal instrument.



Richard Rule studied HND in Instrumentation and Control on an AECI bursary. He completed his studies in 1990. He joined Outokumpu, specialist flotation and mineral processing equipment supplier, in 1996, as Control and Instrumentation Engineer and Project Manager. He started eDART Slurry Valves with Mike Sessions in 2005 to produce slurry control valves.

He left Outokumpu in 2009 as manager responsible for process upgrades, to join eDART Slurry Valves full time where he is Director. Enquiries: Tel: +27 (0) 11 823 6620 or email richardr@edart.co.za

Ultrasonic sensor for wireless tank level monitoring

RET has introduced their Sure Cross U-GAGE K50U Ultrasonic Sensor for use in wireless tank monitoring applications from Banner Engineering. Optimised for use with Banner's Q45U Wireless Node, the pair provide a cost effective, plug-and-play solution to monitor levels in mobile or remotely located tanks and totes. The K50U reliably detects distance from target to sensor in ranges between 300 millimetres up to 3 metres, and features built-in temperature compensation for accurate measurements. The sensor features a standard 1¼" NPT connection and can be combined with the optional BWA-BK-006 bracket and Q45U Wireless Node (sold separately) for an easy-to-mount, IEC IP67, NEMA 6P level monitoring solution.

"Paired with our Q45U wireless node, the K50U delivers a turnkey, single-sensor remote

monitoring solution that is both rugged and affordable. It can also function as a component within a much larger, more complex network with Banner's many wireless sensors and nodes," said Tim Hazelton, Wireless Product Manager, Banner Engineering. "Customers who also purchase our DXM100 programmable controllers can take full advantage of this solution, and set high-high, high, low, and low-low alarms," Hazelton added.

The sensor is an ideal solution for a range of applications beyond liquid or chemical tank level monitoring, such as pallet presence sensing or monitoring dry material level in a hopper.

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LMT sensors reliably detect levels in storage tanks in explosive areas. They can be used in zones 2 and 22. The sensor with its high-quality housing materials such as high-grade stainless steel (316L / 1.4404) and PEEK meets all requirements for hygienic areas. This includes approvals such as EHEDG and FDA.

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WIKA's model FLM-H magnetostrictive level sensor has been specifically designed for the requirements of the food and beverage, pharmaceutical and biotechnology industries. The sensor is particularly suitable for the special conditions of CIP/SIP cleaning processes, such as chemical stability towards cleaning liquids and high temperatures. The guide tube is directly welded to the process connection, which guarantees a crevice-free connection, additional sealings are not required. The sensor is supplied with a dc voltage of 10 ... 30 V. Available output signals are 4 ... 20 mA or 4 ... 20 mA with HART signal. The hygienically designed sensor housing, with an ingress protection of up to IP 68, offers a secure protection for external cleaning with splash water and enables its use in high-humidity environments. The model FLM-H sensor fulfils the high demands of sanitary applications. It is marked with the 3-A symbol and current version number, as it conforms, based on a third party verification, to the 3-A standard.

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Internet of Things ... more than a vision

After automating its processes, the Swiss chemical distributor Brenntag Schweizerhall has found an entirely new business model. Basel (Switzerland) is a stronghold of the chemical industry. This explains why the demand for primaries and base materials such as sulfuric acid, hydrochloric acid and caustic soda is so great in that region. One important supplier of these products is Brenntag Schweizerhall AG, whose warehouse and distribution centre in the 'Infrapark Baselland' is in the immediate neighbourhood of its customers. The company asked **Endress+Hauser** to automate its plant and at the same time ordered a logistics concept guaranteeing ultimate safety and efficiency from storage right through processing to the delivery of products.

Direct supply to customers

Today, the site features a totally new infrastructure with storage tanks and blending units, plus a pipeline network which allows Brenntag Schweizerhall to supply its customers directly. "Until recently, we carried about 30 000 tonnes of hazardous materials by truck to our customers every year. This resulted in relatively high transportation costs," explains Wolfram Heymann, Chief Executive Officer, Brenntag, Schweizerhall. "Our aim was to optimise the supply chain, not only commercially, but also with regards to safety on site because the corresponding loading and unloading operations were no longer required."

Logistics and commercial processes

For this reason, it was not only the automation of the manufacturing process that was highlighted. The logistics and commercial processes were also scrutinised. Working closely with Brenntag Schweizerhall, Endress+Hauser synchronised the data flow along the value-added chain and the data exchange between the actual process control system and the customer's ERP system. Today, the central business processes between all stakeholders can be handled in a common network.

"The cross-system access to information enhanced efficiency and effectiveness helping us to make severe cutbacks on data administration costs," says Roger Jaggi, Head of Engineering Solutions at Endress+Hauser Switzerland. "At the same time, we wanted to keep plant operation as simple and easy as possible." The controls were programmed and set up for the customer using tried and tested standard components. Personnel operate the plant via software that provides graphic visualisation of the process.

Appropriate sensor technology

One important interface is Endress+Hauser's software, SupplyCare: the platform for inventory management relies on the appropriate sensor technology in the tanks to monitor replenishment and deadline scheduling, also allowing the full visualisation of stocks and inventories on the screen – both on site at the operating stations and at the headquarters in Basel. Thanks to the networked supply chain, Brenntag Schweizerhall can now keep stocks low and avoid delivery bottlenecks. Using the fast links of the local fibre optic network, end customers today report their requirements directly to the control system – without the red tape in order handling, and with the automated inventory management ensuring that the tanks and warehouses are always sufficiently full. "No matter how much the customer requests – thanks to automation, the product can now

be supplied efficiently, safely and on time in the desired quantity and degree of dilution," says Roger Jaggi.

Browser-based solution

The direct access to device and process data using a browser-based solution also makes maintenance and service work easier, with the latest device status called up in next to no time. Endress+Hauser's experts are capable of remote monitoring maintenance intervals or of responding to error messages while en route. Thanks to the online access to all data and documents, the source of the error or malfunction is quickly identified. The customer is automatically notified in the event of maintenance work or a change in product availability.

Close collaboration

The close collaboration between Endress+Hauser and Brenntag Schweizerhall from the planning stage to commissioning, pays dividends. "Procurement is a great deal easier today. We've optimised warehouse capacities, increased flexibility in production and cut logistics costs," summarises Wolfram Heymann. "Now we not only have an automated warehouse for chemical base materials, we also have a totally new business model where all our customers and suppliers are integrated in a common network."

The modern plant not only safeguards efficient and timely deliveries to end customers – it has also become safer thanks to the pipeline system. CEO Wolfram Heymann: "The integrated solution has allowed us 1 500 hazardous goods transports off the road – and to eliminate all related loading and unloading processes."

Safe processes

The raw chemicals are supplied by pipeline, rail or truck and stored. Flowmeters (A) measure the quantities. Endress+Hauser instruments continually monitor levels in all tanks (B) and temperature sensors and overflow prevention systems provide safety. The mixing process in the blender (C) is automated. Flow and temperature measurements provide the basics and density and conductivity parameters increase process safety. Customers in the neighbourhood are supplied via pipelines, with trucks used when needed. Flowmeters (D) measure the quantities handled.

Enquiries: Hennie Blignaut. Tel: +27 (0) 11) 262 8007 or email hennie.blignaut@za.endress.com



Pressure calibrator for gas custody transfer measurements

Fluke, represented by **Comtest**, has on offer a new 'Ex' Dual Range Pressure Calibrator for use in classified environments, offering ranges, accuracies and capabilities ideal for gas custody transfer measurements. The new Fluke 721Ex, with IECEx and Atex Ex ia IIBT3 Gb (Zone 1) ratings, is available in 14 models and can be used with a Fluke 720RTD probe for temperature measurement. Fluke has also introduced 700 series pressure test hose and pump kits which minimise the difficulty and leaks when connecting a pressure calibrator or pump to a device under test. The quick installation, without the use of tools, increases efficiency, and saves time. These pressure accessories are a best-in-class set of premium hose and NoTools Required (NTR) pressure connection accessories.

The rugged Fluke 721Ex Dual Range Pressure Calibrator, featuring two isolated, stainless steel, pressure sensors with accuracies to $\pm 0.025\%$ Full Scale, provides measurement of static pressure, difference in pressure and (optional) temperature of gas flow. The Fluke 721Ex is configured by choosing either a 1.1bar or 2.48bar low-pressure sensor, together with one from seven high-pressure ranges, including 6.9, 20, 24.5, 69, 103.4, 200, or 345 bar. The large backlit display will show two pressure readings and a temperature reading simultaneously. Up to five frequently used setups can be stored.

Fluke 700 Pressure Calibration Test Kits introduce a new family of pressure connection accessories to make the difficult task of making pneumatic and hydraulic pressure test connections easy and leak free.

Enquiries: Tel. +27 (0) 10 595 1821 or email sales@comtest.co.za



Smallest foundry robot in its class

ABB Robotics has introduced its latest foundry robot for material handling and machine tending, the IRB 1200 Foundry Plus 2. The smallest foundry robot in its class, this compact robot can increase flexibility and reduce cycle times for precision die casting processes such as smart phone cases and other electrical components.

Now protected with Foundry Plus 2, ABB's optional protection system, the IRB 1200 can withstand harsh environments and meets the requirements of protection ratings IP66/67. The IRB 1200 Foundry Plus 2 is IP66/67 compliant from base to wrist, meaning that the robot's electrical compartments are sealed against liquid and solid contaminants. ABB Foundry Plus 2 robots are also unique due to their superior resistance to corrosion and capability to withstand high-pressure steam washing.

"Foundry robots have long contributed to the productivity and speed of heavy-duty metal casting and automotive applications, and are now becoming



increasingly important in consumer electronics applications to cast light weight metals," says Dr. Hui Zhang, head of product management, ABB Robotics. "This robot will allow our customers to increase productivity, deliver better work piece quality and reduce cycle times."

First introduced in 2014, the IRB 1200 comes in two variants which can handle a wide range of applications and are cost effective due to commonality of parts. The 700 mm reach variant can carry a payload of up to 7 kg, while the longer reach 900 mm variant can carry up to 5 kg of payload. The IRB 1200 is also available with Clean Room protection.

Enquiries: Ragnar Tonnessen. Tel. +27 (0) 10 202 5787 or email ragnar.tonnessen@za.abb.com

Chemical injection on oil rigs, sub-sea drilling and fracking

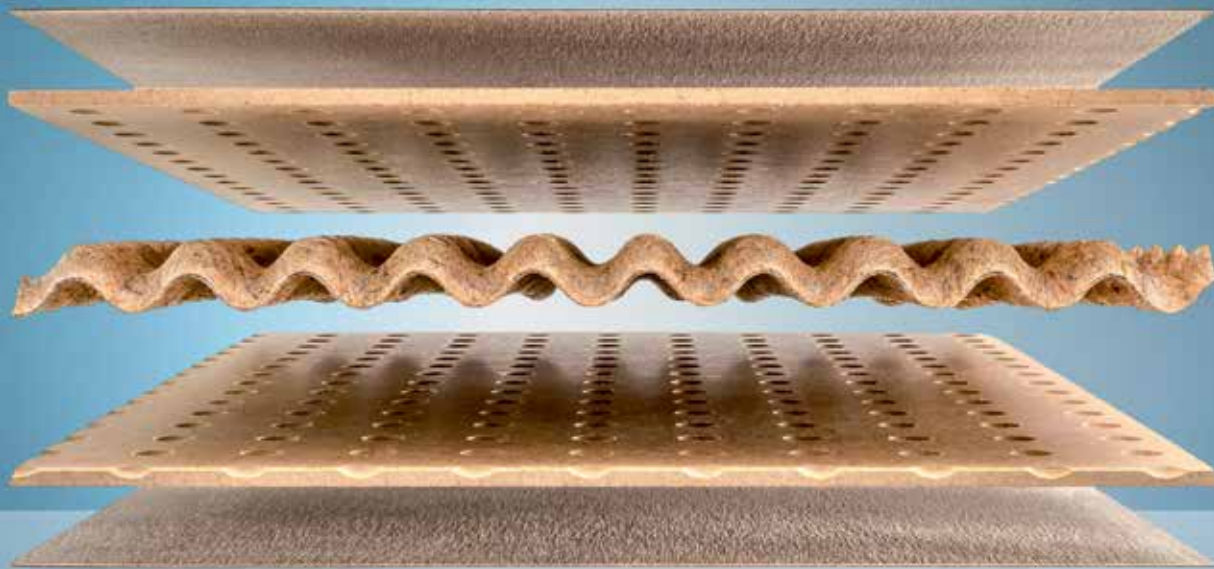
High-pressure processes for chemical injection systems, for example on oil drilling rigs or offshore platforms are a challenge for any flow measurement system. Chemicals added by injection through a bore pipe at high pressure directly at the wellhead increase water viscosity and enable efficient detachment of oil from the reservoir rock making its transport easier. In order to control the process, the injected chemicals must be measured accurately. Conventional volumetric systems such as gear flowmeters or turbine flowmeters cannot be used for all media due to different liquid properties and big differences in density and viscosity, and do not provide the same results in terms of accuracy and reliability.

KOBOLD, represented locally by **Instrotech**, offered their reliable, fail-safe solution, High Pressure Coriolis Flowmeters. The Coriolis Flowmeters, special forms of measuring loops, combined with special materials (different stainless steel versions, HP 160, Duplex) and heat treatment methods allow users to work with operating pressures up to 1 500 bar, extremely low flow rates from 1 kg/h and thus, offer a reliable solution for high-pressure processes.



The Coriolis Flowmeters are highly accurate despite large differences in density and viscosity, reliable because they have no moving parts, and are able to measure the smallest ranges possible.

Enquiries: Tel. +27 (0) 10 595 1831 or email sales@instrotech.co.za



Drilling holes with advanced PC-based control technology

Stefan Ziegler, Beckhoff

Advanced PC-based control technology has been onboard this company's machinery from the start.

With the company's lisocore lightweight construction material, lightweight solutions is a pioneer both in terms of the end product and the manufacturing equipment that makes it. Advanced PC-based control technology from Beckhoff has been onboard the company's machinery from the start. Beckhoff multi-core technology, implemented via a C6650 Industrial PC and TwinCAT 3 automation software, provides the required flexibility for lightweight solutions' unique processes.

The idea for lisocore came to Michael Schäpers in 2004 during a lecture on statics at the Rosenheim University of Applied Sciences. This is when he realised that a shell structure as the centre layer in a sandwich construction would be ideal as a load-bearing material.

Based in Bad Aibling, Germany, lightweight solutions GmbH is the result of that original idea. The company's lisocore product is an extremely efficient, lightweight construction material that consists of two thin cover layers over a three-dimensional core structure. Point-milling the cover layers creates indentations that lock the core structure firmly in place with the help of high-strength adhesive. The result is a classic sandwich-style element, but one with unique load-bearing properties compared to common chipboard. Half the weight and twice the bending modulus of elasticity is what makes this material so special.

Customised solutions for special machinery

When you manufacture a totally new product, traditional machines do not get you very far – you need a customised automation solution, as Michael Schäpers remembers. He says that when his team developed

the first machine with Beckhoff in 2005, pioneering work had to be done. There were no standards and very little experience to design the machines that were needed, so flexibility in automation was the top priority. They actually developed the exact production parameters while building the system. Accordingly, they had to be able to quickly respond to any changes, meaning that the entire system had to be connected by fieldbus technology. They also needed the ability to easily add new drives and safety modules that were not part of the original design. Pre-assembled modules or devices that could not be subsequently changed were not permitted.

A multi-core IPC controls the entire system

Today, lisocore is built on a line developed by lws maschinenbau GmbH, a subsidiary of lightweight solutions. Covering a floor area of 500 square metres, the line drills cover layers, applies the adhesive and combines the layers with the 3 D core to form the sandwich boards before stacking and packaging steps. The core panels, in turn, are manufactured from a special non-woven fabric on one of four internally-developed down stroke presses, each of which is controlled by a C6920 control cabinet Industrial PC (IPC). The main challenge for this very large production line was the implementation of the complete automation system on a single IPC. What made this possible was the ability provided by PC-based control from Beckhoff to assign certain control operations to individual processor cores.

Such a multi-core system would have been impossible without TwinCAT 3. To process the various tasks, they had four CPU cores at their disposal. Moreover, with the EtherCAT-based technology from

Daniel Rauh, Head of Production at lightweight solutions, Michael Schäper, Managing Director of lightweight solutions, and Jens Hülsebusch, Project Manager Systems Engineering at Beckhoff, show off the control system.



”

Half the weight and twice the bending modulus of elasticity makes this material special.

Beckhoff, they did not have to worry about the communication lines within the system. It was very easy to feed the process data gathered from the machine back into the control system – a special feature that helps when developing new procedures and products. You must be able to fully interact with the machine and access the control data. Another Beckhoff benefit is the Twin-CAT Scope tool, a software oscilloscope that allows you to analyse workflows in detail and call up all necessary data for a new process. All of these features deliver huge speed benefits for production and process development.

Broad multi-core support

According to Michael Schäpers, the multi-core capabilities of Twin-CAT 3 software were at the forefront of the decision to use the automation solution. These capabilities are used in the following ways: The first core runs the HMI under Windows. The second core handles additional HMI tasks and runs TwinCAT NC PTP to control the NC axes. The third core runs the TwinCAT software for servo-hydraulics of the flat press, and TwinCAT PLC runs on the fourth core.

One special feature of the servo-hydraulics, particularly with their large number of NC axes, is the way they interact with the control technology. Both the electrical and the hydraulic controls run under TwinCAT, which makes it possible to map the process cycle with great precision.

Leveraging these features of PC-based control technology, all functions can be bundled onto a single PC, delivering an additional margin of safety with regard to component availability. Since all programs run on a single computer, keeping a second IPC ready as a backup for redundancy is easy.

Flexible access to all control data

Although the system may look highly complex, it is actually quite manageable. The architecture is divided into various groups, each of which has its own control cabinet and its own I/Os. To optimise the line, you must be able to add or remove functions easily. To operate such a large system professionally, you need a controller with flexible access options, and the Beckhoff control system meets these requirements perfectly.

To demonstrate the system size and complexity, the following are some of the key components: The C6650 cabinet-mounted IPC with quad-core Intel Core i7 processor controls almost 900 EtherCAT slaves, including EtherCAT Terminals and EtherCAT Box I/O modules, as well as AX5000 Servo Drives split between two EtherCAT masters in the field. A total of 130 NC axes are calculated in a 2-ms task and

moved via 73 AX5000 Servo Drives that, in turn, are equipped with AX5805 TwinSAFE cards and control AM8000 servomotors with One Cable Technology (OCT). The line also employs XFC (eXtreme Fast Control) technology, TwinCAT 'Flying Saw' functionality and four CP79xx Control Panels, making machine operation easy.

Among the most difficult tasks that the machines have to perform at lightweight solutions is travelling to the immense numbers of drilling and gluing points. Adhesive must be applied to 15 000 drill holes in less than 20 seconds with high accuracy. No one had ever done this before, so the flexible Beckhoff control technology was the only means available to handle this complex process required to manufacture Iisocore economically.

Since commencing production in Bad Aibling, lightweight solutions has steadily ramped up its production output to keep up with demand. Future plans call for a system with two- to three-times the capacity of the current line. "We will operate with four feed-in stations and two drill-and-glue stations," explains Michael Schäpers.

Conclusion

The Beckhoff IPC proves its performance not just with regard to the increase in production capacity. Since the multi-core capability of TwinCAT 3 enables the IPC to handle additional tasks, lightweight solutions decided to integrate its building control system into the PC-based controller. Industrie 4.0 is another important aspect for the future. As a first step on its implementation of this concept, the company has already connected the entire automation platform to its SAP system, which is why Michael Schäpers has already decided that: 'As a specialty machine builder, we will continue to count on support from Beckhoff as we move towards Industrie 4.0'.

- When you manufacture a new product, traditional machines don't do the trick.
- You need a customised, automation solution.
- With the company's Iisocore lightweight construction material, 'lightweight solutions' is a pioneer when considering the end product and the manufacturing equipment that makes it.



Stefan Ziegler is in marketing communications at Beckhoff Automation. Enquiries: Kenneth McPherson. Email kennethm@beckhoff.com

Push-In Plus reduces panel-wiring time by 60%

Victor Marques, Omron South Africa

When building a modern control panel, wiring the components is almost always the most time-consuming part.

Any new way to reduce this time is good news for panel builders and their customers. That is why Omron has taken the concept of Push-In Cable connection to a new level by developing a patent-pending system called Push-In Plus technology. The result is that wiring a control panel can now be achieved in 40% of the time it used to take with conventional screw block terminals. Moreover, Push-In Plus technology provides a connection five times stronger than the IEC standard, and which requires no re-tightening after transit or during maintenance.

Push-In Cable connectors have been available for many years. Unsurprisingly, they provide quicker connection than screw-based terminal blocks. However, when stranded wire without ferrule is used, panel builders need to open the locking gate with a screwdriver with one hand, while they thread the wire with the other. Such single-handed threading can be a little awkward.

In addition, the manual force required to push in the wire to achieve a stable connection can cause muscle-fatigue and Repetitive Strain Injury (RSI) – especially with the more complex panels, which may have as many as 200 to 300 components, and more than a thousand wires that need connecting.

Push-In Plus technology from Omron has all the time-saving benefits of traditional push-in terminals, with none of the drawbacks. It can be used with ferruled wire, bare stranded wire or solid copper wire. For all three wire types, the engineer has both hands free to thread the wire – hence no awkward single-handed threading. What is more, the engineer only needs a very light force to make a stable connection – less than the force required to insert an earphone jack.

Perhaps what is most surprising about Push-In Plus technology is its tensile strength. Once inserted, it requires a very large force to dislodge the wire – more than five times the IEC standard. Of course, the wire can be disconnected quickly and easily by inserting a screwdriver to open the clamp.

Push-In Plus technology

- Very light insertion force – less than an earphone jack
- Extreme long-term stability

- 60% faster than traditional screw-type terminals
- No re-tightening necessary
- Both hands are free to thread the wire

The operating principle of Push-In Plus technology is similar to conventional push-in terminals: a spring-loaded latch is positioned in such a way that a wire can squeeze through the contact point easily, but is then held in place due to the unidirectional nature of the spring. However, thanks to patent-pending developments, superior materials and advanced manufacturing techniques, Omron has optimised this principle to minimise the insertion force and maximise the tensile strength of the connection.

With ferrule or solid wire

In the case of wire with ferrule, or solid wire, the contact spring is opened automatically when the conductor is pushed in, and thereby provides the required pressure force against the current bar.

- Simply insert the wire – that is all.

With stranded wire

- Insert a screwdriver into the hole-release aperture to open the latch
- Leave the screwdriver in the aperture
- Insert the wire
- Release the screwdriver in order to fix the wire

The Omron difference

The high-performing Push-In Plus technology has been developed by Omron drawing on its experience and expertise in its core competencies of switch and relay technology. Thus mechanical engineers have been able to optimise the form, balance, and repulsion force of the spring-loaded latch. We also researched and tested the best-fitting materials, and optimised their thickness and overall dimensions. On

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Push-In Plus technology has all the time-saving benefits of traditional push-in terminals, with none of the drawbacks.

- Push-In Plus technology is a level ahead of Push-in Cable Connection.
- Push-In Plus reduces the effort it takes to wire a component.
- Push-In Plus technology is the result of well researched design and advanced engineering techniques.



take note

top of that, advanced manufacturing systems ensure high-precision production.

In short, Push-In Plus technology is a result of well-researched design and advanced manufacturing techniques. Patents have been applied for.

Conclusion

Push-In Plus technology reduces the effort it takes to wire a component, while ensuring that each wire has been inserted fully, without damaging the ferrule. This has been achieved by optimising the spring-displacement setting, so that the wire material is not deformed. This helps guarantee a solid, reliable connection, yet allows for quick release during maintenance or panel upgrades. The spring connection is not loosened by long-term operation. An accelerated life test simulating continuous operation has shown no deterioration in the connection's tensile strength after four years. Other benefits include:

- Push-In Plus technology withstands vibration during both shipping and operation
- The cable-entry aperture is positioned at the front to support easy wiring
- Push-In Plus technology reduces the wiring effort by about 60%, compared to conventional screw terminals
- The technology also makes it possible to use both hands to thread the wire, even when mounting stranded wires without a ferrule. This is because the screwdriver, used to open the spring-loaded latch, remains in its position without being held

For more information on Omron solutions, visit www.industrial.omron.co.za



Victor Marques is Country General Manager at Omron South Africa, tasked with managing the entire sales organisation in the country. This involves developing the company's sales strategy, as well as overseeing the successful implementation of its long-term strategic goals. Victor commenced his career at Omron South Africa as a Field Application Engineer, from where he was quickly promoted to Cape Town Branch Manager. A further promotion followed to the position of National OEM Business Unit Manager, prior to his current role. Victor completed his engineering studies at the former Wits Technikon, now the University of Johannesburg. He has ensured he remains up to date with the rapidly-changing field of automation by completing a variety of internal courses. In addition, he has completed business management studies through the University of Stellenbosch Business School (USB) in order to hone his management skills. Enquiries: Omron Electronics. Tel. +27 (0) 11 579 2600 or email info.sa@eu.omron.com

Protection ... above and below ground

Booyco Electronics' fully integrated Proximity Detection System (PDS) represents the latest generation of this technology and offers a supply of information, enabling the safety intervention capability with a data hub that allows integration with TMM OEM's equipment as well as with surface vehicles.

The Booyco Electronics PDS was developed using the latest electronic technology to facilitate effective and reliable communication, and is suitable for use both underground and on surface. The PDS transfers information between users via

Booyco Electronics' Human Machine Interface. System communication is exchanged with operators using icons making it easy to understand.

The PDS is deployed following specific risk assessments ensuring fit-for-purpose application and the provision of appropriate information to facilitate safety interventions with TMM and other OEM underground and surface vehicles. The deployment of PDS technology could vary between different types of vehicles on a single site.

These high performance and reliable

systems incorporate VLF technology for pedestrian detection either on surface or underground together with GPS technology for vehicle detection on surface.

The Booyco Electronics PDS delivers specific warning, controlled slow-down and stopping zone alerts around a vehicle when detecting pedestrians or other vehicles. This is unique in that it is able to achieve zone shaping and create narrow band zones in close proximity on the side of the vehicles to meet specific operational requirements.

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Sustainable energy for 2 000 farmers

IdeemaSun energy GmbH, based in Wallerfing, Germany, has started the construction of a large-scale PV-battery system at lake Nasho, Rwanda. The system is composed of a 3,3 MW photovoltaic plant and a 2,86 MWh lithium-ion battery storage making it one of the largest PV-Battery set-ups in the world. The system will provide energy for an extensive irrigation system and stabilise the grid of the Nasho

sector in the Eastern Province of Rwanda. More than 2 000 farmers will directly benefit from the project.

The energy system is part of the Nasho irrigation project, initiated by the Howard G. Buffett Foundation (HGBF) and managed by general contractor Remote Group from Rwanda. It is supported by the government of Rwanda. By providing water for more than 1 200 hectares of land the irrigation system will allow to increase crop productivity and to improve the living conditions of local farmers. IdeemaSun will also invest in the training of local workers in order to allow for capacity building and sustainable operation of the system.

project. Helping people to help themselves is the best way to improve living conditions in a country which is severely affected by poverty," says Mario Eckl, managing director of IdeemaSun energy.

The energy system integrates the horizontal tracking system Safetrack Horizon from IDEEMATEC Deutschland GmbH, PV modules from Trina Solar, inverters from SMA and a battery storage system from TESVOLT GmbH. "We will be the first company in the world to apply the TESVOLT storage system in this megawatt range," Eckl confirms.

The PV-battery system is scheduled to be operational in November 2016.

Enquiries: Email info@ideemasun.com



Switchgear for Elandsfontein Phosphate Mine

JB Switchgear Solutions, near Johannesburg, was recently awarded a contract by DRA in Cape Town for the design, manufacture and supply of numerous boards, variable speed drives and soft starters destined for the Elandsfontein Phosphate Mine project, which is currently being developed in their site located near Saldanha in the Western Cape, approximately 95 kms north of Cape Town. The project is supported technically and financially by EEM's major shareholder, Phosfanatia International, a European business with investments in the phosphate industry. In this instance, JB Switchgear supplied their proven and IEC 61439 certified Eagle series of motor control centres.

Enquiries: Johan Basson. Tel. +27 11 027 5804 or email info@jbswitchgear.co.za



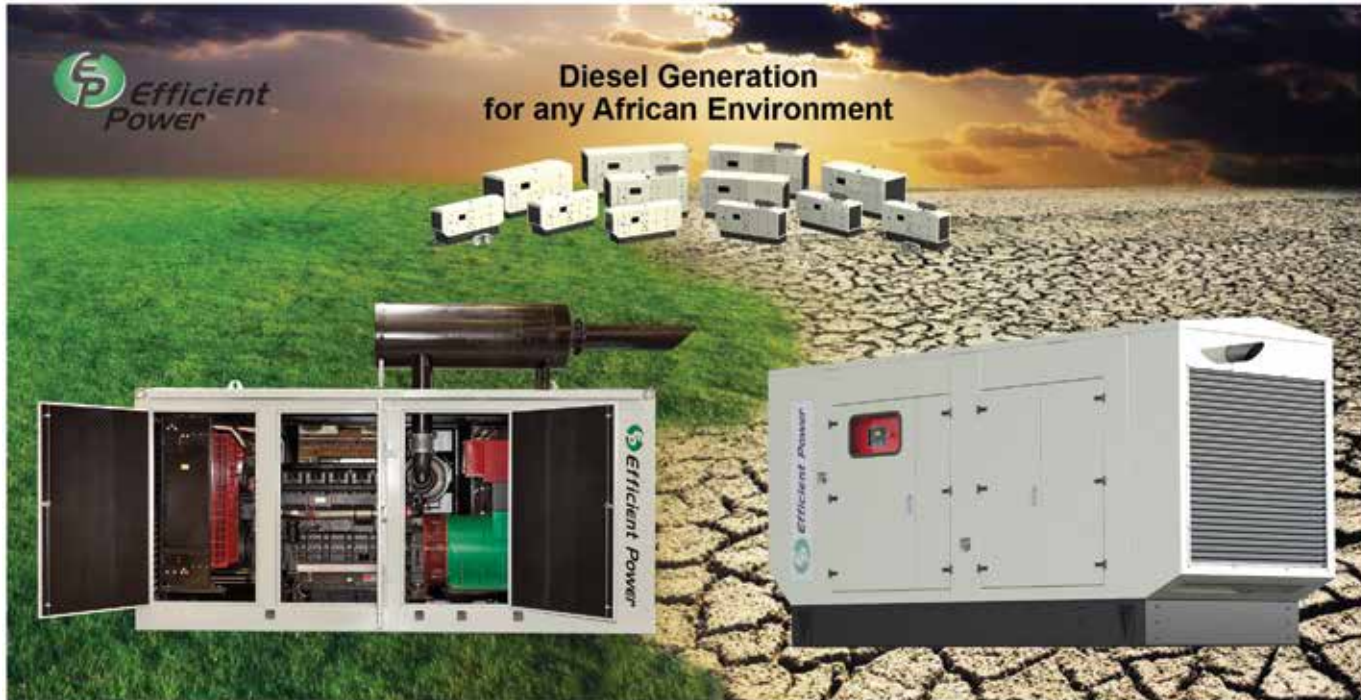
HMI with Codesys 3 PLC and visualisation

RET has introduced Turck's new HMI series TX500 features HMI PLCs with high-end touch displays and fast processors that are ideal for use in small to medium-size machines which have processes that have to be controlled, operated and visualized locally.

Each TX500 is equipped with a Profinet master and EtherNet/IP scanner, as well as a Modbus TCP and Modbus RTU master. The HMIs can also be run as slaves in both Modbus protocols. Codesys3 allows the

lean and simple programming of the PLC and visualisation functions. The latest processor technology of the units guarantees the smooth handling of computing intensive processes right through to moving image visualisations. The high resolution TFT display with 64 000 colours enables the attractive and high performance display of graphics and animations. The front panel of the TX500 series is protected to IP66.

*Enquiries: Brandon Topham.
RET Automation Controls. Email
brandon.topham@retautomation.com*



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**Built in Africa for Africa
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Turnkey solutions for growing energy requirements

Power Management Company **Eaton** participated in this year's Electra Mining Africa exhibition from 12 to 16 September 2016, held at the Expo Centre Nasrec, Johannesburg, South Africa. The company showcased the top selection of their safe and efficient turnkey solutions that help customers effectively manage electrical, hydraulic and mechanical power.

Eaton products launched at Electra Mining included:

Power Xpert CXH – a low voltage motor control and power distribution solution which is designed to deliver superior performance in the most demanding operations. An additional feature of the Power Xpert CXH is that it is equipped with the Power Xpert C445 motor management relay designed to give users the intelligence to monitor and protect their system with unrivaled accuracy.

Series NRX Low Voltage Air Circuit Breaker – designed to meet the needs of low voltage power distribution applications. The compact size minimises non-revenue generating floor space, and the modular design and common accessories allow for easy panel and switch board integration, and the L112 belt conveyer control system. The L112 is a belt conveyer control system designed for harsh and hazardous environments like that of the mining industry. Its standard features include voice communications, signaling and prestart warnings. To ensure risk reduction the L112 is equipped with the SIL3 certified safety coupler utilising emergency shutdown, misalignment and pull rope switches, with an integrated encoding circuit for identification.

Modular solution, Power Xpert Modular, was designed and developed by Eaton's engineers and is focused on leveraging performance with the best cost benefit. The modular and scalable design allows Power Xpert Modular to operate in complex environments, integrating the customers complete power assembly requirements. The design also allows for easy transport via truck, reducing cost and optimising time for the energy, mining infrastructure, data centre and construction segment needs.

Enquiries: Roshanne Smith. Tel. +27 (0) 11 235 4702 or email rsmith@webershandwick.com



Visiting South Africa from America to attend Electra Mining is David Durocher, Global Mining, Metals & Minerals Industry Manager, Eaton Corporation; with him is Trevor Sansom, Eaton's Head of Mining – Africa.

85 Years of SEW-EURODRIVE

SEW-EURODRIVE's current campaign: The Future Starts Now – saw the unveiling of a range of new products at Electra Mining 2016... the biggest mining, industrial, electrical and power trade show in Southern Africa. Innovation, tradition and customer-focus are the cornerstones of SEW-EURODRIVE South Africa. Managing director, Raymond Obermeyer, said: "That was the case when our company was founded 85 years ago, and it still holds true today". Among the showcased products are:

- **IE3 compliant DRN asynchronous motor series** – launched as the standard range of electric motors: A customer who buys a gearbox or drive from SEW-EURODRIVE will automatically have an IE3-compliant motor
- **LTP-B Eco drive** for advanced fan, pump control in the HVAC sector – perfect solution for building designers looking to optimise fan and pump performance in HVAC applications
- **X-series Agitator with integrated Extended Bearing Distance** – a standard gearbox with a modified output side in order to increase the radial and axial forces.

The distance between the low speed shaft bearings has been increased, while bearings with larger dynamic capacities have been used

Enquiries: Jana Klut. Tel. +27 (0) 11 248 7000 or email jklut@sew.co.za



First time at Electra Mining

Having officially opened its doors in South Africa earlier this year, SMC Pneumatics South Africa showcased its innovative offerings to the broader industry for the first time at Electra Mining 2016. The SMC stand at Electra Mining was home to 17 demonstration units – showcasing its quality, innovation, versatility and broad range (12 000 basic products and over 700 000 variations), the FMS-200 training unit – a flexible automation cell which makes use of robotics, pneumatics and hydraulics, and allows trainees to get to grips with the various automation technologies; as well as a Pick and Place unit used to showcase pneumatic technologies in the production line, a large bore cylinder weighing in excess of 170kg, a crust breaker cylinder flown in from the UK and much, much more!

"Our first Electra Mining was a great success and we are pleased that we were able to showcase this world renowned brand on African soil and on such a large scale for this prestigious exhibition," said **SMC Pneumatics South Africa General Manager, Adrian Buddingh**.

Enquiries: +27 (0) 11 100 5866 or email sales@smcpneumatics.co.za



SMC Pneumatics South Africa General Manager, Adrian Buddingh, with Ryan Janse van Rensburg, Riaan van Eck, Ernst Smith and Yattish Jugaroop.

One cable does it all: Flexible Panel connection with CP-Link 4.



DVI, USB 2.0, power supply:
via standard Cat.6A cables.

Up to 100 metres

www.beckhoff.co.za/CP-Link4

The new generation of Beckhoff Panels with industrial strength multi-touch displays offers a wide variety of display sizes and connection technologies. CP-Link 4 extends the portfolio with a simple, standards-based connection technology that is also available in a drag chain version: video signal, USB 2.0 and power supply are all transferred via one conventional Cat.6A cable. Thus, cable and installation costs can be reduced. No Panel PCs, special software, or drivers are necessary.



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CP39xx multi-touch compact Control Panel

CP29xx multi-touch built-in Control Panel

New Automation Technology

BECKHOFF

Powering Malawians with a better life

Armand Pineda, GE Grid Solutions

In this day and age of connectivity, no one should be living without electricity. It has become an essential part of living in the 21st century and those without electricity do not have the same socioeconomic advantages as those who do.

Studies show that access to electricity has a positive effect on poverty and can increase efficiency, improve health, promote economic growth and boost competitiveness. The poor are least likely to have access to electricity, and the more they are disconnected or not connected to the grid, the more likely they will remain poor. It is a never ending cycle of overlooking the vital role connection to the electricity grid plays in enhancing people's lives.

Extending days with access to lighting allows communities to have more time to study, work and play, advancing a country's capabilities, productivity and effectiveness. Heating, refrigeration and modern cooking facilities are all enabled by electricity. Having access to electricity could mean saving time and energy to focus on productivity. Agriculture could receive a boost with modern farming technologies that save time, increase harvest and yield. Access to electricity also means an improved and reliable healthcare system for the wellbeing of the citizenry.

In 2013, it was estimated that approximately 17% of the world population did not have access to electricity. In sub-Saharan Africa, electrification rate in urban areas is approximately 60%, whereas rural areas are only at 14%.

According to the World Bank data, Malawi – the landlocked country located

in southern central Africa – provides less than 10% of its population with access to electricity. With more than 70% of Malawians living below the income poverty lines of less than US\$1,25 per day, the government through the Malawi Growth and Development Strategy II is investing in key strategic areas to stimulate the country's economy. Recognising the importance of energy in economic development of the country, Government has put energy as one of the key priority areas.

In this respect, the Government of Malawi is working towards increasing generation capacity by rehabilitating the oldest power station, Nkula A, as well as expanding, upgrading and rehabilitating the country's backbone transmission network and the transmission and distribution network for an efficient power system. One of the key strategic partners in improving Malawi's Energy sector is the Unites States-funded Millennium Challenge Corporation (MCC) which gave the Malawi Government a US\$350,7 M grant for the Power Sector Revitalisation Program, managed and supervised by Millennium Challenge Account – Malawi (MCA-Malawi).

As a result, the Malawi Government, through the MCA-Malawi, engaged GE Grid Solutions business to design, supply and install the Supervisory Control and Data Acquisition (SCADA) to assist engineers in real time remote monitoring, planning and optimisation of ESCOM's transmission systems spread over the country. This is will help to help create a modern and efficient power grid.

Malawi, the 'warm heart of Africa'

Lying to the east of Zambia, west of Mozambique and south of Tanzania, Malawi is divided into three regions, Southern, Central and Northern, and has the third largest lake in Africa, Lake Malawi. Agriculture contributes more than a third of the country's Gross Domestic Product (GDP) and generates more than 90% of total export earnings. Often referred to as the 'warm heart of Africa', Malawi's

population of approximately 16 million is well known for their warmth and hospitality. The United Nations ranked Malawi's social and economic development at 173 out of 188 countries in its 2015 Human Development Index, and according to the World Bank last year, Malawi is the poorest country in the world.

Most of the power generation plants in Malawi are hydro-powered and located in the south along the Shire River – where close to 50% of the population reside, making it the most densely populated region – and approximately 40% live in the more fertile, lush lands in the central region near the capital city of Lilongwe. Yet today, more than 90% of Malawi's population still do not have access to the electrical grid and the same percentage live on less than US\$ 2 a day. Recognising this uphill battle, the Government of Malawi has launched several campaigns and programs to help Malawi embark on the journey out of poverty and into economic development. One of the organisations working to improve the country's economic growth is the MCA-Malawi.

MCA-Malawi

MCA-Malawi, a Government entity, was established in 2011 to implement, manage and supervise the US\$350,7 Million Millennium Challenge Corporation (MCC) Compact for investment in the energy sector. MCA-Malawi's purpose was to implement activities that will revitalise the power sector. This includes investments in three key areas: Infrastructure Development, Power Sector Reform and Environmental and Natural Resources Management. Each project, with different roles to play, has underlying objective – to stimulate economic growth and play a part in reducing poverty in Malawi.

Malawi – the landlocked country located in southern central Africa – provides less than 10% of its population with access to electricity.



Infrastructure Development Project (IDP)

This project aims to rehabilitate, upgrade and modernise priority Generation, Transmission and Distribution assets in Electricity Supply Corporation of Malawi Limited (ESCOM) system.

The project is thus investing in rehabilitate, upgrade and modernise Malawi's generation, transmission and distribution assets that are in most need of repair. This is done to maintain the existing generation and enhance the capability of Malawi's transmission system while improving the efficiency and sustainability of hydro-power generation.

Power Sector Reform Project (PSRP)

Complementing the Infrastructure Development project, this project is supporting government, improving the financial and operational performance of ESCOM and strengthening the regulatory environment to support policy reform and investment.

It looks into two activities – the turnaround of the Electricity Supply Corporation of Malawi Limited (ESCOM) and Regulatory Strengthening. This sets the stage for the expansion of the power sector in the near future.

Environmental and Natural Resource Management project (ENRM)

This project focuses specifically on the Shire River Basin Catchment areas. The objective is to address the immediate problems of siltation and weed infestation limiting power generation by ESCOM through mechanical and biological means.

It addresses the issues affecting the river, such as aquatic weed infestation and excessive sediments that could cause disruptions to the hydropower plant downstream.

Through the ENRM project, the government seeks to improve land use and watershed management practices in the river by addressing underlying environmental and social issues.

Optimising the grid

Improving the availability, reliability and quality of power supply is essential to ensuring the stability and efficiency of the grid. To do this, MCA-Malawi engaged GE to install and commission an Energy Management System (EMS) and telecommunication system at ESCOM.

The installation of GE's SCADA/EMS e-terra platform will allow ESCOM to monitor, plan and optimise its transmission systems nationwide in real time. With this system, ESCOM will be able to optimise Malawi's power system and increase its efficiency in delivering much needed electrical power to Malawians. GE will also install remote terminal units at existing and new transmission substations in the central and southern region of Malawi, as well as upgrade ESCOM's existing telecommunication system. GE's team of experts will also provide the technical training to ensure that ESCOM is able to garner the best out of the installed system.

As the electricity market evolves, energy management plays a key role to ensure sufficient energy supply to meet energy demand. Today, operators have to take Distributed Energy Resources, Renewable Energy integration and Smart Grid transformations into consideration, while maintaining the current grid and preparing it for the future. Grid stabilisation and modernisation in Malawi is an important element to ensure more people gain access electricity – a key step to the eradication of poverty. The stability of the grid is also essential for future developments, such as grid interconnections, that could further cement the much needed availability of electricity.

Malawi's electrical future – sharing the load

In preparing for Malawi's future electricity grid, MCA-Malawi will construct a 173 km 400 kV overhead line (OVHL) from Phombeya in Balaka to Nkhoma, Lilongwe, and 129 km 132 kV OVHL Chinteche in Nkhata Bay to Bwengu, Mzimba. The

substations at Phombeya, Nkhoma and Bwengu will be designed to accommodate the government's future plans to interconnect Malawi's grid to its three neighbouring countries, Mozambique, Tanzania and Zambia. Sharing the load would mean that Malawi will be able to both receive power when they need it and provide power when it has excess.

Grid interconnections can have a positive impact on electricity availability and could also lower the cost of electricity supply. With the implementation of these bigger and better grid connections and proper equipment to support the effective, efficient distribution and higher availability of electricity, Malawi's energy sector is helping more citizens live better lives. Although access to electricity is not the only solution to poverty, the link between them is evident – especially in developing countries. Connection to the grid could be a catalyst to the eradication of poverty in Malawi, one kilowatt at a time.



Armand Pineda is the Western Europe and Africa Region General Manager at Grid Solutions, a GE and Alstom joint venture, in GE's Energy Connections business. Armand has an international career with more than 20 years of experience in the business development and execution of projects of the Power Industry in Asia, Northern Africa and Europe.

Prior to his role with GE, Armand was the Region Vice-President of Western Europe and Africa for Alstom Grid. He joined Alstom Grid in April 2012 as the Vice-President in charge of the Engineering and Projects Excellence including the Large Projects Organisation.

Enquiries: Email jbole@sternstrategy.com

SANEA and SANEDI recognise excellence

The 2016 SANEA/SANEDI Energy Awards were presented at a prestigious ceremony and banquet hosted by Brian Statham, Chairman of the South African National Energy Association (SANEA). The South African National Energy Development Institute (SANEDI) again collaborated with SANEA in recognising South Africans and their achievements, specifically by promoting awards in the research and innovation sectors. The 2016 SANEDI/RECORD Renewable Energy Research Excellence (RERE) Awards were also presented at the event.

SANEA Energy Award:

Dr Willie de Beer, Energy Sector Strategic Advisor for his ongoing contribution to the Energy Sector in South Africa, the role model he has provided and the success he has achieved. He is a person who fully espouses the SANEA vision of 'Energy People Working Together' in a career that spans some 45 years of service to the industry.

SANEA Energy Project Award:

Acwa Power Solafrica Bokpoort CSP for their concentrated solar thermal power plant (CSP) project which was part of Round 2 of the REIPPPP.

Unlimited Energy and Lawrence Berkeley National Laboratory for their collaboration between a local consulting company and a world renowned research centre which resulted in legislation being passed by the Department of Trade and Industry in March 2016 which will cap the standing losses for a 150 litre geyser over a 24-hour period at 1,38 kWh (from 2,59 kWh).

SANEA Energy Education Award:

Mfundo Mahlase, Rural Economic Development Officer, Siyazisiza Trust, in recognition of his work as a climate change agent who strives towards contributing to a world that is sustainable. Highly Commended Recognition: Eskom Power Plant Engineering Institute (EPPEI) at the University of Cape Town in this category. The EPPEI was founded in 2012 with the goal of creating specialist engineers within the power industry.

RECORD RERE Commercial Application Award:

Power Thermal Harvesting – Vuselela Energy in recognition of the novel adaptation of technology used to generate electricity from geothermal heat sources.

RECORD RERE Young Researcher Award:

Imke Meyer, who studied the Agulhas current as a potential source for renewable energy for her MEng which she completed cum laude whilst she was employed as a Research Engineer at Stellenbosch University Centre for Renewable and Sustainable Energy Studies from 2013 to 2015. Highly Commended Recognition: Toyosi Craig for his work on his MEng, the title of his thesis: A Stand-alone High-Temperature (250°C) Parabolic Dish Solar Cooker for African Conditions.

Enquiries: Sarita Cronje. Email saritac@mweb.co.za



Brian Statham (right) presenting the 2016 SANEA Energy Award to Dr Willie de Beer.

'food & drink technology Africa'

The future of the African food and beverage industry was on show at Gallagher Convention Centre in Johannesburg on 14 and 15 September 2016 at food & drink technology (fdt) Africa 2016. Organised by Messe München (MMG) and its subsidiary Messe München South

Africa, fdt Africa 2016 is a biennial trade fair and conference focused specifically on food and beverage processing, filling, packaging and logistics. The event featured 120 exhibitors.

Enquiries: Email markus.kosak@messe-muenchen.de



Holger Schmidt and Natlee Chetty, Endress+Hauser.



Victor Marques and Evert Jansen van Rensburg, Omron.

Programmable time switch technology

Legrand's new generation of programmable time switch technology encompasses AlphaRex³ and MicroRex time switches for



precise temperature control in domestic, commercial and industrial environments.

"Legrand's Rex time switches, with analogue and digital dials, are ideally suited for OEMs and panel builders who can pre-programme the time switch during installation.

At a later stage when the panel or product is connected to power, all the end-user has to do is set the real time," says Marius Labuschagne, Legrand's technical and solutions manager. "These programmable time switches ensure high clock precision, optimum reliability, maximum safety and enhanced aesthetics.

"In temperature control applications, these devices are used to switch an electric circuit on or off at selected times during a pre-programmed time period.

These time switches also have an automatic return facility and a permanent forced switching on or off override control.

"Typical applications for time switches in heating and cooling installations include water heaters, air conditioners, heating and ventilation systems and swimming pool heaters."

Enquiries: Email legrand.south-africa@legrand.co.za

Robust pressure-resistant position sensors

The new MFH series sensor is suited for flush mounting in various steels. With its 1,8 mm sensing range it shows reliable switching characteristics. The new operating principle of this unit is based on a magnetic-inductive technology that detects only ferromagnetic metals (e.g. steel). It is sealed by means of an O-ring and a supporting ring towards the pressure area.

Besides use in hydraulic cylinders, the sensor is also ideal for other hydraulic components such as valves or pumps. MFH operates reliably for the lifetime of

the cylinder. Furthermore, it is used in mechanical engineering processes, e.g. in plastic injection-moulding or process industry applications. Its attractive price means the sensor can also be considered for simple components where this option used to be too expensive.

The MFH with its standard M12 housing can be installed and adjusted on many different hydraulic cylinders. That is why most cylinder types are covered by only one sensor. Due to its end stop the M9H allows quick mounting. The processing

and installation time is reduced if the same cylinder type is always used.

Enquiries: Alwyn Skelton. Tel. +27 (0) 12 450 0400 or email info.za@ifm.com



Network repair and maintenance business boosted with acquisition

South Africa's largest electro-mechanical equipment and services group ACTOM has acquired the operational assets of Gauteng-based WPI Power Solutions, a company specialising in the repair and maintenance of electrical networks.

The acquisition is effective from July 2016. WPI Power Solutions retains its name but is to be merged into ACTOM MV Switchgear based in Knights, Germiston. WPI has been in operation for over 20 years and has branches in Carletonville, eMalahleni (Witbank), Secunda and Vanderbijlpark.

ACTOM MV Switchgear, which is South Africa's leading manufacturer and supplier of medium voltage indoor switchgear and outdoor miniature substations, recently diversified into the maintenance of electrical networks. It won its first major contract in this field in December last year when it was awarded a R34-million three-year contract by Ekurhuleni Metropolitan Municipality for the repair and maintenance of electrical distribution equipment and related assets in the municipality's southern region, including Boksburg, Germiston and Alberton.

Martin Kelly, ACTOM MV Switchgear's Divisional CEO, said the acquisition of WPI provides just what the business unit requires to strengthen and accelerate its advance into the electrical network repair and maintenance field. "WPI brings with it a well-established customer base that includes several large mining groups and a va-

riety of blue chip industrial companies. It is equipped with a strong branch infrastructure and expert staff," he commented.

"It has extensive experience and expertise in undertaking large scale projects involving preventative maintenance and repairs of networks up to 132kV," he added.

Enquiries: Tel. +27 (0) 11 820 5343 or email avrille.cape@actom.co.za



ACTOM MV Switchgear's Divisional Chief Executive Officer, Martin Kelly (left) with leading members of the business unit's extended repair and maintenance operation (from left): Songezo Mfeya, Witbank Branch Manager; Avrille Cape, After Sales Manager; Dewald Loretz, Business Development Manager; Jacques Smith, Branch Manager for Carletonville; and Vanderbijlpark, Marius Lombard, Regional Manager; Casper Coetzer, Manager for Rustenburg; and Dirk McLaren, Secunda Branch Manager.



Electra Mining 2016

Mega event *Electra Mining Africa* is the forum for highlighting the technological sophistication of the sector and South Africa's globally strategic position in this arena. It is a conduit for successful business transactions. It is the platform for driving sales, sales leads and building brand awareness.



Siemens: Nkosinathi Zulu, Jennifer Naidoo, Tshepo Kgomongwe, Kaylin Pather, Navashni Moodley, Hayden Bielby, Berenice De Serra and Pieta Ferreira.

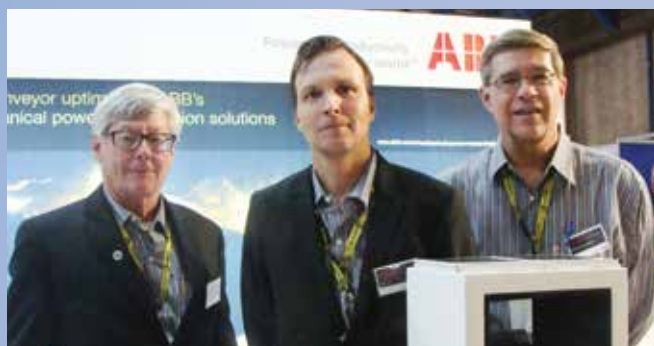


ABB: Leonard A Eros (Global Mining Manager, ABB Colorado), Jari Korkiakangas (Market Manager, Mining, ABB Finland), Bruce Walters (Baldor Electric Company, ABB Group).



Lapp Southern Africa: Alan Mulder, Tarien Dercksen and Jacques Richards.



SMC Pneumatics: Ryan Janse van Rensburg (SMC Apprentice), Riaan van Eck (Training Manager) and Brian Abbott (Product Manager).



Energy Control Systems (ECS): ECS Africa Director, Marius Grobbelaar, and ECS President, Jeff Edwards.



Woodbeam Technologies: Blaize Magee (Director, Woodbeam Technologies) and Kim Dare (LoneStar Marketing Services).



Phoenix Contact's Bruce Patton and Tony Rayner.



A donation from the ZEST WEG Group

At the ZEST WEG Group Electra Mining media briefing, held on 15 September 2016, there was a welcome twist in the tradition of giving a gift to members of the media. Managing Director, Louis Meiring, announced that instead a donation had been made to the SUNSTEP Science Technology Education Programme in the Leandra, Emalahleni and Middelburg areas in the Mpumalanga province, South Africa. The donation made it possible for 105 teachers to attend a workshop where they were trained in the essential practical skills and furnished with the equipment needed to teach technology classes at a senior school level.



The ZEST WEG Group team at Electra Mining 2016.



Johan Van Niekerk (Chief Commercial Officer- Shaw Controls), Chris Watkins (Drives & Automation Manager- Zest WEG Group), Riaan Nel (Drives Sales Manager- Zest WEG Group).



Juliano Saldanha Vargas (Group Logistics and Operations Director - Zest WEG Group), Valter Luiz Knihs (Group Automation & Systems Director- Zest WEG Group), Daniella Xavier Cesar (Head of Trade, Investment & Tourism Section (SECOM), Embassy of Brazil in South Africa, Carmen Nepomuceno Trade, Investment & Tourism Section (SECOM) Embassy of Brazil in South Africa, Edson Cristofolini (Group Africa Business Development Executive- Zest WEG Group).



Francois Labuschagne (Sales Manager- External Sales- Zest WEG Group) and Andre Mans (Chief Operations Officer- WEG Transformers Africa).



Valter Luiz Knihs (Group Automation & Systems Director- Zest WEG Group), Juliano Saldanha Vargas (Group Logistics and Operations Director- Zest WEG Group), Louis Meiring (Chief Executive Officer- Zest WEG Group), Nicky Hariparsad (Group Financial Director- Zest WEG Group).

SMC Pneumatics



*Herman Ross
Sales Engineer
(CT)*



*Ingrid Horner
Production
(JHB)*



*Sikhumbuzo
Mthethwa
Production
(JHB)*



*Riaan Loff
Inside Sales
(JHB)*



*Neven Govender
Sales Engineer
(JHB)*



*Keith Pillay
Sales Engineer
(DBN)*



*Jaco van Sittert
Sales Engineer
(JHB)*



*Derick Westerhuis
Sales Engineer
(CT)*



*Coen Pretorius
Distribution
Manager*

ABB.....27	BRADY South Africa.....14	Helukabel.....15	SMC Pneumatics.....IBC
Aberdare Cables.....16	Current Automation.....Insert	Instrotech.....8	Three-D Agencies.....13
ACDC Dynamics.....OBC	Efficient Power.....39	KROHNE.....7	Trans Electron.....2
ATI Systems.....Insert	Endress+Hauser.....OFC	Phoenix Contact.....25	WIKA.....31
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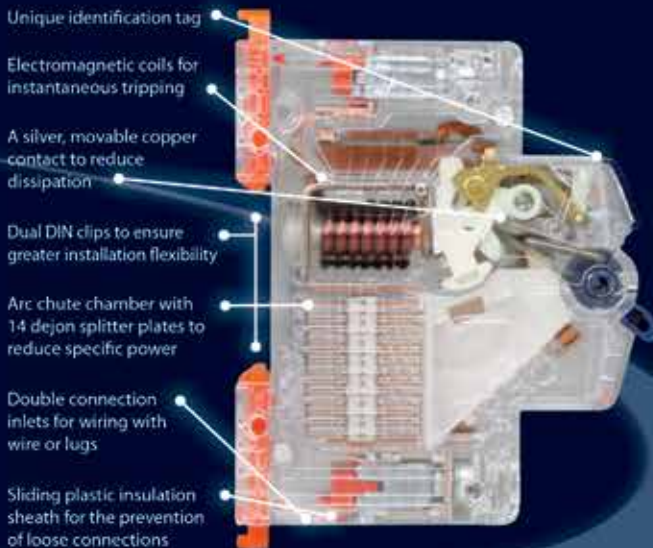
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