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ELECTRICITY + CONTROL

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Editor:
Wendy Izgorsek

Design & Layout:
Adél JvR Bothma

Advertising Managers:
Helen Couvaras and
Heidi Jandrell

Circulation:
Karen Smith

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Karen Grant

Deputy Publisher:
Wilhelm du Plessis

Editorial Technical Director:
Ian Jandrell

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Not often does one begin a comment with an apology; but ... I apologise for treading into an area quite removed from the technical nitty gritty of our industry. The reason I feel the need to do this is simply because politics, today, impacts on everything we are trying to achieve – in industry, in education, in health care and even within our industry. So here we go:

Intriguingly, we are beyond what I discussed in my previous comment – the local government elections in South Africa. If nothing else, they affirm the view that our democracy is strong.

However, a number of issues begin to emerge. One of them is the (unexpected) strengthening of the Rand; the other is the realisation that, as regards service delivery, we have yet a way to go.

Let us consider the Rand. Although I have made this point before, it never ceases to amaze me how economists, who lamented the weakness of the Rand just the other day, now point to the challenge that the strength of the currency poses. Of course they are correct on both counts because the problem relates to the volatility of the currency – and the way it affects our ability to plan.

One solution would be to sit in a smoky room and fix prices – but this is frowned upon.

These two issues are serious – and the challenge of managing international competitiveness in the context of a bouncing currency (and I am sure it will continue to drift up and down) does make for sleepless nights. Equally, being part of an economy where price fixing seems to be something of a national sport, is troubling.

The other point, as we have come to understand, is that as soon as we get a sense that things may just be improving, mud is thrown into the water and all sense of stability seems to evaporate before our eyes. I suspect that regular citizens are likely to be far more critical of that mud as we move forward. To a very large extent I suspect that this is an art, due to the pervasiveness of information in the modern age.

Enough of that bad stuff! The major issue emerging from the local government elections is the stark realisation that human dignity in our society is something that needs to be tackled. I am mindful of numerous talk shows leading up to the elections where service delivery – in particular in areas of water and sanitation – were themes that were raised time and time again. It is also evident that these sentiments were reflected in many communities around the nation – to the extent that voting trends may very well have been governed by this sentiment.

The challenge now is ... how exactly does one make right? To what extent can solutions be found quickly? Can these solutions fit in with the modern trends towards sustainability and green energy? Can it be done? If so, on what scale?

The time has surely come for civil society, industry and political leadership to find those touch points of trust and a shared mission that will allow us to deliver on the promise that this nation holds.

I am convinced that together we can make a real difference; that many of us hold skills, deliver services, or sell products that can play a critical role in optimising how we deliver services to society.

The future, without doubt, is bright – but the question is ... how long can we take to get ourselves to where we really need to be? Sure, the world is not the most stable place right now; and sure, our industry faces huge challenges. But surely we can imagine – and then build – a future that is sustainable and one of which we can be proud.

My sense is that we won't be getting many more chances. Failing at this will simply see the chasm between the rich and the poor widen to levels that may never be bridged.

We all know that would not be in anyone's best interest.

FACE VALUE

Ian Jandrell

Pr Eng,
BSc (Eng) GDE PhD,
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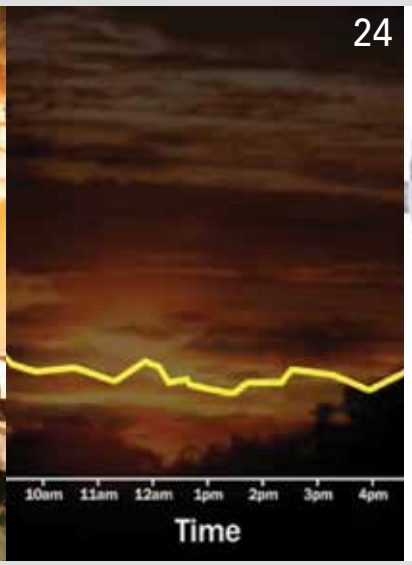

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Cover

Technicians can use **Fluke** Connect to quickly identify and diagnose problems while securely sharing the related data, when they want and with the specific people they have given permission to view it.
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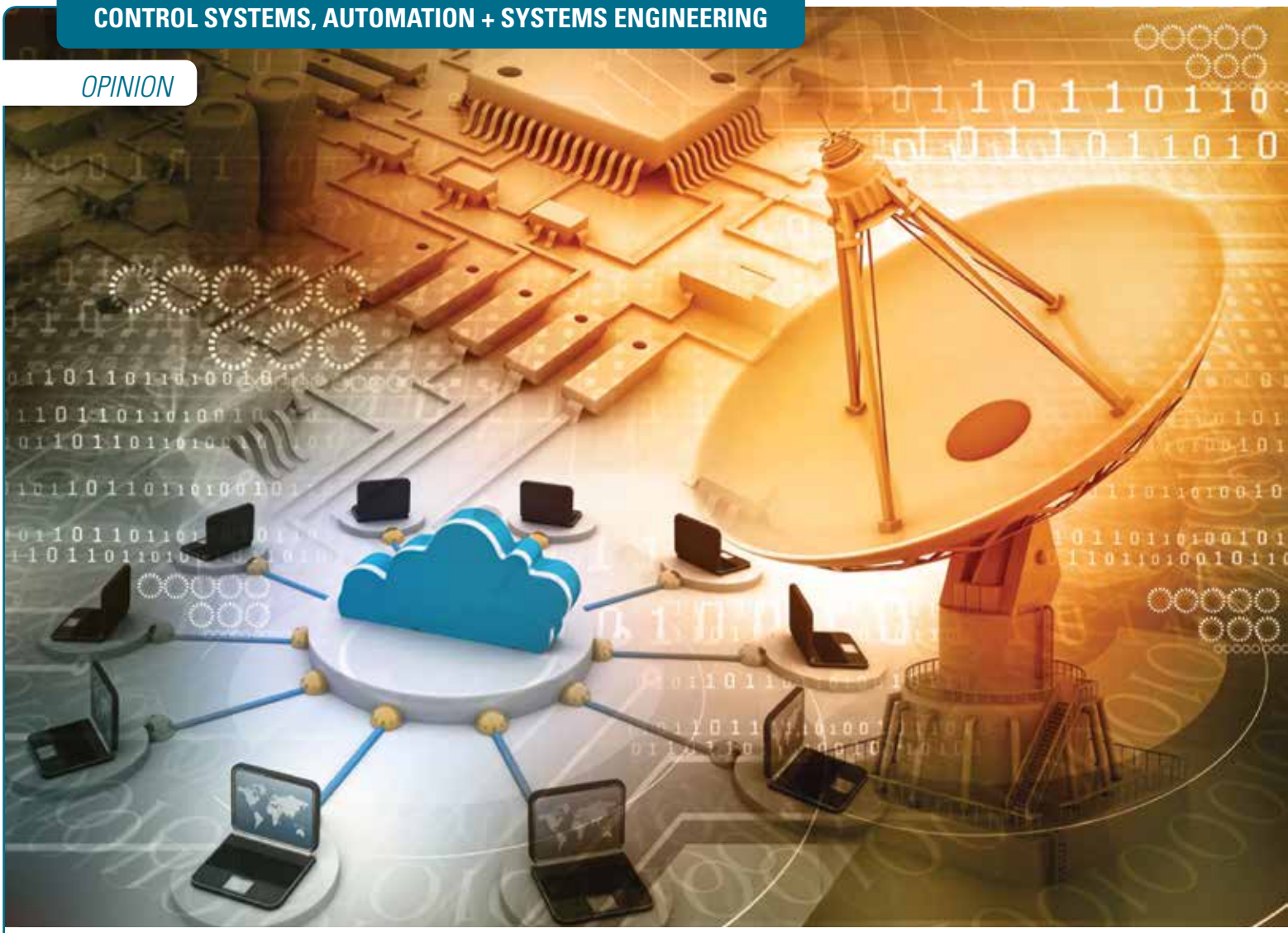
OPINION



Mobility, Big Data and The Cloud: **Opportunities or Commodities?**

Luigi De Bernardini, Autoware (certified member of the Control System Integrators Association (CSIA))

How do manufacturers view these three predominant technology trends … and how do you view them?

There is no conference, magazine or airport terminal where people are not talking about Mobility, Big Data and Cloud Computing. Those three terms, according to who is talking, identify technological trends with which all of us will deal, both at home and at work.

But are they equally important in all fields? Specifically, in the industrial and manufacturing fields, is it necessary to face them immediately, or are they just something to keep an eye on because they could be an opportunity for improvement in the future? To get a better handle on these questions, I discussed these trends with some Autoware clients who typically seize opportunities offered by technology and innovation. The results presented an uneven picture.

> *With different implications and repercussions, Mobility, Big Data and Cloud Computing cannot be considered in the same way.*

However, it was clear that Mobility, Big Data and Cloud Computing cannot be considered in the same way. They have different implications and repercussions that I will try to highlight briefly. Mobility is almost difficult to call an innovative trend because, in some ways, it can be considered a commodity. Everyone is now in the habit of accessing information anywhere at anytime. It is therefore natural for us to expect that same level of connectivity when it comes to accessing the information necessary for our work life.

Regarding the management and processing of large amounts of data, the scenery is more diverse. For some companies this is absolutely a present day opportunity and need. For others Big Data is seen as an op-

portunity for the future. The key differentiator lies in whether or not the company has already implemented some production or process data collection system, thereby providing them some raw material to work with. The more forward-looking companies that have already installed some data collection system now have at their disposal a huge amount of data exploited only in part. The quantity of data they typically have on hand is large enough to prevent the use of standard tools to transform it into strategic information to support decisions. However, those companies have an exceptional opportunity to maintain the competitive advantage built in the past and, using the appropriate tools, to become even more competitive.

Cloud … controversial

From my conversations with clients, the Cloud is the most controversial trend. Among the three trends, Cloud Computing is certainly the one that, up to now, has had less impact on our daily lives, not because we are not touched by it, but because we are less aware of the role it plays. After all, our personal and corporate finances are basically managed in the Cloud by the banking system.

This disconnect comes, in my opinion, from a combination of factors. One of the more significant factors depends on the type and size of the manufacturer. If using the Cloud is not an absolute necessity for a certain manufacturer, that business will not receive significantly more value from the Cloud compared to a solution hosted on-site—from an economic point of view as well as in terms of security, ease of maintenance or use. At the same time, Cloud infrastructure providers are still primarily oriented toward promoting their services to the consumer and general business worlds, without focusing on manufacturing – which has very different needs and characteristics.

Conclusion

Though there is no uniform answer as to how manufacturers view these three predominant technology trends, we will all certainly be dealing with them for years to come.

About CSIA

The Control System Integrators Association (www.controlsys.org) is the only trade association focused on advancing the system integration industry. Its vision is to ensure that manufacturing and process industries everywhere have access to low-risk, safe and successful application of automation technology. The association has over 500 members in 27 countries. CSIA manages the Industrial Automation Exchange (www.csiaexchange.com) as a service to system integrators and industrial automation clients.

take note

- Mobility is what the world is all about.
- Industry is being affected – in the office and in the factory.
- Mobility will play a role in future industrial automation.

CSIA upgrades Industrial Automation Exchange

Two years ago, the Control System Integrators Association (CSIA) launched the Industrial Automation Exchange, with the intention of helping industrial automation end-user clients find system integrators and their suppliers. Now the CSIA has made the site even easier to use. Today the CSIA Exchange features its own blog, largely authored by system integrator members and member partners. It has also incorporated a new library-resources section. "Guest bloggers, control system integrators and suppliers can inform end users of trends and events across all industries and specialties," said Jose Rivera, CSIA Chief Executive Officer (pictured above). "They can share how-to guides and evergreen resource material helpful to automation clients. CSIA is proud of the Exchange's progress. Its database has grown to over 1 200 integrators and more than 200 supplier partners. The CSIA Exchange is becoming a trusted hub of knowledge for automation clients on which to research integration and technology teams." While some cosmetic changes will make information more accessible, the update is about making it easier for integrators to post relevant information, and ultimately, for clients to find them.

A few of the changes include:

- *A new industrial automation community, where clients can ask system integrators questions or notify them of an RFP*
- *The capability to search for system integrators by their office location in a state/province, region or country*
- *A library resource section where CSIA will host guides and evergreen resource material helpful to automation clients, such as how to choose a system integrator*

Tony Veroeven, CSIA Exchange manager said, "The quality of control system engineering content posted on the Exchange by CSIA members is outstanding, so clients find the site to be a great resource when vetting system integrators. Blog articles and resource content will make it even easier to find quality system integrators."

Luigi De Bernardini is CEO of Autoware, a certified member of the Control System Integrators Association (CSIA). For more information about Autoware, visit the company profile on the Industrial Automation Exchange, www.csiaexchange.com. Autoware is based in Vicenza, Italy.

Technology … in the driver's seat

Information provided by Schneider Electric

Full automation has become widely applied in various technological and industrial systems.

The continuing evolution of technology is piloting the progression of controlling systems and functions without the dynamic of human involvement. Full automation has become widely applied in various technological and industrial systems to execute the processing of large amounts of data within limited timeframes – as well as perform functions that would not be viable for human beings. Automatic control systems improve the functioning and capability of controlled objects or systems; they limit or eliminate external interferences which can compromise the entire system.

Automatic control systems improve the functioning and capability of controlled objects or systems. This also includes auxiliary operations such as starting, stopping, monitoring, and adjusting of the controlled object or system's functionality thus culminating in reduced downtime.

Modicon M580 ePAC Controller

Schneider Electric's Modicon M580 — the world's first ePAC controller offers connectivity capabilities to help you react faster to information demands in a safe and a cybersecure environment. Designed for efficient Ethernet networking the Modicon M580 is the ideal for PlantStruxure architecture.

The integration of Ethernet infrastructure is ensured through easy cabling with a third Ethernet port available on all Ethernet modules. An embedded Wi-Fi communication, fibre optic converter as well as embedded switche's function deliver full integration. The Modicon M580 controller has redundant processors, native Ethernet, and cyber-security embedded in its core and brings Native Ethernet capabilities such as its architecture which interconnects all your devices and provides continuous communication flow to reap IIoT benefits.

The Modicon M580 excels in high level computing power for increasingly data-intensive processes through end-to-end 100 Mbps – speed ranging from top to bottom and the improvement of application response time up by ten.

A 64 MB memory data capacity of up by eight delivers high performance, high availability for processors and networks and also features enhanced cyber-security.

> *Automatic control systems improve the functioning of controlled objects or systems.*

Achieving versatility in all operation:

Control systems and automation features must form the basis to perform live applications' updates without halting the process by adding or removing discrete and analogue I/O modules. The Modicon M580 controller also enables the addition of new RIO drop and the modification of channel configuration parameters.

Versatility in operations also encompasses the ability of the Modicon M580 controller to reconfigure modules automatically on hotswap and apply changes to configuration on the fly (CCOTF).

The Modicon M580 is the new recommended controller for PlantStruxure, Schneider Electric's collaborative and integrated automation architecture for industrial and infrastructure customers. Within the Modicon range of modules is the Modicon X80 I/Os with form factor: backplane, power supply, I/O digital, I/O analogue, communication.

The X80 range incorporates the compatible modules common for Quantum Ethernet I/O drops and M340 PLC, all with a M340 form factor. Included are backplane, all in-rack modules, power supply, Ethernet RIO module drop head, all I/O modules, communication modules (except Ethernet), and expert modules.

The Modicon M580 is based on Innovative I/O incorporating robustness, compactness guided by international certifications.

The Modicon M580 is compatible with all M340 existing modules are also supported by X80 drop of QEIO (except AS-I, NOR, SSI). One X80 drop can support two racks along 30 m, just like the M340 PLC (up to four racks for M340). Maximum number of supported X80 drops is 16 for 140CPU6x1xx and 31 for 140CPU6x2xx. PlantStruxure brings together Telemetry, PLC/SCADA, and DCS offerings with complete life cycle services to help make your operations more efficient. From initial design to modernisation, PlantStruxure transparently connects the control, operation, and enterprise levels of your business.

Altivar Process Variable Speed Drives

The Altivar Process Variable Speed Drive (VSD) is the first VSD with embedded intelligent services, allowing for improved life-cycle asset management and enhanced energy consumption. The Altivar

CCOTF – Changes to Configuration on the Fly
DCS – Distributed Control System
EMC – Electromagnetic Compatibility
FDR – Fast Device Replacement
HMI – Human Machine Interface
I/O – Input/ Output
IP – Internet Protocol
IIoT – Industrial Internet of Things
SCADA – Supervisory Control and Data Acquisition
SNMP – Simple Network Management Protocol
SNTP – Simple Mail Transfer Protocol
TCO – Total Cost of Ownership
TCP – Transmission Control Protocol
VSD – Variable Speed Drive

Abbreviations/Acronyms

Process is the first VSDs were first introduced in South Africa by Schneider Electric in 2014 and now include a comprehensive range which comprises the ATV600 series, focused on fluid management from 0,75 kW to 800 kW with advanced pump management and low harmonics capabilities.

The ATV900 series focuses on maximum productivity with exceptional motor control and connectivity. It offers special functionalities for the industrial process segments such as excellent motor performance on any type of motor as well as the total control of any kind of coupling in master/slave applications.

Process automation

The Altivar Process is an IP 21, IP 23, IP 54, or IP 55 VSD for three-phase synchronous and asynchronous motors, specially designed for the following sectors or industries; Oil & gas, mining, minerals & metals, food and beverage as well as water and wastewater.

The association of Altivar Process services with Schneider Electric process automation control systems like Foxboro Evo (for process systems) or M580 ePAC controller (for hybrid systems) offers a high-performance, global automation and motor control solution with optimised Total Cost of Ownership (TCO).

Oil and gas applications of Schneider Electric's VSDs include hydrocarbon production, drilling, offshore and onshore extraction, water treatment and re-injection, crude oil storage, separation and pipeline pumping. Among the pumping functionalities of the Altivar Process is the Progressive Cavity Pump, the electrically submersible pump rod pump, the mud pump rotary table, top drive draw works, and regasification compressors.

In the context of mining and mineral applications; open-pit or underground mining stockpiling/ homogenisation, concentration/ mineral separation solid-liquid separation and final handling and transportation form part of the process automation functionalities.

Altivar Process drives improve equipment performance and reduce operating costs by optimising energy consumption and user comfort. Altivar Process drives provide a wide range of integrated functions, such as safety and automation functions that meet the requirements for the most demanding applications.

Schneider Electric offers fieldbus modules which facilitate seamless integration into the main automation architectures. Fieldbus modules include protocols such as EtherNet/ IP and Modbus/TCP Dual port and Modbus serial links. There are also Standard Modbus and Ethernet protocols, connection of configuration and runtime tools, control and the supervision of the Altivar Process in process architectures (controllers, SCADA, HMIs,) in industrial networks (read and write data), diagnostic, supervision, and fieldbus management functions as well as Ethernet services mainly in the form of SNMP, SNTP, BootP and DHCP, IP v6, cybersecurity services, FDR versus Open Ethernet topologies.

There is numerous configurable I/O as standard to facilitate adaptation to specific applications intuitive commissioning using the graphic display terminal. Altivar Process VSDs further ensure local and remote access and monitoring using the embedded Web server. Energy saving and protection of the grid by means of integrated harmonic filters as well as installation EMC conformity by means of integrated EMC filters which culminate in optimised energy efficiency.

Conclusion

Control systems must encompass solutions that provide simplified choice of automation systems therefore providing peace of mind and confidence for the user because the devices are interoperable and performance levels are guaranteed.

Once the automation implementation is chosen, the customer will have an adequately precise framework, alongside the catalogue and specific guides, to select the requisite automated functions and devices. Schneider Electric automation and control products and solutions cover the breadth of the industrial, infrastructure and building sectors through the capable technology of controlling simple machines to complex process control applications across all industrial, infrastructure and building sectors.

take note

- More and more, human intervention is becoming less necessary in automated systems.
- The less humans are involved the more confidence in the system is critical.
- Modern control and automation systems are built to provide confidence and reliability.

Quality measurement for food, beverage and pharmaceutical industries

German-based **GHM Messtechnik** GmbH, recently opened a dedicated South African subsidiary in Alberton, Gauteng, offers German-quality measurement instrumentation technology suited to meeting the specific requirements of the food, beverage and pharmaceutical industries.

Jan Grobler, Managing Director of GHM Messtechnik SA, said: "The South African food and beverage and pharmaceutical sectors require measurement technology that offers precision and reliability while complying with stringent local hygiene regulations.

"GHM Messtechnik (GHM) provides complete technological solutions through the consolidation of four companies. We believe that food hygiene processes can only be safeguarded by the producer when the measurement technology utilised in this industry comprises a hygienic design and conforms to all applicable laws, which GHM's technology does. The media used, to be processed or created in the food industry often changes properties in regard to density, consistency, conductivity and temperature. Boilers, tanks and similar containers are filled with the widest range of media to which cleaning processes must be adapted and modified. We supply devices that offer safe and reliable measurement for all of these processes," said Grobler.

The use of materials that come into contact with media is well documented by the FDA and 3A. All GHM's sensor parts that come into contact with media and close to the process are capable of withstanding the cyclical cleaning and sterilisation temperatures as outlined by the abovementioned standards associations.

GHM offers more than 30 different basic designs in their new GTL temperature sensor series, all of which are suited for use in the pharmaceutical, food and beverage industries, and are European Hygienic Engineering and Design Group (EHEDG) certified.

"Our sensors offer wide ranges of length and diameter, with our transducers being configured to customer requirements. The correct configuration can be achieved by the customer by using the GTL programming tool" said Grobler.

Enquiries: Jan Grobler. Tel. +27 (0) 11 902 0158 or email info@ghm-sa.co.za

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Lean paperless manufacturing solution

Version 6.1 of the Siemens Simatic IT eBR software is at the heart of its Manufacturing Operation Management for the life science industries. The new version of the software enables users to easily implement paperless manufacturing solutions by offering two main features: A new web-based MBR (Master Batch Record) module which facilitates the management of key process parameters, and native integration with the Siemens automation layer (Simatic PCS 7 process control system and HMI systems). The new version reduces the work involved in engineering and operation, helps users to enforce standardisation and makes for a more transparent production process, so shortening the time-to-market.

Product quality and safety are the top priorities for the life science industries, especially in the pharmaceutical industry. At the same time, many companies need to cut costs and increase innovation. **Siemens** offers a paperless manufacturing solution for enhancing both efficiency and product quality, while at the same time bringing down risk and costs. Fully integrated communication is established between the automation level and manufacturing IT. This enables complete electronic recording and documentation of quality-related production data, while eliminating time-consuming manual procedures and paper-based batch reports. Simatic IT eBR 6.1 facilitates the implementation of the paperless manufacturing. With a new Master Batch Record module and a 'Project Startup' package, it provides a list of out-of-the-box deliverables to speed up project execution time. In addition, it offers native integration with Siemens PCS 7 Batch and new access to electronic work instruction lists embedded in SCADA/HMI clients. By accelerating the design, execution, review and release of regulated production processes and electronic batch records (EBRs), Simatic IT eBR helps both enhance product quality and lower production costs.

Simatic IT eBR 6.1 is based on the engine of the former XFP product developed by Elan Software Systems and acquired by Siemens in 2009. It combines 30 years of proven experience in the pharmaceutical industry and native integration with the rest of the Siemens portfolio for regulated and non-regulated industries.

Enquiries: Dr. David Petry. Email david.petry@siemens.com
Twitter: www.twitter.com/siemens_press
and www.twitter.com/SiemensIndustry
Blog: https://blogs.siemens.com/mediaservice-industries-en

Modular tower light … superior flexibility

Banner Engineering has introduced the EZ-LIGHT TL70 modular tower light. Offering superior flexibility, the TL70 can be customised as needed, and allows for easy position changes in the field. The big, bright 70 mm tower features advanced LED drive technology, providing highly visible operator guidance and equipment status indication.

The tower light can display up to five colours – plus an audible alarm module – in one tower, which allows for multiple colours to be lit simultaneously. The loud 92 dB adjustable alarm offers four user-selectable tones, including pulsed, chirp, siren or continuous. For optimal performance, each light segment can be selected solid ON or flashing, and appears grey when off to eliminate false indication from ambient light.

"Our new TL70 modular tower light is one of the most versatile indicator lights for industrial environments," said Chuck Dolezalek, Director of Engineering for Lighting at Banner Engineering. "With the ability to fully customise the indicator light with multiple colours, sounds and configurations, in addition to quickly changing positions in the field, the TL70 is ideal for a wide range of applications."

Banner's TL70 modular tower light is available as modular segments, allowing users to build a custom device. For user-friendly installation, the TL70 is up and running in just three easy steps, which include assigning the module settings, assembling the device and applying power. The TL70 is also available as a preassembled configuration.

For use in harsh environments, the TL70 modular tower light features rugged, water-resistant IP65 housing with UV stabilised material. Housing is available in black or grey, which allows users to match the device to their application.

Enquiries: RET Automation Controls. Brandon Topham. Tel. +27 (0) 11 453 2468 or email brandon.topham@retautomation.com

Belt rip and tear detection for conveyors

Conveyor belts are used where materials need to be transported from A to B, e.g. in mining, cement, sand and gravel industries. A conveyor belt may get damaged by sharp-edged stones or materials; or become worn out during operation. Such damage must be detected and the conveyor belt deactivated.

The new belt rip and tear detection system from ifm electronic is used to reliably detect belt damage.

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

Visit ifm electronic at Electra Mining 2016 – Stand E07, Hall 7

Comprehensive cardiac catheter testing

Shane Novacek, Beckhoff Automation

Boston Scientific Corporation in Marlborough, Massachusetts, USA, is one of the world's largest manufacturers of medical technology devices and products for diagnosing and treating cardiac, digestive, pulmonary and vascular diseases, to name just a few. To ensure that customers and patients receive products that meet the strictest quality guidelines, the company employs PC- and EtherCAT-based control technology from **Beckhoff** in its testing stations for cardiac catheters.

Modern medical diagnostic and therapy applications employ a wide range of medical equipment and devices. Before they can be used on patients, however, they must pass a stringent inspection process for quality assurance. "This is a field where we excel," says Roberto Listek, Principal Equipment Engineer at Boston Scientific. "We place great value on continuously improving our testing procedures and employing state-of-the-art technologies, which is why Boston Scientific uses a PC-based automation platform in its torque tester device for cardiac catheters."

Cardiac catheters are used to diagnose and treat many cardiac and circulatory diseases. The catheter – a thin plastic tube – is guided through the patient's blood vessels to the coronary arteries or cardiac chambers. To ensure the catheters work properly as they are being navigated through the patient's arteries even under difficult conditions, they are subjected to stringent stress tests, with the final step employing a torque testing device. This type of test measures the rotational response at the distal end of a device while it is being rotated at the proximal end – an important value to know when operating a catheter during a medical procedure.

PC-based platform meets all flexibility and reliability requirements

Boston Scientific had to accommodate a relatively short timeframe for developing and implementing the torque tester. Nevertheless, the list of technological requirements grew longer and longer as the project progressed. "It included, among other things, a stable control platform without any rotating media or fans. In terms of software, the engineering platform had to be based on the IEC 61131-3 standard. The PC-based control system from Beckhoff met these and other requirements," says Roberto Listek.

Boston Scientific's torque tester is controlled via a Beckhoff CX1020 Embedded PC. Since it is fanless and uses a Compact Flash card as a storage medium instead of a rotating hard disk, it met the requirement to have the fewest possible moving parts in order to maximize reliability. "The Beckhoff platform provides a wealth of standard connectivity options, such as integrated USB and DVI ports, which enables us to simply plug in a USB stick to call up system data for reference purposes," explains Listek. "We then combined these hardware functions with TwinCAT, the powerful automation software from Beckhoff and Windows XP Embedded as the operating system to create a testing system that meets all our requirements. Roberto Listek continues: "The TwinCAT programming environment provides a simple and efficient way to implement all necessary functions. For example, with a simple function block in TwinCAT, we were able to cover our automation requirements as well as resolve earlier problems with data mapping and logging during tests." With industrial Ethernet as the system bus, the system's communication runs through a series of EtherCAT I/O modules, including various digital and analog inputs and outputs, as well as an EL6751 CANopen master terminal. "Since the system had to be able to process large amounts of test data quickly and efficiently, the high-speed communication and superior data acquisition capabilities, enabled by the EtherCAT Terminals, provide the best possible solution," adds Listek.

High-performance testing system ensures high-quality medical products

"By implementing a PC-based control system from Beckhoff, we were able to develop a system that fully meets our requirements for comprehensive quality testing in terms of reliability, simplified data acquisition and efficient performance. As the needs of the medical technology industry keep increasing and changing, Boston Scientific is definitely ready for the future," concludes Roberto Listek.

Enquiries: Kenneth McPherson.
Email K.McPherson@beckhoff.com
or visit www.beckhoff.com

Above: *Boston Scientific Corporation, USA.*

Left: *At the heart of the torque tester is a CX1020 Embedded PC which controls all test functions that are required for the qualification process. Image: Boston Scientific Corporation, USA.*

Making configuration easy

Comtest, local representative of Fluke Corporation, has introduced Fluke 154 HART Calibration Assistant, a standalone tablet-based communication tool that makes HART configuration easy. The 154 provides HART communication functionality that when combined with a Fluke 750 Series Documenting Process Calibrator or 720 Series Multifunction Process Calibrator enables the user to calibrate the full range of HART devices used in the process industry.

The Android-based tablet comes configured with the FlukeHART mobile app that utilises a long-range wireless HART modem, which connects to the HART transmitter being tested or configured. This allows technicians to wirelessly communicate with the device up to 250 feet away eliminating the need for technicians to stand next to the device so they can work from a safer, more convenient location.

The 154 provides full HART Device Description (DD) support of all HART devices and can monitor PV, SV, TV, QV, and other measured HART variables. Quarterly DD updates can be downloaded free of charge from the Fluke website for three years from the first use of the product.

The calibration assistant includes a configurable connection cable that accepts either hook clips for connecting to wires or extended tooth alligator clips designed to connect to transmitter connection screw heads. Its rechargeable lithium-ion battery is designed to last for several days of device testing and configuration under normal conditions.

The 154 includes the Android-based tablet, charger and USB micro-cable, installed FlukeHART mobile application, HART modem, USB mini-cable, hook test clips, alligator clips, magnetic hanging strap, and hard-side case.

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

Long range object detection

Ultrasonic sensors transmit and receive sound waves in the ultrasonic range. The object to be detected reflects the sound waves and the distance information is determined via time of flight measurement. As opposed to photoelectric sensors colour, transparency or the object's surface shine do not play a role. Blister packages in packaging technology or transparent plastic bowls in the food industry can be reliably detected.

The ifm ultrasonic sensors in M18 design provide a particularly small blind zone and long sensing ranges up to 2,2 m which are usually only achieved by sensors of a considerably larger design. The round and cube designs are available in a plastic or a particularly robust high-grade stainless steel housing.

The vibrating sound transducer reduces the deposit of dust. The sensors operate reliably with heavy soiling so that they can be used in applications in which photoelectric sensors meet their limits. They are set to the application via teach button, wire teach or IO-Link. Besides the sensors with the diffuse reflection principle ifm also offers versions for retro-reflective operation for orientation-independent object detection, for example wire mesh.

Enquiries: Tel: +27 (0) 12 450 0400
info.za@ifm.com or visit www.ifm.com

Open faced angle sensors – valve position monitoring

Turck has introduced two new versions of their inductive angle sensors for rotary actuators. Both new product offerings provide customers with a rotary valve sensing solution ideally suited for harsh environments; one includes a stainless steel Minifast connector and the other, using a terminal chamber, provides customers with ATEX and IECEx approvals. Utilising the inductive resonant circuit measuring principle and introducing an innovative open face sensor design for rotary valve sensing, the RI360-DSU opens the door for new potential in valve monitoring on rotary actuators. The RI360-DSU open faced inductive angle sensors deliver analogue or discrete outputs and provide flexible mounting options previously not available. Turck's RI360-DSU inductive angle sensors are able to monitor quarter turn valves and three-way valves, while also detecting the valve position during cleaning cycles. Additionally, the sensors are capable of detecting the wear of seals, thus saving downtime from seals that are worn from switching cycles. For flexible operation, the sensors are available with switching or analogue outputs.

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

Physics of a **Motion Control Move**

Glyn Craig, Techlyn

In this article the forces, velocities, inertias and power interact during a point to point move are studied.

System components

Figure 1 shows the main components. The incoming mains supply passes through the rectifier which converts the alternating current (ac) into pulsating direct current (dc). The smoothing section then charges a capacitor up to the peak dc voltage. The power electronics then converts the dc voltage into 3 phase ac voltage which drives the motor, which in turn spins the load. This subject was dealt with in more detail in an earlier article in this series. *Refer to the bibliography for a list of prior publications.*

Energy flow during a move

For a motor coupled to a load, there are four modes of operation:

- Motor drives the load in the forward direction
- Motor drives the load in the reverse direction
- Motor brakes the load in the forward direction
- Motor brakes the load in the reverse direction

These four modes are referred to as **Four Quadrant Control** and are shown in *Figure 2*. The X direction depicts rotational velocity (positive and negative) and the Y direction depicts motor torque (positive and negative).

- Quadrant 1 shows the load being driven (motoring) in the positive direction
- Quadrant 2 shows the load being slowed (braking) in the reverse direction
- Quadrant 3 shows the load being driven (motoring) in the negative direction
- Quadrant 4 shows the load being slowed (braking) while running in the forward direction

In the motoring quadrants, the power flow is positive. Power is the product of velocity and torque.

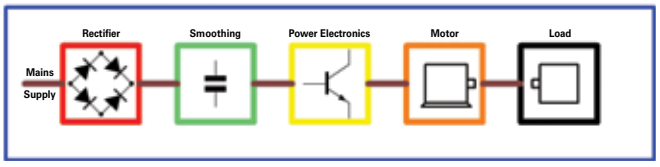

Figure 1: System components.

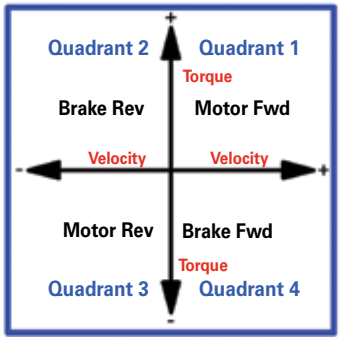

Figure 2: Four quadrant drive principles.

Quadrant 1 shows:
(positive velocity) X (positive torque) = positive power

Quadrant 3 shows:
(negative velocity) X (negative torque) = positive power
In other words, the flow of energy in Figure 1 is from left to right.

In the two braking quadrants, the power flow is negative. That is, energy is extracted by the drive, from the load being braked. The energy recovered is the kinetic energy of the rotation.

Quadrant 2 shows:
(negative velocity) X (positive torque) = negative power

Quadrant 4 shows:
(positive velocity) X (negative torque) = negative power

Flow of power

In the motoring mode, as noted above the flow of power in *Figure 1* is from left to right. Note that energy is the average power multiplied by the measurement time interval.

When braking, the flow is reversed in *Figure 1*. Energy flows from right to left in *Figure 1*. Thus the load is slowed by the motor and the recovered energy flows in from right to left until it reaches the smoothing section. The capacitor is then charged to a higher voltage in an attempt to store the energy. At some point this voltage will become dangerously high and the drive protection circuitry will

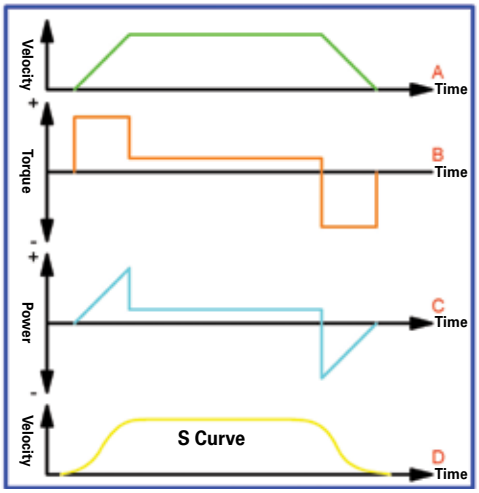

Figure 3: Trapezoid move profiles.

close the system down. This, of course should not occur in normal operation, and is dealt with in one of two ways:

A power transistor can connect a high capacity power dump resistor across the smoothing capacitor to allow the excess energy to be dissipated as heat in the power dump resistor. When the voltage across the smoothing capacitor reaches a safe level, the power dump is switched off.

At the cost of considerable complexity the rectifier can reverse its action and pass the capacitor's stored energy from right to left into the supply line. This is more efficient than the dissipative method using a power dump

Which system is appropriate will depend on a number of factors.

The power dump method is used in the power systems or systems with a low duty cycle. For example, a payoff machine feeding wire from a stock drum into a batch packaging winder at constant tension would only be required to be in regeneration mode briefly at the end of each production cycle as it slowed the stock drum to zero speed. The rest of the cycle would see the drum at standstill or in motoring mode.

A mine hoist, on the other hand, would spend a considerable amount of time in the regeneration mode as the cage or skip was being lowered. In this case a dissipative power dump would be a profligate waste of energy.

A Trapezoid Move

Figure 3 section A shows the principle of operation (velocity versus time). The move commences with a period of acceleration at a constant rate. This is followed by a plateau section at constant velocity. Finally, this is followed by a controlled deceleration to complete the move.

Section B shows the corresponding torque versus time. Note that the torque is constant during the acceleration and deceleration in this case. The relationship between torque, inertia and acceleration is given by:

Torque = Inertia X Acceleration
Or $T = J \times \alpha$
Where : α = Acceleration in radians/sec^2
J = Inertia in kg.metre^2
T = Torque in Newton.metres

Note that the Inertia is the sum of the motor rotor inertia plus the load inertia. Inertia for small systems are often expressed more conveniently in kg.cm^2 as this results more easily visualised numbers rather than tiny decimal numbers.

1 Newton.m^2 = (100)^2 kg.cm^2
= 10 000 kg.cm^2

During the plateau section (constant velocity) the torque is only required to overcome system friction.

Finally, deceleration requires negative torque as deceleration is merely acceleration with a negative sign.

At this point, the torque drops to zero in this example. This would not be true in the case of, say, a hoist which would have balance the torque produced by the mass of the load.

Section C shows the resulting power produced by the motor. During acceleration the power produced rises linearly with the (constant) acceleration.

Power = Torque X Velocity
$P = T\omega$ where Power (P) is measured in Watts
Torque (T) is measured in Newton metres
Velocity (ω) is the angular velocity in radians/sec

More conveniently, ω can be expressed in Rev/sec or rev/minute.

Using ω in rev/sec
$P = 2\pi\omega T$ (ω in rev/sec)
Using ω in rev/minute (RPM)
$P = \frac{2\pi\omega T}{60}$ (ω in RPM)

If the torque is not zero after the move, as would be the case with a hoist, the power delivered by the motor is zero as there is no velocity. In practice, system losses will consume a small amount of power. This can be made zero by a brake fitted to the motor.

Section D shows a modification to the trapezoid move. The beginning and end of the acceleration and deceleration profile is modified to provide a gentle start and stop. This is the so-called S curve. When the load is driven by a gearbox with lost motion (backlash), the S curve reduces the acceleration jerk at the velocity transition points. Apart from reducing audible noise, gearbox life is extended. Move time is, of course, extended in this case.

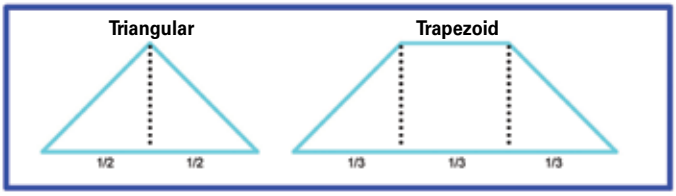

Figure 4: Triangular and trapezoidal moves.

Move Times

Refer to *Figure 4*.
The Triangular move accelerates the load for half the time and decelerates for the remaining time. This profile is used for shorter moves.

Note that the deceleration time can be shorter than the acceleration time if there is significant friction as this will aid the braking torque provided by the motor. For a given motor torque, this profile gives the minimum move time.

The times are dependent on load inertia and available motor torque. It is standard practice to use only 60% of the available motor torque to allow for unforeseen extra demands on the motor. From the longevity point of view it is much better to run the motor well within its performance capabilities.

A mine hoist spends a considerable amount of time in the regeneration mode as the cage or skip is being lowered.

The Trapezoidal move is used for long moves as the motor will have a finite practical maximum available top speed. Maximum speed with a stepper motor is constrained by the falling torque produced at higher speeds. In general a sensible upper limit for stepper motors is 600 RPM (10 rev/sec).

Conclusion

With brush motors, peak speed and torque are constrained by commutator and brush considerations. Brushless motors provide win-win performance, as the rotor is a permanent magnet with no propensity for self-heating. In addition the stator (on the outside of the motor) can be convection and conduction cooled. Brushless motor construction and operation was covered in an earlier article.

Note that standard gearboxes will often tolerate only modest input speeds, due to friction heating of the oil seals and lubrication problems. Gearboxes intended for use with induction motors would normally not see much more than 1 500 RPM.

As shown in *Figure 4*, it is common for each of the three sections to occupy a third of the move time.

In this case it can be shown that the maximum speed during the plateau section has to be 50% higher than the average speed of the complete move.

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All articles referred to are available in the flip magazines online as well as in E+C Spot On.

take note

- Forces, velocities, inertia and power all interact.
- Using an S curve reduces jerking.
- Peak power depends on acceleration.

Glyn Craig is a director of Techlyn. He has been involved in the mechatronics field for many years. Enquiries:
Tel. +27 (0) 11 835 1174 or email glyn@techlyn.co.za

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The Zest WEG Group, a subsidiary of leading Brazilian motor and controls manufacturer WEG, started out as a South African company and maintains its strong commitment to contributing to the development of the African region.

The Zest WEG Group has been servicing the mining sector for more than 35 years and by leveraging best practice engineering and manufacturing capabilities, the group is able to offer a range of standard off-the-shelf products as well as end-to-end energy solutions.

An in-depth understanding of the harsh conditions found within the mining sector and years of experience on the African continent, have ensured that the Zest WEG Group service offering is fit-for-purpose.

From single product installations to individually customised solutions, which are application specific, the latest technology is used to ensure optimum performance and reliability without compromising on energy efficiency.

WEG products are engineered to facilitate a safe and reliable mine and plant with operational stability and the highest possible production levels as an objective. Reduced maintenance and ease of serviceability assist in lowering the total cost of ownership for the mine.

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Compact version of new generation AMV12 switchgear

ACTOM MV Switchgear recently developed and introduced a compact version of its new generation AMV12 air-insulated indoor switchgear.

The AMV12 range, rated for 12 kV with current ratings of 1 250 A and 2 500 A at 31,5 kA in accordance with IEC 62271-200, has proven to be highly successful since its launch into the market in January 2015. Over 300 panels have already been sold and supplied to numerous customers, which include Johannesburg's City Power, the City of Windhoek, Hessequa Municipality (Stilbaai), CONCO and DRA.

The supplementary compact version now on offer has been developed specifically for use in instances where space constraints apply.

The width of a compact panel, which has a current rating of 800 A, is 650 mm, while individual standard AMV12 panels are available in widths of 800 mm and 1 000 mm.

"A single compact unit is 18% smaller in width than one of our standard 1 250 A rated AMV12 units. This translates into a space saving of between 14 and 18% for a typical switchboard, depending on the busbar rating and mix of compact versus standard units making up the complete switchboard," commented Greg Whyte, ACTOM MV Switchgear's Design and Development Manager.

The new compact unit has been type-tested and certified in accordance with the IEC System for Conformity Testing and Certification of Electrical and Electronic Components, Equipment and Products Certification Bodies Scheme (The IECEE CB Scheme), the world's first truly international system for the mutual acceptance of test reports and certificates dealing with the safety of electrical equipment and products. The type-tests on the compact AMV12 panel assembly, complete with circuit-breaker, earthing switch and cable-side voltage transformer, were carried out overseas through the well-known international certification body TUV Rheinland in January this year.

Enquiries: Greg Whyte, ACTOM MV Switchgear. Tel. +27 (0)11 820 5140 or email greg.whyte@actom.co.za

ACTOM MV Switchgear/s Rhett Kelly (left) and Greg Whyte pose in the business unit's Knights plant with a compact AMV12 unit.

Motor rebuilt for Zambian copper mine

Marthinusen & Coutts, a division of Actom, recently completed the rebuild of a 6 550 kW 2 pole 11 000 Volt squirrel cage induction blower motor for a copper mine in Zambia.

According to Rob Melaia, engineering and technical executive at Marthinusen & Coutts, the motor had suffered a rotor failure which caused collateral and associated damage to the stator and also considerable damage to the rotor laminations at the core extremities.

Marthinusen & Coutts has extensive experience with the rebuilding of such large rotating machines and it is this ability to leverage knowledge gained from years in the industry that facilitates the identification and repair of electrical machinery in limited time.

The repair work undertaken comprised a stator rewind, a rotor rebar including a partial recore with new laminations and the replacement of the P900 high strength rotor retaining rings.

Interestingly, the retaining rings are made from the same steel used for the largest turbo generator in the world and this was sourced by Marthinusen & Coutts from a leading German supplier in record time. "Working closely with our network of local and international partners facilitates access to specialists in all fields and allowed the fast track procurement of these specialised rings. This was especially impressive as these were procured over the Christmas period," Melaia says.

The rotor rebar involved new rotor bars using high resistivity brass alloy and the redesign of the rotor cage axial locking system.

Once the rebuild had been completed, the motor was tested at Marthinusen & Coutts' facility which houses the third largest high speed dynamic balancing machine in sub-Saharan Africa.

"We were able to perform high speed balancing as well as a full no-load run test to verify vibration and bearing integrity condition performance," Melaia says.

Enquiries: Richard Botton. Tel. +27 (0) 11 607 1700 or email richardb@mandc.co.za

New benchmark for IE3 energy-efficiency compliance in Africa

Energy efficiency and sustainability are becoming more and more important in the development and re-engineering of industry products, especially due to stricter legal requirements. On 1 January 2015, the second stage of Regulation 640/2009 came into effect, stipulating increased energy efficiency in asynchronous ac motors.

This meant that all two-, four- and six-pole asynchronous motors with a power rating of 7,5 kW to 375 kW introduced into the European Union, Switzerland and Turkey must meet the requirements of energy-efficiency class IE3. Less energy-efficient asynchronous motors are no longer permitted for this power range, with a few exceptions. On 1 January 2017, the IE3 requirement will come into effect for all asynchronous motors with a power rating of 0,75 kW to 375 kW.

While South Africa does not face the same regulatory pressure as the EU, **SEW-EURODRIVE** has decided to raise the benchmark locally by launching its new DRN series as its standard range of electric motors. "We also have to take into account our customers across our borders. For example, if we supply an African OEM carrying out an overseas project from South Africa, the IE3 requirement has to be met. We not only supply the local market, but have to take our export obligations into account as well," National Sales Manager Norman Maleka comments. "The approach we have adopted with our customers is to highlight the energy-efficiency component."

The challenge for SEW-EURODRIVE was to develop an IE3 motor that can replace an IE2 motor without any problems, high cost or effort. This meant reducing energy losses while retaining the same motor frame size. The solution was the DRN series, which is as small, light and compact as the comparable DRE series. The weight and dimensions of the IE3 motors have only changed marginally, while the entire brake portfolio, unique built-in encoders and all additional features are all still available. The new IE3 motors comply with all global design specifications and standards.

"In South Africa, we will basically bring the DRN series in as a complete range, and not present the option of the earlier range. It will be a standard. If a customer purchases our gearmotor, the motor itself will be IE3 compliant. This means we will set the benchmark once again," Maleka explains.

"What is equally important is the fact that the DRN series is downward compatible with our previous motors, regardless of the energy class. It fits right onto our gearboxes, which means no additional effort on the part of our customers." Another feature providing extra benefits for customers is the development of a global stator. "The new IE3 series will be beneficial to us from a stockholding point of view. It also fulfils our mandate of bringing in the latest, most energy-efficient products into the local market. We are looking forward to seeing how the local market will receive the new range."

Enquiries: Visit www.facebook.com/SEWEurodriveSA

SEW-EURODRIVE National Sales Manager, Norman Maleka.

The new DRN series will be launched officially at Electra Mining Africa 2016 from 12 to 16 September 2016, at the SEW-EURODRIVE stand in Hall 6 J20. The company will unveil a range of new products under its 'The Future Starts Now' campaign.

Motor protection relay brand now with IEC 61850

The Reyrolle Rho-C type 7SR17 Motor Protection Relay provides comprehensive, configurable motor protection with enhanced functionality and performance through a user friendly interface. There is no limitation to the size of 3-phase induction motor that the Rho-C can be applied.

Current and optional voltage inputs may be supplied with this unit which provides for a comprehensive, integrated protection and metering solution. Prevailing tough economic conditions can cause mines to operate modern motors close to thermal limitations.

The Rho-C thermal algorithm has therefore been optimised to match the thermal overload characteristics of all types of motors and cooling systems. In addition, IEC 61850 has recently been added to the suite of supported protocols for integration into modern substation automation systems.

Enquiries: Marcel Kelly. Tel. +27 (0) 11 457 1600 or email marcel.kelly@woodbeam.co.za

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Fast-track solution for fast-track projects

The fast-track nature of many large industrial and mining projects on the continent has seen an increase in the demand for containerised housing for Motor Control Centres (MCCs). These stations are quicker to establish on site than their brick-and-mortar counterparts and they are assembled off-site in factory-controlled conditions.

There is no limit to the size of the MCC stations, with containers connected side by side or stacked on top of each other to provide the necessary space. Being a modular solution, individual containers are easily transported to the project site and then erected.

Shaw Controls' chief commercial officer, Johan van Niekerk notes that the company supplied these solutions to many project sites including Eskom's Medupi Power Station project and the associated Exxaro Grootegeluk expansion programme. And, while this is a growing trend, Shaw Controls, a division of **Zest WEG** Manufacturing, is leading in their supply. The company's firm grip on this growing market can be attributed to its intense focus on quality at its 12 000 m² manufacturing hub in Robertsham, Gauteng.

Van Niekerk says the containers are constructed to customers' specifications at the Shaw Controls facility. "All our containerised housings are built from scratch. We install all the necessary fittings and claddings, based on individual customer requirements," he says.

This approach is in line with Shaw Controls' strategy of keeping manufacture in-house to reduce costs and maintain close control over quality. The strategy is working considering that Shaw Controls' order book for all its solutions, including its leading range of MCCs, is five times the size it was a year ago.

A sizeable share of this comprises orders from blue-chip mining houses and international engineering companies involved in brownfields and greenfields mining projects in Africa. Van Niekerk says the company's close affiliation to the mining industry means that it has to comply with the highest standards in design and manufacture of MCCs and panels.

This includes all quality and safety standards adhered to by Australian engineering firms, who are dominant players in the African mining industry. This is complemented by Shaw Controls' IEC 61439 certification which proves the integrity of its panels.

Enquiries: Kirsten Larkan. Tel. +27 (0) 11 723 6000 or email marketing@zestweg.com

Johan van Niekerk, chief commercial officer at Shaw Controls.

Low-voltage soft starters with enviable track record

PSTX is designed to address some of the most common electrical problems that comes from starting motors. It both reduces n. current at the same time as it keeps the motor protected from both load and network irregularities. A great component in any motor starting panel.

The built-in earth fault protection detects if there is an earth fault in the motor connection that may lead to damages. The current limiting function detects if the current has exceeded the set trip level and prevents heavy loads from creating unnecessary electrical stress during start. Reduced current allows OEMs to install the motor in more networks and motor protections will prolong their equipment's lifetime. Installing and using the PSTX is made fast and easy, saving time for everyone involved in installation and commissioning. Initial design decisions made were done so to consider all aspects of the purchasing, operating and servicing life-cycle of the product.

With PSTX, much of the required functionality typically required for most applications is is already built-in. The bypass will reduce both energy consumption and heat generation while running motors at full speed. Having it built-in saves both time on installation and space inside the panel. With all its included functions such as torque control to avoid water hammering, jog with slow speed to rotate motor slowly both forward and reverse as well as possibility to clean a pump by reversing the flow PSTX is the complete motor starting solution. To increase reliability of the process, PSTX includes a limp mode that will allow the continuing of operation even where a thyristor fails. As a result, the end-user enjoys improved productivity and full-potential motor usage.

Enquiries: Elvis Khumalo. Tel: +27 (0) 10 202 5000 or email Elvis.khumalo@za.abb.com

ISO 90001 Quality Assurance accreditation

Celebrating its 85th anniversary this year, **SEW-EURODRIVE** South Africa Quality Manager Clinton Warrington says that SEW-EURODRIVE is continually looking at its own internal processes in order to make improvements and boost quality and performance. "ISO 9001 is all about customer satisfaction. We need to understand what our customers require from us, in order for us to be able to fulfil these requirements," Warrington explains.

Billed as a quality 'stamp of approval' for millions of organisations worldwide, ISO 9001 is one of the most widely used management tools in the world today. The ISO standards are designed to help organisations ensure that they meet the needs of customers and other stakeholders while complying with all statutory and regulatory requirements related to specific products.

Warrington adds that attaining the ISO 9001 mark will ensure business best practice at SEW-EURODRIVE. "The accreditation encompasses the total organisation. It is a business management approach, right from the customer, through to all areas, functions and departments."

SEW-EURODRIVE embarked on an extensive process in order to acquire the necessary accreditation. "We wanted to ensure we had everything in place and that all departments were fully committed in order to ensure our success in attaining ISO 9001," Warrington stresses.

"We wanted to guarantee that it was not just a window-dressing exercise, but a fully functioning business tool that ensures that all parts of the organization continually improves with the aim of not just enhancing but also exceeding customer requirements." Warrington reveals that, following its success in attaining ISO 9001, SEW-EURODRIVE has now set its sights on attaining industry-leading ISO 14001– Environmental accreditation.

Enquiries: Visit www.facebook.com/SEWEurodriveSA.
Tel. +27 (0) 11 867 7763
or email nomvelo@ngage.co.za
or visit www.ngage.co.za

SEW-EURODRIVE South Africa Quality Manager, Clinton Warrington.

Type test certification for local switchgear company

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 km 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 its proven and IEC 61439 certified Eagle series of motor control centres.

Enquiries: Johan Basson. Tel. +27 (0) 11 027 5804
or email info@jbswitchgear.co.za

Peak Demand Management

Facility Case Study

Hannes Roets, Power Optimal

To understand the concept of Demand Management, we have to refresh our memory of electricity basics a little.

Remember... Power is the rate at which energy is consumed by a load at any instant in time. In other words, the load 'demands' a certain rate at which the energy is transferred. Watt is the measurement of Power, describing the rate at which electricity is being used at that particular moment. For example, a 100 Watt (W) light bulb 'demands' 100 W of electricity at any moment when turned on.

On the other hand, energy or consumption is measured in watt-hours which describes the total amount of electricity used over time. Watt-hours are a combination of how fast the electricity is used (watts) and the length of time it is used (hours). For example, a 100 W light bulb, which demands 100 W at any one moment, uses 100 watt-hours of electricity in the course of one hour.

A simple way to determine the difference between demand and consumption is by examining these two examples.

In *Figure 1*, a 100 W light bulb burning for 10 hours consumes 1 000 watt-hours or one kilowatt-hour (kWh). The entire time it is turned on, it 'demands' 100 W from the power station. That means the power station is required to have 100 W available whenever the customer switches on the light.

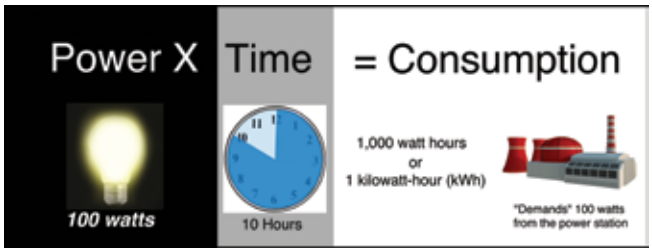

Figure 1: One 100-watt light bulb burning for 10 hours consumes 1 000 watt-hours or 1 kilowatt-hour (1 kWh).

Similarly in *Figure 2*, ten 100 W light bulbs burning for one hour also consume 1 000 watt-hours or 1 kWh, but it now requires or 'demands' 1 000 W or 1 kW. Observe that in both instances the consumption is 1 kWh. However, take a look how differently the second scenario impacts the power station from a demand point of view. It is now required to supply ten times as much power in response to the 'demand' of the 10 light bulbs operating at the same time. These two clients will receive identical bills because both of them used 1 kWh of energy. However, the utilities have an ace up their sleeve, as we shall see shortly.

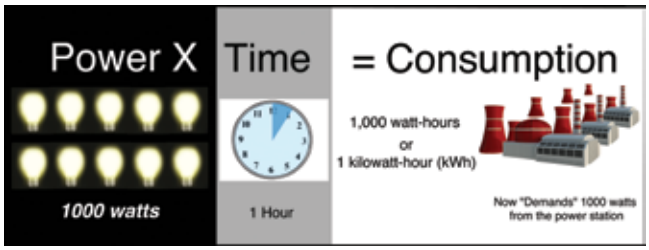

Figure 2: Ten 100 watt light bulbs burning for one hour also consume 1 000 watt-hours or one kilowatt-hour (1 kWh.)

Demand is measured in kilovolt-amps (kVA), which is broadly speaking the same as kilowatt (kW) but a phenomenon known as Power Factor complicates the equation. This article is not the forum to explain that, so for the sake of this discussion we will assume a Power Factor of 1, which makes kW = kVA.

In most instances the amount of electrical energy (kWh) required, is not the problem. The biggest problem arises when the demand (kVA) escalates. Consumers are frequently requested to turn off their geysers and other unnecessary equipment during the morning and evening peak (see *Figure 3*). When the demand outstrips the supply, load shedding occurs, which is Eskom's style of Demand Management, albeit an inefficient, but necessary, method.

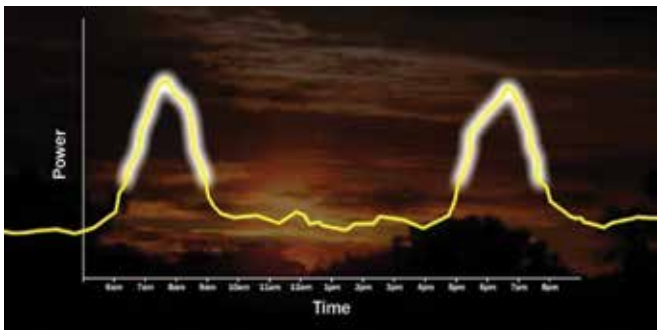

Figure 3: Daily Peak demand occurs between 06:00 and 09:00 (mornings) and 17:00 and 20:00 (evenings).

Playing the Ace

A consumer that creates a high demand needs more facilities from the electricity supplier. This includes a vast array of expensive equipment like transformers, wires, substations and even generating stations. Peak consumption, when the need for electricity is at its highest, must be met. To recover their additional expenses, the utilities play their ace. They charge liberally for the high peak demand that most of us help create and of which many consumers are totally unaware.

Eskom and municipalities usually charge commercial and industrial customers for both demand (1 000 W in the example given) and consumption (1 kWh). Business account holders that generate a demand in excess of 100 kVA will typically find this item on their bills.

> *'If you cannot measure it, you cannot manage it'.*

Measuring the demand

Customers are charged for the highest peak registered during a billing cycle, usually a calendar month, and the demand is usually measured as an average over a period of 30 minutes.

For instance, if most of the electrical equipment is used during that 30 minute interval, the demand charge will be close to the maximum. Just one high peak demand in any of those short 30 minute intervals (1 440 in a 30 day month) will mean a substantially higher bill.

The chart in *Figure 4* illustrates the concept. The shaded area depicts how much electricity this client used, and he will get charged for that in kWh. The red line on top indicates the 'maximum demand', the point where the consumption reached a peak during this 24 hour cycle.

The smart meter measures these peaks and the highest 30 minute period recorded during a month will be the figure that determines the demand charge for that particular month.

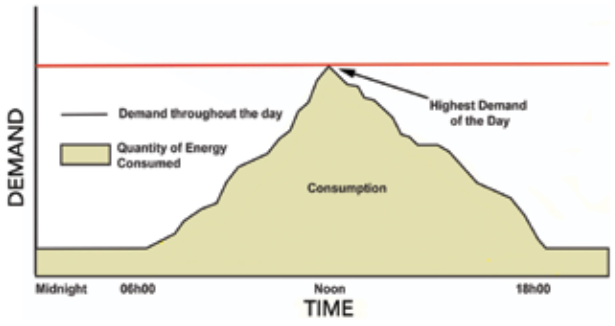

Figure 4: The maximum 'demand' recorded during this 24 hour cycle.

Because the client gets charged as described, a considerable amount of money could be saved by spreading the electricity usage throughout the day and night. Running equipment one after the other rather than at the same time would reduce his demand. Broadly speaking, that is the concept that the company that the author represents, uses to manage the electrical load, consequences of which are meaningful savings.

Automated Peak Demand Management

PowerGuard is an established, IEC certified peak power demand management technology. It utilises intelligent load shifting of non-essential devices, such as electric water heaters or geysers, boilers, air conditioners, swimming pool pumps, etc. It does it in such a way that substantial peak power reductions can be achieved without any impact or inconvenience to the end user.

Case Study at Avianto Hotel, Wedding & Function Venue

This case study is the result of an installation of the automated Peak Demand Management equipment used at the very upmarket Avianto Hotel, Wedding & Function Venue in Muldersdrift, Krugersdorp (South Africa). This intervention was intended to curb the unacceptably high demand that was generated by the hotel's normal activities, without affecting operational efficiency.

Since it had already been established that Demand Management would be the only energy management opportunity that would be considered, a 'Walkthrough' energy audit was conducted. During the energy audit the following non-critical loads that could be controlled, were identified:

- Fourteen 2 500 W air conditioners and fans
- Thirty-seven 3 000 W geysers
- Three sets of 1 000 W elements for underfloor heating
- Total kW that could be controlled: 149
- Total number of channels: 75

For Measurement and Verification purposes an attempt was made to access the data stored in Eskom's smart meter. High-resolution historical data would have been very helpful in developing an accurate baseline from which to determine actual energy savings. This attempt was abandoned because of numerous administrative difficulties.

In almost any kind of energy efficiency programme, it is essential to have accurate data before starting a savings project. Furthermore,

it is essential to have steady and ongoing data as soon as projects are implemented to ensure energy savings are sustained. In a nutshell, 'If you cannot measure it, you cannot manage it'.

Unless you know what your baseline is, you will neither be able to identify the most beneficial areas for the greatest gains nor would you have the ability to verify whether your interventions are working or not. For that reason, a smart meter that serves an online graphic user interface was installed about six weeks before the PowerGuard switch-on. The data gathered during those six weeks proved to be invaluable.

All data is readily available via a web-based online system where the authorised user has round the clock access. In addition to the load profile and billing data, additional statistics can easily be generated for a given load profile. These statistics provide accurate billing information for the period selected, allowing a customer to directly measure the financial implication of a specified period.

Since this project concerned demand only, and also because the Eskom meter data was unavailable, it was decided to use historical billing data for the 12 month period prior to the intervention for creating a baseline. It was established that the kVA figures reported on the Eskom bills were actual readings and were assumed to be accurate (see *Figure 5*).

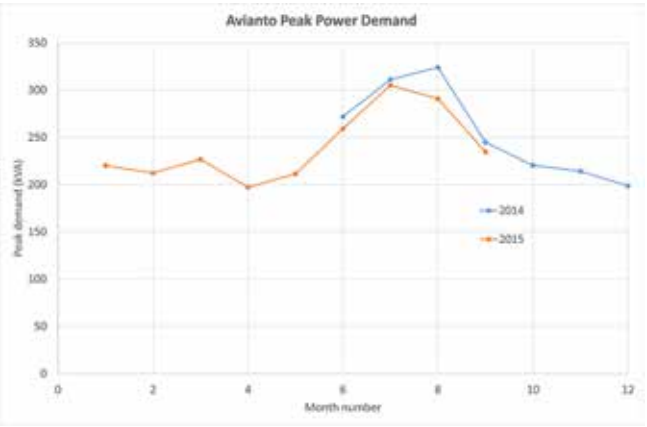

Figure 5: Maximum Demand (kVA) readings on Eskom bills for a 12 month period.

The system was commissioned on 12 August 2015 and initially calibrated to limit the demand to 250 kVA. Some days later it was reduced to 240 kVA after it was confirmed that it was operating well within its operating range.

Figure 6 is a graph and analysis produced by the online interface of the smart meter that was installed prior to PowerGuard. It clearly shows that peaks occurred around the 300 kVA mark before switch-on, with a maximum of 309 kVA reached on 18 July. A comparison between the demand figures for 100% hotel occupancy just prior to switch-on and immediately after that, shows a reduction of approximately 50 kVA.This particular bill falls in the high season with a kVA tariff of R210,66 which means the savings for that month alone came to approximately R10 000.

The client reported a seamless transition with no adverse effects on operations detected for the eight and a half months from switch-on. Since the calibration setting was reduced from 250 to 240 kVA, the system has required no attention and has been operating as predicted.

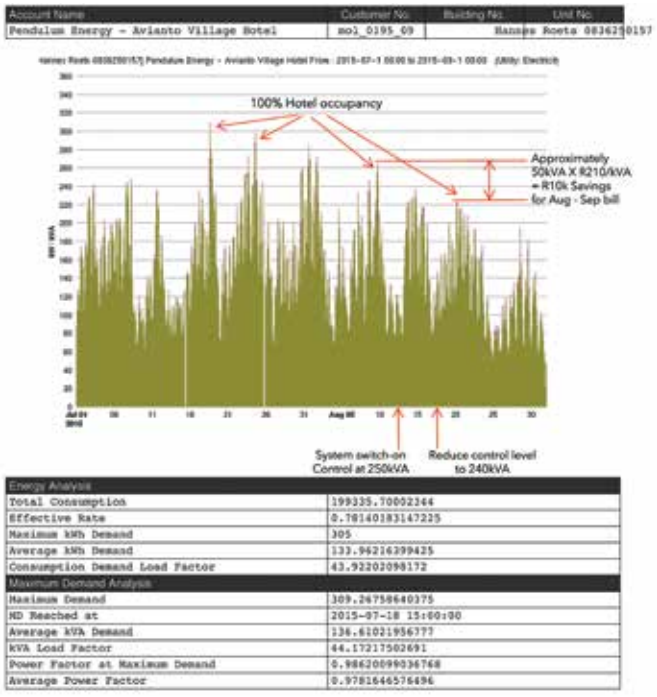

Figure 6: Graph showing electrical profile and demand analysis, before and after switch-on.

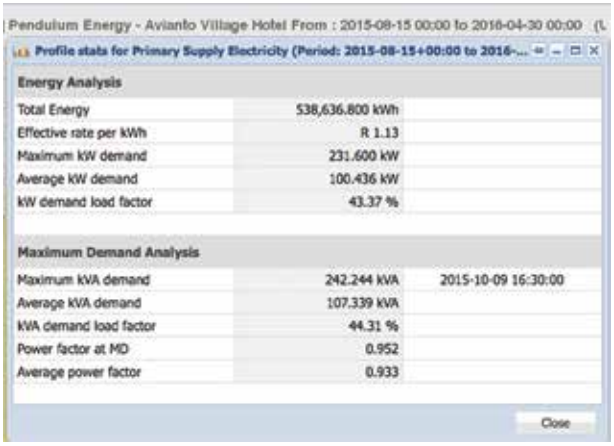

Figure 7: Profile statistics for the period 15 August 2015 to 30 April 2016.

The profile statistics (see *Figure 7*), acquired from the smart meter shows that the control level set at 240 kVA had been maintained for the period that the system was operational.

Financial analysis

Assuming a conservative reduction in demand of 50 kVA for Winter and 30 kVA for Summer, the following savings could be realised.

Eskom 2016 – 2017 kVA tariff

High season (June, July, August):	R262,72 X 50 = R13,136 X 3	= R39,408
Low season (September – May):	R139,06 X 30 = R4 171,80 X 9	= R37,546,20
Estimated total saving for 2016 – 2017 year:		**R 76 954,20**

Simple Payback

Capital cost of Project:	R80 000
Net Annual Savings:	R 76 954 (first year, likely escalating 8 – 10% per year)
Payback period:	**11,5 months**

Return on Investment

Capital cost of Project:	R 80,000
Net Project Value	R 76,954
ROI	**96%**

Notified maximum demand reduction

This facility is served by a connection that carries a maximum notified demand of 500 kVA. That means that it may never exceed that demand, and if it does it faces a heavy penalty or in some instances even disconnection.

In 2016, Eskom charges R13,28 per kVA for access to the connection, which results in a monthly charge of R6 640.

In *Figure 7*, it can be seen that, since the PowerGuard intervention the facility constantly operates at a demand of 240 kVA, which is less than 50% of the notified demand. That affords the opportunity to safely reduce the notified demand to 300 kVA, which leaves a generous safety margin of 60 kVA.

Additional savings

Reduction of 200 kVA X R13,28 = R2 656 X 12 = R31 872 per year additional potential savings!

Conclusion

Considering that the benefits far outweigh the disadvantages, an exceptional Return On Investment (ROI) and a payback period of less than 12 months, it is clear to see the economic benefits of investing in Peak Demand Management. It allows all participants, customers, and utilities to benefit from the efficient use of the network and generation without adversely affecting the energy service.

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[3] Theron JJ. Personal communication with design engineer at Crane Electronics, Randburg. March 2016.

[4] Electricity+Control. October 2012. http://www.eandcspoton.co.za/resources/docs/Energy/Peak_demand_management_benefits_environment.pdf

take note

- Energy we have; the challenge is the power.
- South Africa, and most developing economies, needs systems that manage demand.
- Proper demand management can positively impact on your electricity bill.

Hannes Roets is a Director at PowerOptimal.
Enquiries: Visit www.poweroptimal.com
www.linkedin.com/company/poweroptimal
Skype: sean.moolman

Precision current loop calibrator saves time

The **Comtest Group**, Fluke's authorised Test and Measurement Distributor for South and southern Africa, has offer Fluke 709 and 709H mA loop calibrators, specifically designed to save time and produce high-quality results. These calibrators are built around

a user-friendly interface with a Quick-Set rotary encoder knob. This tool reduces the time it takes to measure, or source, current and power up a loop. The protective holster easily fits into a technician's hand and the large backlit display is easy to read, even in dark, cramped worked areas. The 709H adds HART communications and supports a select set of the HART universal and common practice commands. This makes the 709H unique as both an affordable, compact loop calibrator and powerful HART communication troubleshooting tool. In the communicator mode the user will be able to read basic device information, perform diagnostic tests, and trim the mA output on most HART enabled transmitters. In the past, this could only be done with a dedicated communicator, a high-end multifunction calibrator, or a laptop computer with HART modem. Fluke 709H will allow virtually any technician to service and support HART devices. In addition, the 709H offers:

- Logging of HART data in the field. Once recorded by the 709H in the field, the 709H/ TRACK software can upload the HART configuration of up to (20) HART devices in your plant and output data in either (.csv) or (.txt) format.
- Data logged mA loop measurements and HART data can be recorded from a particular transmitter for trouble-shooting and loop tuning. The data log feature offers selectable capture with recording intervals of 1 to 60 seconds and a logging capacity of 9 800 records or 99 individual sessions. Each data sample contains the 709H mA measurement, all four process variables, and the standard status conditions.

Enquiries: Tel. +27 (0) 10 959 1821 or email sales@comtest.co.za

Earthing and short-circuiting device with aluminium cable

When using aluminium-cable earthing and short-circuiting devices instead of copper-cable for railway systems, switch-gear installations or overhead lines, the advantage of the weight-reduced cables becomes immediately evident.

The new aluminium earthing and short-circuiting device (single-pole, 50 mm² or 70 mm²) from **DEHN Africa** is considerably easier to transport and use than conventional devices. In the past, high copper prices led to material theft and damage, meaning that the new earthing and short-circuiting device with aluminium cables offers huge cost saving and convenience potential.

The new offering from DEHN Africa comes in a variety of different models, including an earth clamp for overhead contact lines and clamp for railway tracks with tommy bar; an earth clamp for overhead contact lines and clamp for railway tracks with ratchet; a universal clamp (T Pin Shaft) and universal clamp (Handle); a conductor clamp and universal clamp (Handle); ball head caps (Ø25 mm); a universal clamp (Handle) and clamp for railway tracks with tommy bar; a universal clamp (Handle) and clamp for railway tracks with ratchet; and with universal clamps (Handle) on both sides. Thus, earthing and short-circuiting kits can be fitted with the available clamps using diverse combinations to fit the required function.

Enquiries: Kirk Risch. Tel. +27 (0) 11 704 1487 or email alexis.barwise@dehn-africa.com

Reliable software for multiple phase measurement

Emerson Process Management introduces Micro Motion Advanced Phase Measurement (APM), a software option available on the Model 5700 Transmitter. The software solution helps improve measurement accuracy across diverse industries in challenging multi-phase applications such as direct wellhead and separator net oil measurement in the oilfield and starch concentration for food and beverage plants.

This multiple phase measurement solution provides insight into the complete flow stream, including oil, water, and gas, through an intuitive, local display. Leveraging Emerson's years of experience in providing solutions for process upsets or intermittent two-phase flow, Advanced Phase Measurement provides continuous, real-time production data for oil, water and gas void fraction. "Advanced Phase Measurement was designed with production engineers in mind, providing insight into production trends with a single device to reduce capital and operating expenses," said Kevin Borden, Product Manager. "You can track whether production is increasing or decreasing, allowing proactive management of changing field performance which ultimately equates to more dollars in your bottom line." Advanced Phase Measurement has also proven useful for the life sciences and chemical industries, providing critical measurement insight to reduce waste, maintain product quality, and identify process upsets even in the presence of multiple phases.

Enquiries: Michael Eksteen. Tel. +27 (0) 11 451 3700 or email Michael.Eksteen@Emerson.com

Cables for Africa

Internationally renowned cable manufacturer **Helukabel**, is pulling out all the stops at this year's Electra Mining 2016 with a technically orientated stand designed to provide mine operators with correct cabling solutions for their mining requirements.

Managing director, Doug Gunnewegh, says that the emphasis for this year's exhibition is to show the wide array of cables and accessories that are purpose designed for all mining applications. Whether it be wear-resistant trailing cables at the rock face, chemically resistant cables for process applications, Easy Click compression glands for panel building or any other application, it pays to use the right solutions for the job at hand.

"Rather than simply making do with what is available in the storeroom, we would like to highlight the benefits of using purpose made products that are specially designed for the application, is easier to install and will live up to its stated lifespan.

"Apart from being tailor-made for a wide range of applications, our products are designed and manufactured in Germany and Europe to the highest possible quality standards and bear the necessary approvals for quality," says Doug.

With over 30 000 product lines available, customers are sure to find a solution for their requirements. If not, the company has invested in state-of-the-art research and development facilities to enable it to develop cables to almost any requirements. The range also includes industrial and infrastructure cables and wires, data network and bus technology, custom cables, accessories, robotics and installation tools.

The impressive new operations and warehousing facilities are situated at 1052 Schooner Street, Lazer Park, Honeydew.

Enquiries: Doug Gunnewegh. Tel. +27 (0) 11 462 8752 or email doug.gunnewegh@helukabel.co.za

To add an element of interest to the Electra Mining 2016 stand, Helukabel will host wiremen and electrically orientated staff, to compete in a challenge to see who can achieve the fastest times to install a compression gland in a mock-up of an electrical cabinet. Winners will win bragging rights and a chance to take home a good selection of prizes for their efforts. The stand can be visited in Hall 7, at stand number E5 (Nasrec).

Helukabel Managing director, Doug Gunnewegh.

New compact hand-held vibration meter

Instrotech, distributor and manufacturer of a range of process control instrumentation and specialised systems, has announced the launch of UK-based Monitran's MTN/VM220, a compact, handheld meter for measuring vibration levels. It is a rechargeable, portable instrument designed to operate with a constant current accelerometer to provide accurate vibration measurements. Conforming to ISO10816-3, the MTN/VM220 is engineered to detecting the early signs of component wear or failure in pumps, motors, gearboxes and other mechanical assemblies.

Measuring only 130 x 78 x 28 mm, the MTN/VM220 has an easy-grip, rubberised case and a long-life rechargeable battery and had the ability to store up to 100 time-stamped readings, including; RMS, peak, peak-peak, crest factor and bearing conditions, all on an easy-to-read, colour LCD display.

The unit is shipped in a foam-lined, durable carry case and includes the MTN/2200, a general purpose sensor probe with a default sensitivity of 100mV/g, as well as a magnetic base and spike (for use with the probe), a coiled cable with a 4-pin Lumberg connector at each end, and a universal battery charger.

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

First order for compact voltage transformers

ACTOM High Voltage Equipment's (HVE) first contract for manufacture and supply of compact 132 kV voltage transformers (VTs) was awarded to it recently by leading infrastructure company Consolidated Power Projects (CONCO) for supply to Tshwane Metropolitan Municipality.

HVE developed the new competitively priced and efficient compact VT in-house and introduced it into the local market in 2015. The new product is 35 to 40% smaller than the conventional unit and is accordingly about 15% lower in price.

The compact VT's are available with standard porcelain insulators or glass-core and silicon composite insulators – the latter being pollution-resistant and less subject to damage than the conventional product.

The contract to HVE, awarded by CONCO in mid-February this year, is for manufacture and supply of 12 compact VTs fitted with porcelain insulators. The VTs form part of a range of HV equipment Tshwane Municipality has ordered under a three-year frame contract it awarded to CONCO last year.

"It was fortunate for us that we completed development and testing of the compact VT when we did as it comfortably comes in at the right price as quoted by CONCO to Tshwane Municipality on their frame contract. We couldn't have accepted the order for our traditional VTs at that price," commented Nick de Beer, HVE's Product Manager, Instrument Transformers.

Enquiries: Casbah Zwane Tel (011) 820-5369 or emailcasbah.zwane@actom.co.za

Nick de Beer (right), Product Manager, Instrument Transformers, and Etienne Venter, Design Engineer, Voltage Transformers, of ACTOM High Voltage Equipment.

Company excels at regional awards

Royal HaskoningDHV was victorious at the recent South African Institution of Civil Engineers (SAICE) KwaZulu Natal Regional Awards in Pietermaritzburg having won Awards for Technical Excellence; Branch Award for Excellence in Civil Engineering; and the Company Champion Allan Rowe trophy. These prestigious awards were held at the Golden Horse Casino's Conference Centre in Pietermaritzburg to honour individuals, project excellence and community-orientated initiatives. In the category for Technical Excellence, Royal HaskoningDHV won the award for the Hlambanyathi Development Project for the Department of Transport. The project was undertaken in a joint venture between Royal HaskoningDHV and an emerging consultant – Mzansi Africa.

Mervyn Bosworth-Smith, Principal Engineer at Royal HaskoningDHV says: "This entire project started about 9 years ago with the bridge contract taking about 18 months to complete. It gives one satisfaction that you have done something that makes people's lives easier, being able to enhance society and improve people's living conditions."

For the residents of the isolated Makhosaneni area, access to schools, markets, the Ndundulu clinic and the district hospital was provided by a treacherous low level crossing of the Hlambanyathi River. The isolation of the area had led to a deepening of rural poverty and many young people were abandoning family homesteads for better opportunities closer to urban areas. The Department of Transport has successfully resolved this situation by the construction of a high level bridge and a shorter, safer access road. At the same time a training programme for unskilled workers was initiated and a variety of associated transportation projects were undertaken on a plant hire basis to provide additional work in the area. The project was complicated by the presence of a local dam immediately below the bridge site which provides for local water supply. Serious consideration had to be given to the protection of this facility during construction.

Royal HaskoningDHV's Hlambanyathi Development Project will now go on to be entered into the annual national awards which will be hosted by SAICE and SAFCEC (South African Forum of Civil Engineering Contractors) on 13 October 2016 in Johannesburg. *(See Social Engineers on page 47).*

Enquiries: Visit www.royalhaskoningdhv.com/za

Investing in future South African engineers

Three top-performing South African matrics have become the first students in Sub-Saharan Africa to secure placement in the prestigious Siemens Apprenticeship Scheme in Germany. The global engineering firm has pledged its commitment to addressing South Africa's shortage of engineers by investing in the three youngsters.

Kelly Moorosi (19), Joseph Shandlale (22) and Hendri Meintjies (22) finished top of a list of more than 1 000 applicants for the all-expenses-paid three year theoretical and practical training in electrical and mechanical engineering in Berlin. Their careers are already well on track because they are guaranteed skilled employment at Siemens in South Africa upon their return home.

"We are identifying top talent and training the engineers of tomorrow," says Clifford Klaas, Siemens SA Executive Director: Corporate Affairs, HR and Sustainability. "These young people are being nurtured and developed from the very beginning of their careers, with benefits both to the individuals and the wider economy."

"Kelly, Joseph and Hendri are future engineering pioneers for **Siemens** SA and we are proud to be sending them to our international operations. I am confident they will excel during their training and bring their new skills and experience back home to benefit South Africa," says Klaas.

The three apprentices say their apprenticeship will be life changing. "Siemens has provided an opportunity I never thought possible. I will make the most of my apprenticeship and return home to pursue a career in mechatronics," says Moorosi. *(See Social Engineers on page 47).*

Enquiries: KeshinGovender. Tel. +27 (0) 11 652 2000 or email keshin.govender@siemens.com
Twitter: www.twitter.com/siemens_press

Predictive Maintenance with Wireless Fluke Connect® Tools

Keeping electrical workers out of harm's way

Non-contact tools increase electrical safety

It's the foundation of any electrical safety program: limiting the exposure of workers to the electrical hazards of shock and arc flash. Using test leads and clamps to probe inside a live panel when troubleshooting and performing routine maintenance always exposes workers to danger. Electrical personal protective equipment (PPE) is a last line of defence and must never be relied upon as the primary method of protecting electricians and technicians. Safe work practices, including the use of non-contact test tools that do not require electrical workers to place themselves in harm's way, must first be considered when it comes to electrical safety.

Fluke Connect™, introduced in 2014, added a new level of efficiency and effective collaboration for maintenance and troubleshooting, in all kinds of manufacturing, commercial, and retail facilities. Technicians can monitor real time results from more than 20 different Fluke test tools from a smart phone (up to 10 at a time on iPhone and six on Android). This information can also be securely shared, in real time, with authorised team members in other locations.

In addition, test results and maintenance data can be collected through the Fluke Connect app and stored by asset in secure Fluke Cloud™ storage. That means that troubleshooting and maintenance staff can access that data in the field to compare new measurements to baseline measurements to more quickly identify problems.

The end result is that technicians can use Fluke Connect to quickly identify and diagnose problems while securely sharing the related data, when they want and with the specific people they have given permission to view it.

Fluke's newly released clamp meters - the Fluke 376 FC True RMS ac/dc Clamp Meter with iFlex and the Fluke 902 FC True-rms HVAC Clamp Meter allow the technicians to access tight places and work around large, awkward conductors and can transmit measurements to a smartphone or tablet for later, detailed analysis. Those measurements can be uploaded to the cloud. Technicians can combine measurement data from multiple Fluke Connect test tools to create and share reports from the job site via email and collaborate in real time with other colleagues with ShareLive™ video calls or email, increasing productivity in the field.

The 376 and 902 clamp meters also decrease the frequency that technicians will need to wear personal protective equipment when working on high voltage/ current panels. Technicians simply turn off the panel, verify the panel is de-energised using standard safety procedures, place the clamp and sync it to a smartphone with the Fluke Connect app, close the panel, re-energise it, and take measurements from a safe distance.

The Fluke 376 FC True-rms ac/dc Clamp Meter with iFlex features:

- Integrated VFD LowPAS filter for low driver measurements
- True RMS voltage and current for non-linear signals
- Measureable to 1 000 A dc and > 25 000 A ac
- Finds and log intermittent faults, and establishes base-line and trends
- Creates and transmits results in report-form wirelessly via Fluke Connect® Measurements app from site

The Fluke 902 FC True-rms HVAC Clamp Meter features:

- Dual rated - CAT III, 600 /CAT IV, 300 V
- Microamps for testing pilot light sensors
- Resistance up to 60 kilohms
- Ac current, ac/dc voltage
- Capacitance and contact temperature

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

Additive manufacturing technique **extends life of sensors**

Markus Wolf, OR Laser

An additive manufacturing technique called DMD (Direct Metal Deposition) enables reliable protection of sensor elements by means of a hard alloy.

It makes it possible to significantly extend their lifetimes. Industrial sensors are very sensitive components. They are deployed to precisely and reliably monitor temperatures, flow rates, and pressure over long periods of time, for example in oil and gas pipelines. They are subjected to extreme stresses while doing so. Each day, about a million barrels of crude oil, or 160 000 cubic metres, pass through a pipeline with a diameter of one metre. That is equivalent to 1 850 litres per second. Onshore gas pipelines have an extremely high internal pressure of 100 bars, which can even reach 200 bars or more in offshore pipelines. Sensor elements used to monitor the flow suffer considerable wear as a result of corrosion and abrasion. This shortens their lifetimes and necessitates costly repairs.

> *Direct Metal Deposition (DMD) enables reliable protection of sensor elements by means of a hard alloy… significantly extending their lifetimes.*

Thanks to an innovative powder nozzle developed by O.R. Lasertechnologie GmbH, OR LASER, the technology of powder-based laser cladding also known as DMD can be used to greatly prolong the life expectancy of these sensors, for example, in pipelines of the oil and gas industry.

Conventional method

The compact EVO Mobile laser welding system is excellently suited for applying wear-resistant coatings and carrying out repairs or modifications. The system uses relatively low laser output levels starting at 200 W, but its high deposition rate of up to 5 000 mm³/h makes it ideal for a vast range of applications. It boasts both high efficiency and great value for money due to its low price. The way to lastingly protect a sensor from wear is to coat it with Stellite. The cobalt-chromium-based alloys known by this name are very difficult to machine. The conventional approach is to apply composite clad layers with a total thickness of several millimetres. However, the intense heat applied during the process results in considerable mingling of the sensor's material with the Stellite cladding. Use of the conventional method therefore considerably shortens its lifetime.

New method

Unlike with conventional methods, the laser only minimally melts the surface of the sensor, and only at scattered points. Metallic powder, with grain sizes between 45 and 90 µm, is fed coaxially to the laser beam and permanently fuses with the object's surface. The advantages of this approach include precise deposition of the material, low heat penetration, and an undistorted, crack-free coating. Track widths between 200 µm and 2 mm are possible.

The coaxial arrangement also permits deposition of material independently of the direction of cladding, so that the workpiece can be freely rotated in all directions and, if required, even 'grow' in three dimensions.

Moreover, the laser parameters can be dynamically adjusted to changing conditions on the fly. In order to prevent oxidation and the formation of tiny bubbles, the work is done in a shielding atmosphere of argon, a noble gas. The resulting surface quality is like new, free of pores and cracks, very close to the required final contours, and neat. The sensor itself is hardly affected by this 'minimally invasive' technique, while its resistance to wear is greatly improved.

Conclusion

The team of the R&D department of OR LASER spent a year collaborating with the Fraunhofer Institute to develop a highly efficient, easy-to-install powder nozzle that works with high repeatability and is suitable for automated processes. The team worked hard at finding a way to increase the durability of these sensors with the additive laser technique, thus improving the reliability of gas and oil pipelines.

The system is completely manufactured in Germany, and the nozzle is the first of its kind to enable a combination of wire- and powder-based laser cladding. The company not only develops laser welding and cladding systems, but also the appropriate means of controlling them. For example, the CAD/CAM software solution called the ORLAS SUITE is able to program the cladding strategy for complex geometries and align the required laser tracks with micron accuracy. For clamping the workpiece, there is a rotary shaft that allows full five-axis CNC work to tap the full potential of this innovative additive manufacturing technique.

take note

- Sensor durability is paramount in industry.
- New manufacturing techniques can help extend sensor lifespan.
- Direct Metal Deposition (DMD) provides a hard alloy protective shield over sensor elements.

Markus Wolf is a graduate physicist and Head of the R&D department at OR Laser and an expert in the field of laser systems for industrial laser applications.
Enquiries: Eric Herrmann. Email e.herrmann@or-laser.de
info@or-laser.de

How to work **smarter,** not harder

Jan Gerritsen, Endress+Hauser

A cement company mastered the challenge of dust formation, abrasion and high temperatures for reliable level measurement in clinker silos with the help of a self-learning smart sensor.

Cement is a fundamental part of life, and demands are high in respect to the quality of this construction material. Different varieties are created by joint grinding of the basic clinker with a gypsum anhydrite mixture, with gypsum rock or blast furnace slag and other aggregates. The current construction market situation demands a high level of flexibility and fast switching of varieties from production plants. This is why system availability and storage capacity in the clinker silos are becoming more and more important.

However, clinker silos differ from typical bulk solids silos in terms of their size and the stacking and discharge systems associated with this. This means that it is fairly common for a central column to be incorporated in the silo, with various openings. As well as being abrasive, clinker typically forms fine dust clouds during storage. As the clinker is transported directly out of the kiln and into the silo via the cooler, the bulk solids have a high residual heat – temperatures which may exceed 100°C. All these factors make reliable level measurement very challenging. This is particularly true as the installation location for the measuring technology is often defined by local factors.

Challenging conditions for measuring technology

One clinker silo at a Cement Factory presented particularly challenging application conditions for measuring technology. In addition to dust formation, abrasion and high temperatures, massive structures impeded reliable level detection. Strong false echoes occurred caused by the filling device via a flanged central column in the clinker silo with various openings. To date, these problems were frequently resolved by means of an electromechanical plumb line system. The disadvantage of this contact-based measurement system as far as abrasive media are concerned is the high amount of maintenance required. To reduce this, ultrasound devices are frequently used which are contact-free. But this technology in turn has its physical limitations in terms of very strong dust formation.

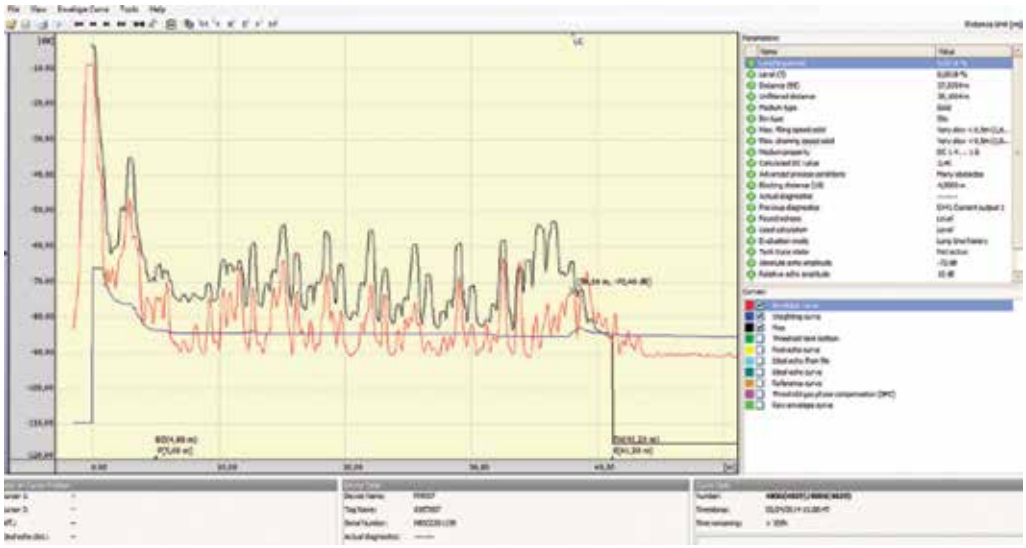
Solution

The solution for this cement factory: The Micropilot FMR57 bulk solids radar measuring device from Endress+Hauser. Because this free-space radar device combines the no-contact approach and the resistance to dust. False echoes are also no problem for the smart sensor which features multiple echo detection and uses clever evaluation algorithms to compensate for these disruptive factors.

The self-learning software algorithms in the Micropilot are capable of monitoring and characterising up to 20 microwave reflections simultaneously:

- Level signals
- Interfering signals
- Doppler signals
- Ground signals

> *A smart solution ... fit for our digital age.*



This screenshot from measurement at the clinker silo shows the echo envelope curve with the signal plot. Special evaluation algorithms allow signal reflections to be evaluated even beneath interference masking.

The signal type is defined by evaluation of the various reflection properties, such as reflection height, reflection position, reflection speed and direction of travel. These unique evaluation algorithms make it possible for the first time to reliably evaluate a signal reflection even beneath interference masking and regardless of radar operating frequency.

Reduced maintenance

Using the Micropilot FMR57 with the technological package of innovations allows the system operators at this plant to view information at any time – including during filling – on the current level and hence the availability of the clinker. The new measuring technology also reduces the amount of maintenance required for this silo compared with the electromechanical system.

No compromising safety

But being a smart solution does not mean that the sensor makes any compromises in regards to safety. As all devices in the Micropilot FMR5x range were developed in accordance with IEC 61508 [1]. This high quality allows the radar devices to be used to meet SIL 2 requirements. Development in accordance with IEC 61508 [1] makes it possible to achieve SIL 3 with two radar devices with homogeneous redundancy.

When it comes to secure data management, just rely on HistoROM, the company's ingenious data management concept for two-wire devices like the Micropilot FMR57. This permits lots of functions which are important for safe system operation. Permanently connected to the transmitter housing, it automatically stores all data belonging to the measuring device.

Recalibration not necessary

But that is not the only benefit HistoROM offers. The automatic data back-up allows time to be saved when replacing electronics without having to recalibrate. When the electronics are replaced, the device data from the last parameterisation are loaded automatically by the HistoROM memory chip into the new electronics, and the device automatically resumes its measurement operation. Parameterisation via the display or downloading the device data on a laptop is not required. The data is also stored in the display as a backup. If a parameterisation process fails, the previous settings can be restored and the relevant HistoROM data will be overwritten with the display data. The 'data duplication' option permits parameterisation of devices in the same applications, and here a set of parameters can be transferred from one device to the other. As a result, all requirements are met in an elegant fashion. The effect: greater reliability in system operation, with reduced costs. Thanks to a smart solution – fit for our digital age.

Conclusion

The clinker silo at the cement factory is 40,8 metres high, more than 16 metres wide and is fairly demanding in terms of measuring technology:

- Another platform is located beneath the cover
- In the middle of the silo is a flanged central column with various openings. False echoes occur here
- A great deal of dust is formed during filling

The Micropilot FMR57 free-space radar with multiple echo detection and intelligent evaluation algorithms can handle these difficult conditions with no problems.

Reference

[1] IEC 61508. 2006. Functional Safety of electrical/electronic/programmable electronic safety-related systems.

take note

- Sensors must be chosen to suit their working environment.
- Whereas non-contact sensing technologies are prolific, devices must provide suitable performance.
- Specific radar sensors have been designed to work in silos with dust abrasion.

Jan Gerritsen, Product Manager for Level and Pressure at Endress +Hauser, started his career as an apprentice at Atomic Energy in the 80s. Jan has 32 years' experience in various industries which includes the Chemical Industry while he was working for Necsa, the Primaries and Metal Industry as well as the Food and Beverage Industry. Jan joined Endress+Hauser in 2005 as an External sales person and was promoted to be Level Product Manager in 2013. In addition to his responsibilities he was elected as the acting Product Manager for Pressure in 2016. Enquiries: Tel. +27 (0) 11 262 8000 or email jan.gerritsen@za.endress.com

Being sensible with sensors in intralogistics

There has been much debate in the field of intralogistics around whether classic high bay storage devices or self-driven shuttle systems are the future.

Gerry Bryant, managing director of **Countapulse Controls**, says that both technologies have their place and can coexist in the future.

"What is significant is that we can offer solutions for both technologies to make processes simpler, quicker and more efficient," Bryant says.

Countapulse Controls is the official southern Africa distributor of the full range of Leuze sensors, and among its product line-up are a myriad of sensing solutions. The company has been servicing the African continent for more than 40 years and offers customers access to its depth of applications knowledge.

Significantly, the company also operates a technical advisory hotline which is available 24/7 to assist customer in the appropriate selection of sensors for given applications and to assist with further support to overcome any areas where difficulties may be experienced due to lack of skills or know-how within an organisation.

Commenting on products used in the intralogistics fields, Bryant says that there are specific sensing solutions for different areas within a high bay storage facility and it is essential that end users understand the individual capabilities of these before making decisions.

Access guarding is an important area within intralogistics and the Leuze RSL 400 safety laser scanner is capable of accomplishing two tasks simultaneously as this device has two autonomous protective functions.

Offering exceptional performance characteristics, this safety laser scan has a separate connection unit with integrated cable management facilitating uncomplicated mounting. Its large plain text display has an electronic spirit level enabling simple alignment, while its "Sensor Studio" software allows fast configuration with just five mouse clicks.

The robust sensor also allows integrated Ethernet interface for full network connectivity.

Efficient access guarding without muting sensors is easily done using Leuze MLC 530 safety light curtains. These sensors use the interruption of the protective field to enable material transport.

An important task in high bay storage areas is data transmission and the high performance Leuze DDL S 500 data transmission photoelectric sensor allows 100 Mbit/s real time transmission. This allows the reliable transfer of all types of data to and from the facility.

Bryant explains that optical data transceivers are most appropriate for any application where data needs to be transmitted without cables and importantly without interference. The DDL S 500 enables contact free optical communication in applications where mechanical systems are pushed to their technical limitations. These devices offer additional functionality that simplifies operation, start up and diagnostics.

Other sensors that are popular in the field of intralogistics are retro-reflective photoelectric sensors. Sometimes known as diffuse sensors, these devices perform detection tasks with light in a wide range of forms and are suited to all conceivable shuttle applications.

"Access to technical information and assistance is essential to ensure that sensing solutions are the best fit for an application, and we encourage companies to make contact with us sooner rather than later so we can assist them to make their operation simpler and more efficient as well as safer," Bryant concludes.

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

New designs expand ultrasonic sensors' portfolio

Turck is adding new designs to its portfolio of ultrasonic sensors. The RU sensor in the M18 housing is now also available as a right-angled head variant. Its radiation angle is rotated by 90 degrees, which simplifies mounting in restricted and angular spaces. Angle head variants are available for ranges up to 130 cm.

The ultrasonic sensor in the CK40 housing is particularly suited for room monitoring or sag detection. Its rectangular design enables a very large detection angle of 60°.

This enables the sensor to also detect objects which only scatter the reflected sound signals or reflect them very poorly. The CK40 is suitable for ranges up to 250 cm and is available with an M12 or terminal chamber connection. Turck has developed the robust RU-600U in the M30 stainless steel housing with a 600 cm switching distance for applications requiring a very large range. In spite of its large range it comes with a very short blind zone of only 60 cm.

Turck offers the compact M18 ultrasonic sensors in three new variants. The M18 sensor with a frequency output (LFX) provides an inexpensive alternative to the conventional analog output in applications requiring a measured value.

The other compact variant is an opposed mode sensor. This sensor switches as soon as the sound signal is no longer reflected. In this variant the blind zone of the sensors is extremely small.

Compact ultrasonic sensors with an NPN output have also been added to the range. For more information on Turck's New Ultrasonic Sensors contact RET Automation Controls

Enquiries: Brandon Topham. Tel. +27 (0) 11 453 2468 or email brandon.topham@retautomation.com

First radar level sensor for liquids that operates at 80 GHz

VEGA Control's VEGAPULS 64 product launch took place on Friday 15 July 2016 in Johannesburg. John Groom, Group Director, used the comparison of a Black Forest cake recipe to explain the features of the new VEGAPULS 64 sensor to the audience.

John Groom, together with Business Development Manager, Frikkie Streicher, presented the capabilities of the VEGAPULS 64, the first radar level sensor for liquids that operates at a transmission frequency of 80 GHz. This included, among other features, a demonstration of the radar beam's excellent focusing.

Their presentation showed that with an 80 mm antenna, the VEGAPULS 64 emits a radar beam angle of only 3°. This means the sensor delivers reliable measurements even in vessels with internal installations such as heating coils and agitators. The demonstration included that of the dielectric constant in relation to the volume of oil in a recipe. The dynamic range of the VEGAPULS 64, with increased sensitivity from 96 dB to 120 dB, was also shown.

At the end of the evening guests were left in no doubt that the VEGAPULS 64 is revolutionising the liquid level market for measurement across multiple industries.

Enquiries: Chantal Groom.
Email Chantal.groom@vega.com

Industrial Ethernet switch solution

Industrial Automation brings considerable benefits to the manufacturing industry, such as saving labour costs, decreasing the danger of exposure to hazardous environmens and decreasing defect rate.

When all production processes become computer-integrated, digitised and intelligent, forming a manufacturing network becomes a necessity. Therefore, the first challenge manufacturers and system integrators face is finding an effective way to connect different kinds of equipment to create a stable, reliable and rugged network.

Antaira Technologies recommends its latest line of Managed Gigabit Ethernet Switches: LNX-2012GN-SFP series which can withstand harsh environments and provide stable and high-efficiency automatic networks in outdoor and factory applications.

Enquiries: Email info@antaira.com

World leader in liquid analysis

After extensive market and competitor research, US consulting firm Frost & Sullivan concluded that Endress+Hauser supports its customers better than any other provider in the area of liquid analysis. The global Company of the Year Award for water analysis instrumentation is based on an independent study. Analysts took into account each company's visionary innovation and performance as well as customer impact.

"A robust product portfolio, coupled with strong acumen for innovation and focused customer centricity, has been instrumental in strongly positioning Endress+Hauser amidst competition in the global water analysis instrumentation market," said Frost & Sullivan Industry Analyst Krishnan Ramanath. With 9,25 points out of a possible 10, Endress+Hauser clearly sets itself apart from the competition, which scored 8,5 and 7,5 points.

"**Endress+Hauser** offers a comprehensive product range to cover all the analytical parameters needed to monitor water quality," underlined Krishnan Ramanath. Today, transmitters, samplers and analysers from the Liquiline family, in addition to Memosens sensors, form the foundation of a universal liquid analysis platform that is suitable for many industries and applications, from simple pH measurement points to wet-chemical analysers for demanding measurement tasks.

"This award confirms that we have revolutionised liquid analysis with our products," said Dr. Manfred Jagiella, Managing Director of liquid analysis specialist Endress+Hauser Conducta based in Germany. As a member of the Group's Executive Board, he is responsible for the analytical business. "A well thought-out overall concept and perfect interaction between all components ensures reliable measurements, simple operation and low total costs of ownership."

The company's success in liquid analysis is no coincidence. Endress+Hauser views the entire field of analytics as a focus of development. "Our customers want to measure more than just process conditions. They also want to determine material characteristics and product quality in real-time while the process is running," explained Matthias Altendorf, Chief Executive Officer of the Endress+Hauser Group, the strategy.

Enquiries: Jan Swart. Tel: +27 (0) 11 262 8000 or email jan.swart@za.endress.com

Bulkheads for standard applications

Legrand's bulkhead lights designed for various environments include bulkheads for standard applications, weatherproof Koro and Plexo fittings for tougher environments and a decorative range of exterior bulkheads, designed for enhanced aesthetics and improved safety.

"High performance lighting not only enhances the ambience of outdoor areas at night, but also provides a reassuring feeling of safety at all times," states Johan Bosch, general manager, Legrand SA. "Weatherproof bulkhead lights have been designed to withstand tough environments and are also ideal for use as escape sign lighting."

Bulkhead lights, with an IP54 rating, are fitted with a high resistance seal to offer protection against water and dust. This range, which is available with round and oval polypropylene bases and porcelain lampholders, accommodates compact fluorescent lamps. These bulkheads have resistance to high temperatures and are self-extinguishing at 850°C.

Legrand's LED bulkheads lights have integrated sensors, with settings for detection, a switch off warning and an adjustable automatic standby function. It is easy to manually modify time delay, daylight set-point and detection range settings.

Robust weatherproof bulkhead lights, with an IP 55 rating, have been designed for interior and exterior use in tough environments, including industrial applications. Oval fittings, with a colourless glass diffuser, accommodate 55 W halogen lamps, 17 W compact fluorescent lamps or 8 W LED lamps. Round units, also with a colourless glass diffuser, can be fitted with 70 W halogen lamps, 20 W compact fluorescent lamps or 12 W LED lamps.

Enquiries: Tel. +27 (0) 11 444 7971 or email legrand.south-africa@legrand.co.za

Intelligent sensors pave the way for the industry of the future

At the Hannover Messe (HM) trade fair, **SICK** AG presented innovative sensor solutions for forward-looking applications under the slogan 'Industry 4.0 ready'. As a technology supplier in the field of industrial sensors, SICK's presentation explained how intelligent sensor data can be used – from highly aggregated, complex web services in the cloud and shop-floor systems for logistics transparency to autonomous robot control.

From its stand at Hannover Messe – the world's largest industrial fair, featuring 3 342 exhibitors – SICK demonstrated the importance of its role as a technology driver in the field of Industry 4.0. Alongside the company's own intelligent systems and sensors, SICK also presented various examples of its collaborations with research and industry partners. These joint exhibits featured integrated solutions typical of Industry 4.0, which were a big hit with visitors. In particular, the exhibit on human-robot collaboration proved to be a major draw, featuring a robot arm which

took a glass cup from a visitor. The robot used the RFID tag affixed to the cup to read the individual print job and performed the task by itself. As the station was protected with microScan3 laser scanners, the robot was able to work without partition screens in this application. As soon as anyone came within a certain distance of the robot during operation, its movement slowed down. If someone came even closer, the robot stopped completely. Meanwhile, the trade fair also featured a first in the field of track and trace technology in the form of the RFU65x RFID read/write device, which creates transparent paths within the factory. The device is the first to be able to measure the movement direction of an RFID tag bearer when read. This means that, in the future, it will be possible to record not only the position, but also the transport path of workpieces with minimal effort. In this way, the current location of a part will always be evident in real time.

Enquiries: Silvia PUCKL. Email silvia.puckl@sick.de

Smallest low-pressure transmitter in the market

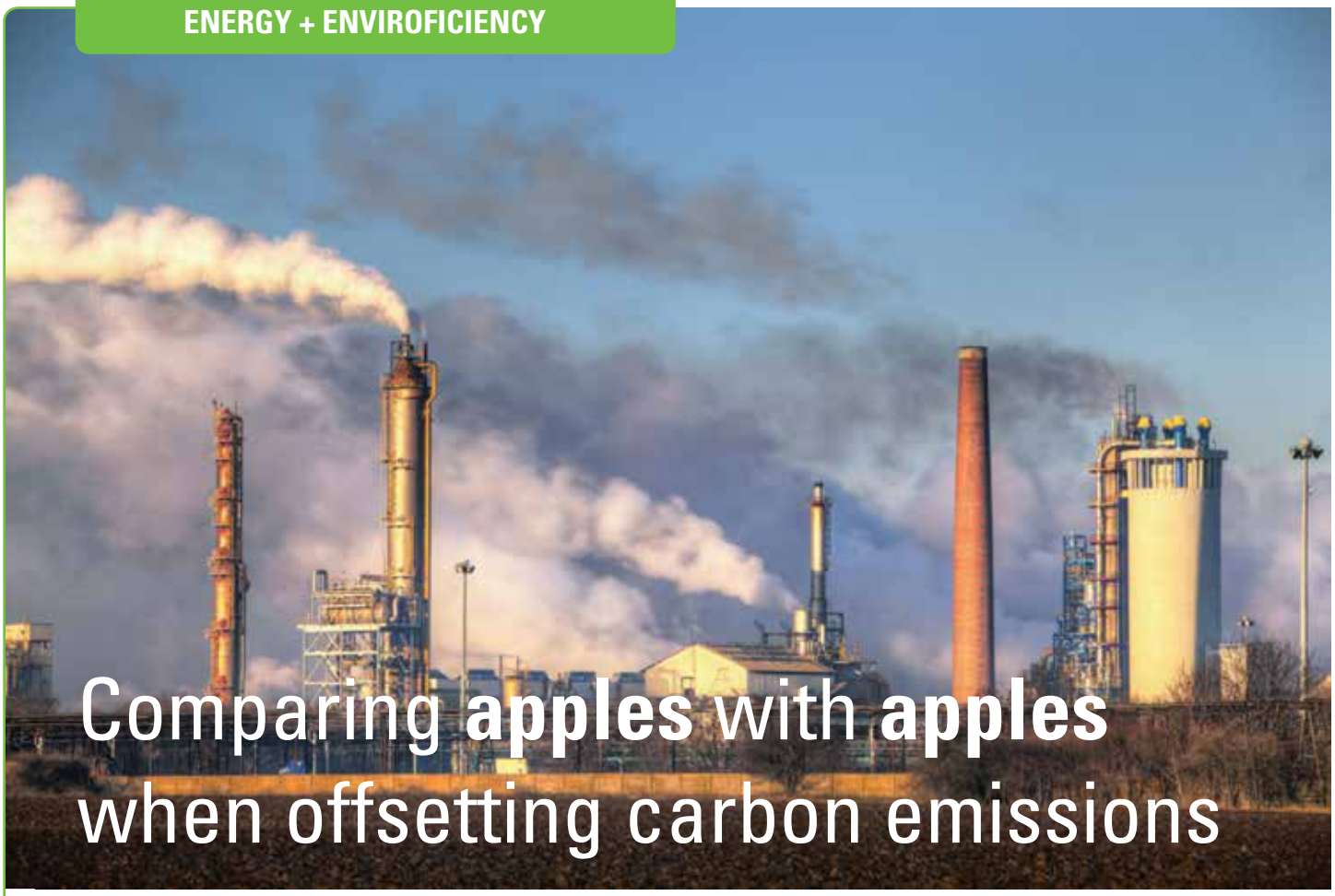
Telemecanique Sensors has presented the OsiSense XMLP transmitter for low-pressure ranges in southern Africa. As the smallest electronic sensor for pressures from -1 to 6 bar(g) (-14,5 to 60 psi), the OsiSense XMLP helps original equipment manufacturers reduce the overall size and cost of industrial machines in a vast number of sectors. At the same time, the solid body of OsiSense XMLP provides ample resistance to overpressure and harsh operating conditions.

This new device from Telemecanique Sensors is significantly smaller than any other electronic low-pressure transmitter in the market. Its dimensions help optimise machine design and simplify installation, even in the most confined spaces. The new OsiSense XMLP allows for direct mounting on the compatible OsiSense ZMLP (switch and display) or through a remote connection, offering a simple and economical solution for low-pressure management.

The housing of the new OsiSense XMLP offers high resistance to corrosive environments in applications such as water pumping. The new sensor has a robust and compact body that provides a degree of protection up to IP69K, depending on the type of electrical connector (M12, DIN, Packard, or PVC cable). Thanks to its pressure cell design, the XMLP range offers a particularly high over-pressure resistance and high durability, even in case of a hammer effect.

To meet the needs of machine builders, the OsiSense XMLP low-pressure transmitter supports several analogue output types, different fluid entry types, and various pressure ranges (including combined pressure ranges). The introduction of the OsiSense XMLP low-pressure transmitter means that customers can choose from a broader offer of devices for a variety of pressure ranges from Telemecanique Sensors.

Enquiries: Ramesh Singh. Schneider Electric. Email ramesh.singh@schneider-electric.com



Comparing **apples** with **apples** when offsetting carbon emissions

Silvana Claassen, CES South Africa

The author offers a second article in a series on Carbon Tax in South Africa, regulation of which is expected to become official in January 2017. The first article was published in Electricity+Control in May 2016.

Following last year's publication of The Draft Carbon Tax Bill, the Draft Regulations on Carbon Offsets were made available for public comment on 20 June 2016. These proposed regulations are providing content to Section 20(b) of the Bill: 'The Minister must make regulations in respect of carbon offsets'. The publication of these Regulations is a strong signal that the making of provisions for the actual implementation of the tax, is in progress.

The Carbon Tax can be classified as a negative incentive to change behaviour by penalising industry in a financial manner by putting a price on its carbon emissions. The carbon offset mechanism, as proposed in these Draft Regulations, contains complementary 'positive' incentives aimed at encouraging businesses to take actions with the same effect as envisaged by the carbon tax: an accelerated transition to a low carbon economy. The Draft Regulations on Carbon Offsets are targeting both the sectors that are liable to paying carbon tax and sectors that are not covered by the carbon tax. Moreover, the proposed scheme is facilitating a synergy between these two groups of sectors:

- For liable entities, the Draft Regulations on Carbon Offsets offer an alternative to paying carbon tax on a maximum of 10% of a company's total carbon emissions [1] and at a cost lower than the costs associated with tax payable
- Through these Regulations, sectors that are not covered by the carbon tax, are encouraged to invest in projects that avoid, reduce or sequester greenhouse gas emissions thus generating carbon credits
- These credits (or offsets) can be sold to liable entities for the purpose of reducing carbon tax liability

The Draft Regulations released on 20 June 2016 by National Treasury, present the proposed system for achieving the above goals and objectives, capturing four core-elements:

Eligibility Criteria: Which types of carbon credits [2] can be used as carbon offsets [3] for reducing one's carbon tax liability?

The Offset Duration Period: For how long can a carbon credit be used as a carbon offset in order to reduce one's tax liability?

Limitations to qualifying technologies: What types of projects are excluded from generating carbon offsets in respect of these Regulations?

Administration of the carbon offset system: What are the procedures for claiming the carbon offset allowance?

Following the publication of these Regulations, several stakeholders have commented on the content. Often the focus is on the limitations to qualifying projects (regulation 4 of the Draft Regulations), which makes sense as this is a crucial element for potential project-developers. For example, projects that destroy industrial gases such as trifluoromethane (HFC-23) or nitrous oxide (N_2O) from adipic acid production cannot generate credits for the purpose of offsetting carbon tax liability. This is in line with international trends such as the ban on the use of these types of credits in the EU Emissions Trading System.

Instead of elaborating on ineligible projects in respect of offset origination, this article zooms in on another element of the proposed carbon offset system: the 'Offset Duration Period' (regulation 3 of the Draft Regulations). The Offset Duration Period, as presented in the Regulations, relates to the period after the generation of a carbon

offset. In other words, the time window during which a purchased carbon offset can be used for reducing one's carbon tax liability. This article aims at clarifying why this is an important element for a well-functioning offset mechanism.

> *A carbon offset generated by a specific project can only be utilised for purposes of reducing tax liability during the crediting period (and/or renewal period if eligible) of that project.*

The typical feature of an offset mechanism is to compensate one action with another action made elsewhere: emissions reductions made in e.g. the Northern Cape Province are compensating the carbon emissions of a Johannesburg based manufacturing plant. The net atmospheric emissions are zero. Such a mechanism can only work if measures are in place to safeguard that the amount of carbon dioxide equivalent [4] emitted in Johannesburg is exactly the same quantity as the emissions reduced in the Northern Cape. Without going into too much detail, the methodologies adopted by the respective carbon standards (CDM, VCS and Gold Standard) stipulate exactly how the actual emissions reduced by an approved project [5] must be calculated and verified. However, as scientific research develops over time, new climate-change related evidence is released regularly which may call for a revision of facts and consequently the amendment of the standards' methodologies [6]. The international standards are dealing with this issue through the introduction of crediting periods. A crediting period is a period during which an approved project can generate carbon credits in accordance with the baseline conditions at the beginning of that period and by application of the same methodology throughout that crediting period. Upon renewal of the crediting period these conditions have to be reviewed and adjusted if new information has become available since the start of the project.

In summary: two types of time frames need to be considered in respect of a carbon offset in respect of the Draft Regulations on Carbon Offsets:

1. The period during which the carbon credit can be generated (this is the crediting period as explained above)
2. The period during which one can 'retire' a carbon credit, e.g. by utilising it for offsetting one's carbon tax liability (as earlier mentioned the so-called Offset Duration Period)

Coupling these two time-frames is a means to ensure that apples are compared with apples: an essential requirement for an offset scheme as proposed in the Draft Regulations on Carbon Offsets. In other words: ***A carbon offset generated by a specific project can only be utilised for purposes of reducing tax liability during the crediting period (and/or renewal period if eligible) of that project.***

The duration of the Offset Duration Period of a specific carbon offset depends on:

1. The type of project (i.e.: CDM, VCS or Gold Standard) that generated the carbon offset
2. The point in time within the crediting period of that project when the offset was generated

For detailed information on the crediting periods applied by the international standards, reference is made to the CDM, VCS, and Gold Standard rules and requirements as well as the text stipulated in regulation 3 of the Draft Regulations on Carbon Offsets and its Explanatory Note.

Acknowledging the importance of putting a limit to the validity of a carbon offset, as outlined above, an Offset Duration Period may in addition be vital for protecting the carbon market. Given the phased character of the Carbon Tax implementation process, it is likely that the price of one tonne of CO_2e will increase over time from the current R 120 a tonne [7]. When companies are buying bulk carbon credits at current prices in order to offset more expensive future liabilities, this may have an undesirable effect on the carbon market. The question that arises here is whether the allocated time window as proposed by the Regulations might be too long? It is not clear whether the protection of the carbon market was one of the reasons for introducing the Offset Duration Period, but it is surely something that can be given some thought.

As an appendix to this article, the other elements of the proposed mechanism are summarised.

Credits meeting the following criteria are eligible for use of carbon offsets in respect of these Regulations:

- Credits generated by a registered CDM, VCS, or Gold Standard project (or other standard if approved by Minister of Energy)
- Credit generating project is located in SA
- This project is not subject to carbon tax
- Project is registered after implementation of the tax [8] (unless rules in respect to transfer into SA Registry are met)
- Credits have co-benefits in line with SA's development priorities.

Non-eligible projects:

- Projects owned or controlled by liable entities
- Projects benefiting from 12L tax incentive
- Projects developed under REIPPPP
- Industrial gas destruction projects

Procedure for claiming tax allowance:

- Pre-screening of project ideas and carbon credits, by the Designated National Authority (DNA) within the Department of Energy
- Transferring credit from international registry into SA Registry
- Issuance of carbon offset certificate
- Submission of certificate to SARS

Notes

1. *Depending on sector, as determined in Schedule 2 of the Bill.*
2. *A carbon credit is a general term representing the verified reduction of 1 tonne CO_2e emissions.*
3. *A carbon offset is a carbon credit that has been made elsewhere and that one can purchase to compensate for one's own carbon emissions. In other words: a carbon offset is a carbon credit but a carbon credit is not necessarily a carbon offset.*
4. *Carbon dioxide equivalent (CO_2e) refers to the quantity of CO_2 (kg) that would have the same global warming potential (GWP) of a specific greenhouse gas when measured over e.g. 100 years, e.g.: $GWP_{CO2e} = 1$, $GWP_{CH4} = 25$, $GWP_{N2O} = 298$.*
5. *An approved project is: a CDM-, VCS-, or Gold Standard- project; or a project that complies with another standard that is approved by the Minister of Energy; and that meets the South Africa specific supplementary criteria.*
6. *An example is that as of 1 January 2013, the GWP of methane is 25 tCO_2e/tCH_4 instead of 21 which was the value used up till then. This would result in an increase of credits potentially to be generated for the same activity as a result of a change in verification methodology.*
7. *The price as set out in the Draft Carbon Tax Bill of 2015.*
8. *Credits generated before implementation of the carbon tax may be eligible as long as specific requirements relating to the transfer from international registries into the South African Registry are met.*

In the previous article written by Silvana Claassen - Carbon Tax in South Africa (Electricity+Control, May 2016):

- $MtCO_{2e}$ should have appeared as $MtCO_2e$
- CDM - Clean Development Mechanism (not Climatological Dispersion Mode)
- UNFCCC - United Nations Framework Convention on Climate Change

Editor

take note

- Carbon tax is here to stay.
- Draft regulations on carbon offsets were made available for public comment in June 2016.
- The regulations introduce both punitive and positive incentives.

Silvana Claassen is the owner of CES South Africa (Pty) Ltd, a consultancy-firm specialising in climate change and energy management. She is a qualified Certified Measurement & Verification Professional (CMVP) and has extensive experience in providing both government institutions as well as SMEs and major international corporations with strategic solutions to an increasing number of challenges related to the transition to a low carbon and resources constrained economy. Building on her experience and expertise, Silvana registered CES South Africa (Pty) Ltd in early 2016. CES offers solutions to businesses in relation to management of risks and opportunities associated with increasing constraints of resources and a global movement to low carbon economies.
Enquiries: Email silvana@carbon-energy-solutions.co.za

First Generation III+ nuclear reactor provides electricity to the grid

On 5 August 2016 at 00 hours 35 minutes (GMT) Unit 6 at Novovoronezh NPP in Russia, which uses Rosatom's innovative VVER-1200 technology was connected to the national grid and produced its first 240 MW of electricity. Thus the most important and critical operation – the first trial of generation to the grid – has been successfully completed.

Generation 3+ nuclear reactors are currently being built in the United States and France. However, the Russian Unit 6 is the first to the reach the stage of being connected to the grid. The full-time commercial operation of the Unit 6 is expected to begin at the end of 2016 after reaching 100% capacity and mandatory acceptance testing. Once connected to the grid the unit will operate for at least 60 years. Connection to the grid took place 5 months after the first criticality programme that was started in March 2016.

"This event is our great victory, which crowns a huge amount of work in installation and adjustment of equipment, and complex process operations. It can be stated that all works were done reliably and safely. The operating personnel clearly understands the process, equipment operation safety and reliably," Andrey Petrov, General Director of Rosenergoatom, **Rosatom**'s power generation division.

The connection to the grid was preceded by the turbine start up (approach to planned spin up in idling mode of the turbine generator's rotor) and its trial work in idling. Specialists carried out a large set of checks and tests at different power build up stages, as well as inspection of different equipment was carried out. These measures were necessary to confirm reliability and safety of the power unit in its further operation.

Valery Limarenko, President of NIAEP, Rosatom power engineering and construction division, pointed out: "Rosatom is the world's largest supplier of nuclear power plants in the global market. Today, we have made our positions stronger. This opens new opportunities for building up our presence in the global market."

The innovative power units of Generation III+ possess improved performance parameters. They are absolutely safe in operation and fully meet the IAEA's post-Fukushima requirements. They feature a large number of passive safety systems, which are able to function even in case of a plant blackout and without operator's intervention. Unit 6 of Novovoronezh NPP features a passive heat removal system from the reactor, hydrogen recombiners and a core catcher, which are unique and have no similarities worldwide. The commissioning of power unit 6 will raise the total power capacity of Novovoronezh NPP by 1,5 and will give a boost to the Voronezh regional economy.

Enquiries: Ryan Collyer. Rosatom Africa.
Email rcollyer@rosatom.co.za

Rising Star Awards

The past four years have seen the **Rising Star Awards** grow from strength to strength, each year identifying, recognising and celebrating the young talent that South Africa has to offer.

Rising Star Awards 2016

Banking & Financial Services	Construction & Engineering	Energy & Environment
Entrepreneur	ICT (Telecoms & Technology)	Manufacturing, Retail & FMCG
Media & Marketing	Mining & Minerals	Professional Services
Service Public & Private	Tourism, Leisure & Hospitality	Transport, Logistics & Security
Brian Mahlangu	Charlene Joseph	Leon van Wyk
Grant Gavin	Gareth Kingston	LeratoLegoale
TsokuMaela	Rousseau Jooste	DapoAdeyemo
NomthandazoDlanga	Thabo Ngoepe	NtsakoNukeri
Nedbank	Liviero Group (Pty) Ltd	Eskom Holdings SOC Limited
RE/MAX PANACHE	Britehouse - A Division of Dimension Data	Aberdare Cables
Okuhle Media	AngloAmerican	Khonology
Johannesburg Property Company	Emperors Palace - Peermont Global	Transnet Freight Rail

"We were thrilled to see the calibre of entrants this year – I am encouraged by the talent coming through the ranks across all industries in South Africa," said Laura Barker, Managing Director of BlackBark Productions, organisers of the Rising Star Programme.

The awards are for young, talented individuals in the 28-40 year age category, and form part of a unique platform where winners can go beyond just the recognition for work already done, and participate in a leadership and development programme throughout the year after winning. They also have a unique opportunity to network across industry sectors, with both their fellow winners, and minds in the country through a mentorship programme. *(See page 47).*

Enquiries: Cheryl van der Merwe.
Email cherylvdm@gmail.com
or visit www.risingstarawards.co.za

Business unusual revolutionising electrical construction

Enl Electrical, part of the **Zest WEG Group**, is not only on a drive to change the electrical contracting industry, but also the larger South Africa construction landscape.

Its strategy is working considering that the electrical contractor enjoyed a record revenue year in 2015, while recording 404% growth rates since 2010. Importantly, as much as 60% of the company's projects last year comprised repeat customers, but this has come from approaching the construction environment differently.

"One of our success stories is that we are always invited back by our customers. This tells a very important story, especially in construction. In our industry, it also sends a very clear message to us and the market that we are definitely doing something correct," says Trevor Naude, managing director of Enl Electrical.

He says that a major competitive edge for Enl Electrical is its ability to understand its customers and their unique project requirements.

"We are not just supplying a product that meets a specific specification. As contractors, we are delivering something unique. If we do not understand their needs, it is going to cost us money," says Naude.

As he points out, relationships start at boardroom level and they are reinforced by delivery of what was promised by the company's top level management. And, it is for this reason that the management team is known for also participating in the close-out of projects.

Transparency is also key for Naude, who is extremely concerned by contractors' known exploitation of scope changes in projects to their own benefit. "It is a tumour in the entire construction industry, and therefore a practice we have shunned. We refuse to indulge in this and are on a concerted drive to change this practice through the way we approach our contracts from bidding through to completion of the works," he says.

As part of the company's drive to 'transform the culture of the local contracting fraternity' even at the operational level, significant time and effort is spent by Enl Electrical in developing its well-known "A-teams" that are headed up by impeccable leaders.

"Any team is indicative of the size of the project, but it is our teams' leadership that is a significant differentiator on a construction site. They are not merely technically competent, as this is a given for any construction team, our leaders understand the business of construction and are effective in multiple areas, which is exactly what is needed to complete projects successfully," he says.

Last year, these teams helped build a uranium mine in Namibia, a new gold mine in Ghana and a platinum mine project in Rustenburg, Northwest Province, as well as being involved in a Coca-Cola factory expansion programme in Dar es Salaam, Tanzania.

The company's policy of open and transparent communication with its customers has also been adopted internally.

In-house conferences are held once a year where on-site experiences are shared internally to improve performances on contracts and, just as importantly, to break conventional construction mindsets.

"We unpack what has made us so successful and do not shy away from understanding and sharing between us what has not worked to our benefit, and how we could improve in these areas," says Naude.

'New management blood' has spent significant time developing a large company mindset internally to ensure Enl Electrical successfully secures and completes large projects, since the company was acquired by Zest Group in 2008.

However, he notes that Enl Electrical has still preserved the benefits that come with a small business.

This 'small business memory' includes Enl Electrical's agility and therefore, ability to react quickly to market demands.

Clearly, Enl Electrical has a recipe for success - business unusual. And, this approach to business is being welcomed in a market that is rapidly changing, and demanding more from contractors.

Enquiries: Kirsten Larkan. Tel. +27 (0) 11 723 6000 or email marketing@zestweg.com

Trevor Naude, Managing director of Enl Electrical says the company is one of the fasting growing electrical contractors in the region.

33 kV OHL construction at Asanko Gold Mine in Ghana.

High performance gearboxes and load detection

BMG's extensive range of drives and motors encompasses newly launched products from Dinamic Oil, leading manufacturers of hoisting winches and planetary gearboxes. New to the range are Dinamic Oil high performance HyPer gearboxes and an electronic load detection system for precise control and enhanced safety.

"HyPer gearboxes combine Dinamic Oil's GB series gearboxes with the modular advantages provided by parallel shaft and helical bevel gearboxes, as well as gearmotors, says Bryan Pickles, BMG's Varvel brand manager.

"These new combined unit gearboxes offer high torque to weight ratios for optimum performance in diverse applications, including conveyor drives, construction, mining and quarries, marine tensioners, industrial and marine lifting equipment and machines for steel production plants and sugar mills."

This flexible combined unit has an output torque up to 3-million Nm, a ratio starting from 40 and electric motor-inverter combinations up to 22 kW. The new electronic load detection system, which is mounted on the winch structure, uses an analogue or digital signal to control torque, as well as to precisely control the lifting and lowering load. This flexible system, which is programmed to users' exact requirements, permits load control of the crane's winch, while displaying its value on the remote control. This enables easy movement and ensures optimum safety.

Enquiries: Bryan Pickles. Tel. +27 (0) 11 620 1689 or email bryanp@bmgworld.net

Certified Renewable Energy Professional training

A week of renewable experiences is lined up for delegates coming to Port Elizabeth where the Nelson Mandela Metropolitan University (NMMU) will be hosting the Certified Renewable Energy Professional (REP) programme from 20 - 23 September 2016.

The week starts off on Monday the 19th with a visit to the Van Staden's Wind Farm near Jeffreys Bay, courtesy of Metrowind and Africoast, and close by is the Crossways farm where the Rhino Group will be conducting a tour of the famous Rhino House which is completely off the grid showcasing that building green can be indeed magnificent. The first five candidates to book and pay for their training, and confirming interest to attend the Monday excursion will be accommodated at no extra charge. Additional visitors on the first day excursions will incur a small fee of R300 for transport.

Tuesday the 20th is course registration where training will take place at the NMMU engineering campus until Thursday the 22nd. Each afternoon after training there will be interesting visits to the algae plant to demonstrate a different type of renewable option, the uYilo eMobility lab showcasing battery storage research as well as the campus's solar powered car ports, the Joule and other vehicles, as well as the PV research facility, with a ride in one of the alternatively powered vehicles.

A voluntary examination will be written the morning of Friday 23 September 2016. All welcome to attend. REP carries 4 CPD credits for ECSA.

Handbook

EnTF is running an offer for the course pre-reading handbook valued at R2 000 for R500 (including VAT and courier) – please email should you wish to purchase the handbook to read before your course. Handbooks may also be collected at the Pretoria or Port Elizabeth offices.
Enquiries: Thieda Ferreira. Email info@entf.co.za

Bizz Buzz

AFL receives six new patents

AFL, represented locally by Comtest, has been awarded six patents for new products and technologies that enhance Optical Connectivity and Apparatus (OCA) products, fibre optic cable and sensing products. AFL was awarded a patent for a specialised Logging Cable designed to more accurately measure Distributed Pressure and Temperature Sensing (DPTS). AFL's OCA business unit received a patent for a Fibre Splice Enclosure; a patent for the method and apparatus for a universal XDSL demarcation interface with multi-functional capability and single performance enhancement; a patent for an Exterior Distribution Pedestal Cabinet; a patent for an Optical Fibre Distribution Cabinet .AFL's Research & Development Centre received a patent for an innovation to Fujikura's Optical Fibre Vibration Sensor technology.

Enquiries: Comtest. Tel. 010 595 1821 or sales@comtest.co.za

Eskom's Rob Stephen elected president of Cigré

Congratulations to Eskom's Dr Rob Stephen who was elected President of Cigré, an international council on large electric systems. As the first African for the position of President, Dr Stephen is in a favourable position to expand the benefit of Cigré into less developed countries in Africa, South America and Asia. "My experience in the electrification field can assist to expose engineers in these countries to share problems and develop solutions in line with Cigré goals. Important initiatives such as support of young engineers in the Next Generation Network, as well as support for women in Cigré need to be continued," Dr Stephen said.

Enquiries: Email media.desk@eskom.co.za

Fast Neutron reactor reaches full power

On August 17, unit 4 of the Beloyarsk nuclear power plant in Russia started operating at full power for the first time. The 800 MWe BN-800 unit is fuelled by a mix of uranium and plutonium oxides which produce new fuel material as it burns. The reactor is scheduled to enter commercial operation later this year. Plant operator Rosenergoatom said, "We will now begin comprehensive testing of the unit at its rated capacity. This is the final stage of major preparation before the unit is ready to deliver power in commercial operation." The company added, "During the 15 days of comprehensive testing the unit will have to perform consistently at its rated power load in accordance with the design parameters, without deviation."

Enquiries: Email rosatom@m-p.ru

Regulating drones

Drones, or unmanned aircraft, have become a common phenomenon for the military, meteorologists as well as hobbyists, with the latter category quickly seeing these toys become incorporated into the lifestyles of many South Africans.

These toys can cost anything from R1 000 to more than R100 000, meaning that should a drone go missing on a flight, the owner can expect to suffer a substantial financial loss. Many insurance companies offer household insurance for suitable hobby users.

MpumeleloTyikwe, Managing Director of Alexander Forbes Insurance, said liability was a real issue when flying a drone. "The risk factors involved are collision with 3rd party property, collision with a person causing injury or death and the collision with airborne objects. Many insurance companies offer household insurance for suitable hobby users. Read your policy wording carefully as this insurance often does not cover the aircraft while in use (flying)," Tyikwe said.

"If you are a hobby drone pilot taking pictures purely for fun or personal use, you do not need a licence or registration of the craft. Invasion of privacy remains a concern – obtain people's consent prior to video recording or flight over the area that does not belong to you."

"Check with your insurer or broker what cover is available for loss and damage of the drone as well as what cover there is for liability."

Alexander Forbes provides cover for hobbyist drone enthusiasts under the home contents section, providing for loss or damage of the drone in their homes, as well as third party liability for injury loss or damage when the drone is being used. "However, covering loss or damage of the drone away from home would come at an extra cost and policy holders should discuss this with their brokers."

To name a few, the drone must keep out of restricted, prohibited and controlled airspace and keep 50 m away from people, buildings and roads. For private use or operation the drone can be up to 7 kg in weight.

Enquiries: Visit www.safedrone.co.za

Nowhere to hide

How cyber-security needs to move from hopeful attempts at outright prevention, to real-time. The recent high-profile credit card fraud suffered by one of South Africa's major banks, which netted hundreds of millions of rand, has once again thrust cyber-security into the spotlight. In the modern digital world, the threat landscape is rapidly escalating, evolving in new and unpredictable ways, and causing companies of all sizes and all industries to re-assess their current security practices.

Anton Jacobsz, Managing Director of **Networks Unlimited**, a value-adding distributor of converged technology, data centre, networking, and security technology, notes that: "We're now firmly immersed in the era of 'total connectivity' – where people, computers and other devices are constantly connected, exchanging data and performing transactions. Quite simply, traditional signature-based tools are too static and easy to circumvent when pitted against the increasingly sophisticated attack syndicates seen in cases like the recent bank heist and other major breaches," he explains.

Hoping to achieve outright prevention is an impossible goal, and the name of the game has now shifted towards quickly identifying the wide variety of breaches as they enter the network, and swiftly neutralising them.

Intelligence Driven Security

Organisations are advised to move towards what RSA Security have coined as 'Intelligence Driven Security': a set of next-generation capabilities powering real-time threat detection and response, and optimising a firm's security resources (personnel, processes and technologies) to combat sophisticated attacks.

"Intelligence Driven Security is about getting visibility into every contour of one's attack surface, monitoring live activity with advanced algorithms that detect anomalies, and activating automated response processes to neutralise attacks." Intelligence Driven Security systems analyse these massive amounts of data traversing the network, scouting for signs of unusual behaviours – from people, applications, infrastructure, and communication. Their horizons extend beyond the traditional, explicit indicators (such as previously identified malware signatures or blacklisted IP addresses and domains).

As data relating to all networks and endpoints are available through a single management system that scales as required, using distributed computing architectures, security teams do not need to toggle between different security tools and applications.

In this way, security investigations that may have previously taken days can now be handled in just minutes. When attacks occur, as they inevitably will, organisations using Intelligence Driven Security will benefit from rapid identification and neutralisation – protecting vital information and financial assets.

Enquiries: Lynne McCarthy, +27 (0)11 202 8400 or email lynne@nu.co.za

Eskom engineer walks off with Rising Star Award

Leon van Wyk (left) was presented with the Standard Bank Rising Star Award in the Energy and Environment sector, by Rose Nkosi (Sasol Limited). Leon is the Air Quality Manager (Group Technology) at Eskom Holdings SoC Ltd. He holds an MSc in Chemical Engineering and is a registered engineering professional. He joined Eskom in 2011 and is currently responsible for overseeing all major Electrostatic Precipitator Plant, Fabric Filter Plant and Desulphurisation Plant projects in Eskom. *(Read story on page 43).*

Enquiries: Visit www.risingstarawards.co.za

Royal HaskoningDHV excels at SAICE KZN Regional Awards

Royal HaskoningDHV was victorious at the recent South African Institution of Civil Engineers (SAICE) KwaZulu-Natal Regional Awards in Pietermaritzburg having won Awards for Technical Excellence; Branch Award for Excellence in Civil Engineering; and the Company Champion Allan Rowe trophy. *(Read story on page 30).*

From left: *Craig Cavanagh (Director, Icon Construction), Craig Longworth (Contracts Manager, Icon Construction), Kollin Pillay (Foreman, Icon Construction), Jonathan Bernon (Site agent, Icon Construction), Henk De Wet (Icon Construction). Sephelele Mtshali (Project Manager KZN Department of Transport), Mervyn Bosworth Smith (Contracts Engineer, Royal HaskoningDHV), Graham Croucamp (Icon Construction), Darryl Klaasen (Bridge Engineer, Royal HaskoningDHV), Kevin Reeves (Director, Icon Construction).*

Siemens invests in future engineers

Three top-performing South African matrics have become the first students in Sub-Saharan Africa to secure placement in the prestigious Siemens Apprenticeship Scheme in Germany. Kelly Moorosi (19), Joseph Shandlale (22) and Hendri Meintjies (22) finished top of a list of more than 1 000 applicants for the all-expenses-paid 3.5-year theoretical and practical training in electrical and mechanical engineering in Berlin. *(Read story on page 30).*

Enquiries: Keshin Govender. Enquiries: Keshin Govender. Tel. +27 (0) 11 652 2000 or email keshin.govender@siemens.com

CLIPBOARD APPOINTMENTS

SMC Pneumatics

Milenda Makaukau
Inside Sales (Johannesburg)

Michael Goulborn
Inside Sales (Johannesburg)

Riaan Loff
Inside Sales (Johannesburg)

ACTOM Power Systems

Sy Gourrah
General Manager

PowerCell Sweden

Charlotta Sahlin
Director Marketing & Communication

Karl Samuelsson
Director of Product Development

Strutfast

Tony Kinsella
Group Managing Director

Magnet Group

Sheldon Payne
National sales manager (SLV, Magnet Projects & Solutions, Johannesburg)

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Email zydelia@reputationmatters.co.za

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Enquiries: Email marketing@saee.org.za

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