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We have reached the end of another year – and an exciting one at that!

It is not possible to wrap up this year without reflecting on some of the issues that have significantly affected us all. These include the challenges of leadership that we face as a country as well as in other critical spaces within our economy and society. Much of what we have seen has not been great. In fact, the vast majority of South Africans have been deeply upset by the way things have developed. The local government elections were a real indication that all is not well. Even though the results may not necessarily speak to any specific and sustainable shifts in power – what they do show is a growing dissatisfaction and anger developing throughout the country.

The recent USA election surfaced similar sentiments, where sectors of the society feel increasingly isolated and angered by a growing sense of not being able to change their lot.

However, I take many positives out of this year. The entities and institutions established to support our Constitution have stood up to the plate and delivered. And so it should be.

Politicians (and I do not care who you are, or how good you claim to be) are just politicians. They have remarkable skills, but operate in a space where bending a little this way and that is necessary to achieve the best outcome. I respect and understand that. The trouble is, right across this globe, they tend to forget where the bending stops and a real stiff spine becomes important. Be that as it may, I am but an engineer! In our reflection, it is important to review what worked in 2016 and what did not; and to embed that learning for our future progress. Each of us, because of where we find ourselves in our industry, is in the fortunate position of being able to make a difference in the lives of others. Therefore, if we ignore the anger that has built up in our society it is at our peril. If we are not able to get to the bottom of the real issues (notwithstanding situations that are milked for all they are worth) and begin to address them – we are doomed.

I end this year completely convinced that we have started to move in the right direction; that many of the individuals and organisations that have driven us to despair, share our own wishes and desires; and that together we can make this place magic.

I wish you and your colleagues, your clients and your families, all the very best over the Festive Season. My colleagues in Electricity+Control, and Crown Publications, share in this wish.

Charge up those batteries – you are going to need them in 2017!

Ian

Ian Jandrell

Pr Eng,
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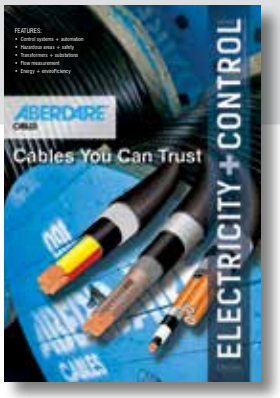
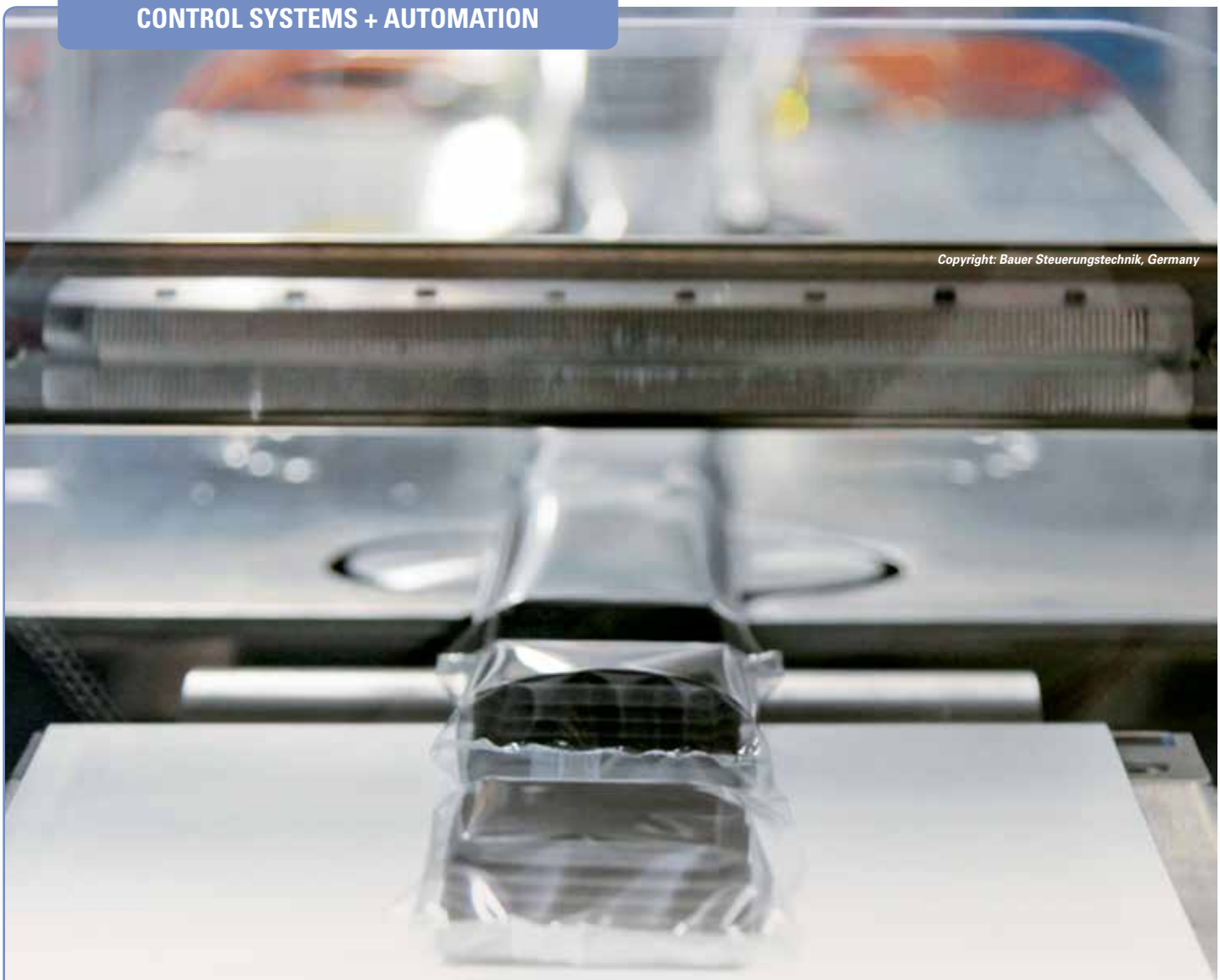


Cover

With 70 years' experience, **Aberdare Cables**' focus remains on its customers, embracing technology and embodying high standards of quality. *Read more on page 11.*

Regulars



Packaging at **500 Cycles Per Minute**

Frank Würthner, Beckhoff Automation

Design of positioning tools and successfully combining mechanical engineering with control technology.

Bauer Steuerungstechnik counts on PC-based control from Beckhoff for its latest flow pack machine to ensure fast, accurate and highly flexible packaging processes. The powerful system of modular, scalable hardware and TwinCAT 3 software facilitates a wide range of interfaces, numerous motion control functions and efficient energy management. Other benefits include integrated engineering, easy software updates and rapid remote diagnostics.

When Hartmuth Bauer decided in 2015 to build a flow pack machine, he was already quite familiar with the project's engineering requirements. He founded his company in 1999 as a one-person business for services related to control cabinet design and construction. In 2011, what is now called Bauer Steuerungstechnik GmbH in Bretten, Germany, began developing smaller machines and systems for material handling applications. From the start, Bauer depended on control technology made by Beckhoff. When the company started to build custom-designed material handling systems, it also began to develop smaller machines, such as ergonomic equipment for control cabinet manufacturers. Together, the companies designed several positioning tools and successfully combined mechanical engineering with control technology.

> *Hartmuth Bauer founded Bauer Steuerungstechnik in 1999 for services related to control cabinet design and construction.*

Hartmuth Bauer depended on Beckhoff and the company's Industrial PCs from the start, because PC-based control technology and the TwinCAT automation platform delivered the openness and future-oriented capabilities Bauer was seeking. It appreciated the lack of any interface

I/O	– Input/Output
NC	– Numerical Control
OCT	– One Cable Technology
PC	– Personal Computer
PLC	– Programmable Logic Controller
PTP	– Point To Point
USP	– Unique Selling Points
VPN	– Virtual Private Network

Abbreviations/Acronyms

limitations with this technology, as well as the great variety of I/O components and the numerous software modules with important special functions. Most importantly, Bauer works with Beckhoff because it delivers complete automation technology from a single source; it operates worldwide and offers a flexible and reliable service.

Working together to build an innovative flow pack machine

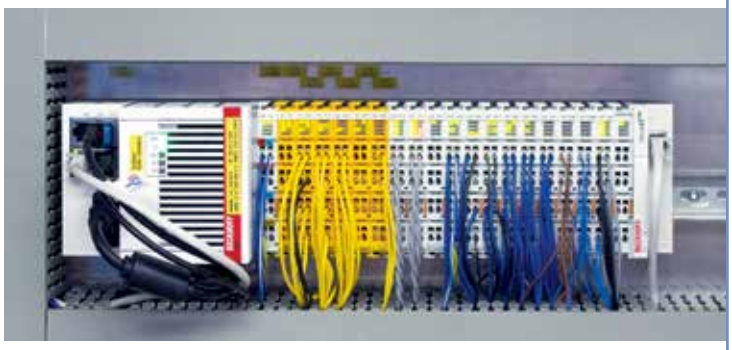
In the field of control cabinet construction and automation, Bauer Steuerungstechnik offers customised solutions, designed according to customer specifications for a wide range of industries. These include everything from the automobile industry, to forming technology and machinery for the food and medical industries, as well as specialty machines. The latest product is the B500SH, a horizontal high-speed flow pack machine that packages pharmaceuticals and cosmetics, as well as food and non-food items, quickly, gently and safely. The stainless-steel flow pack machine can package almost any material, even those in wet production areas.

Together with Beckhoff, Bauer Steuerungstechnik developed an innovative solution: a machine with a user-friendly visualisation concept that stands out with rapid setup capabilities and a compact design. Emanuil Benner, who is in charge of the technical features of Bauer machines, explains that the exceptional flexibility of the Beckhoff control and drive technology enables the kind of rapid product changeovers necessary in packaging applications. The 15,6-inch CP2916 multi-touch Control Panel displays all settings at a glance. The operator can call up all necessary data, such as product-specific parameters, and respond instantly to any recipe changes. With the highly dynamic and precise drive technology from Beckhoff, the machine can package products not only quickly, but with exceptional accuracy – from the slowest to the fastest machine cycles.

The machine is controlled via a CX5140 Embedded PC running TwinCAT NC PTP and a TwinCAT Camming software module. In addition to the CP2916 multi-touch Panel, additional Beckhoff components include EtherCAT and TwinSAFE I/O terminals, two AX5206 Servo Drives with AX5805 TwinSAFE cards, and AM8000 servo motors. The drive components are connected via One Cable Technology (OCT), which simplifies the modular approach considerably.

Günther Breithaupt, Application Software Engineer at the Beckhoff Pforzheim sales office, says that with the cam scaling function in TwinCAT NC PTP, the curve for the separation process is computed in the PLC and transferred to the NC immediately after the recipe has been selected. As a result, you can change the package length and height directly in the recipe and start running a new product without having to make adjustments on the machine or spending time on

Emanuil Benner, in charge of control technology at Bauer, and Günther Breithaupt, Application Software Engineer at the Beckhoff sales office in Pforzheim.



A glimpse into the control cabinet: The Beckhoff CX5140 Embedded PC runs packaging processes of the flow pack machine via EtherCAT and TwinSAFE I/O terminals.

conversion. The integration of NC and cam scaling in the PLC with ready-made TwinCAT motion control function blocks made this easy. Also, with OCT employed on the AX5206 Servo Drives, the interfaces that were needed to integrate another encoder without having to add more hardware, were available. That way, any foil slippage could be directly compensates for.

Standardised and consistent engineering

The Unique Selling points (USPs) of the flow pack machine include:

- Depending on the specific product and packaging material, the B500SH can churn out 500 packages per minute with a maximum foil speed of 50 metres per minute and setup changeover times of less than 10 minutes
- During the development phase, the two companies designed the system's drives for the desired speed and dynamics; therefore, the feeder components can be quickly adjusted to the selected recipe with additional user guidance on the screen and via an integrated control workflow. That way, the system controls the changeover setup process itself.

The compact B500SH flow pack machine from Bauer Steuerungstechnik can even be used in wet production areas.
Copyright: Bauer Steuerungstechnik, Germany

Other benefits arise from the integration of TwinCAT 3 software into Visual Studio, because it features a consistent engineering environment irrespective of the control system size. Emanuil Benner adds that PC-based control technology is flexible enough to handle all future requirements, and the open technology enables easy import third-party programs – a feature that demonstrated its usefulness just recently, when a machine had to be retrofitted with a vision system.

Power metering terminals for comprehensive energy management

Whatever additional technology the user may need in the future, Bauer Steuerungstechnik will be ready, since the PC-based control technology offers a very broad range of interface capabilities. EtherCAT, PROFIBUS, Ethernet, CAN – who knows what will be needed for future applications. The same applies to new features. When new regulatory requirements had to be satisfied, the EL34xx EtherCAT power measurement terminals were available to supply the machine with functionality for a comprehensive energy management system. Now users can even document how much energy was consumed to package each individual product.

Since controlling the flow pack machine requires considerable computing power, Bauer Steuerungstechnik selected the CX5140 Embedded PC with Intel Atom quad-core processor. One core handles the NC functions, while the second handles the PLC operations. Visualisation and image processing run on the two remaining cores. With these features, the company is confident that the company is ready for the future.

Conclusion

Remote control and maintenance capabilities are other areas where PC-based control scored important points, particularly since their machines are used all over the world. The company did not want to use VPN routers – as required with traditional PLC technology – to access the machine or be forced to use a third-party provider. With PC-based control, full access to the system is possible. All that is needed is an Internet connection to look at everything down to the individual axis, no matter where the machine is located."

www.bauersysteme.de
www.beckhoff.com/TwinCAT3
www.beckhoff.com/packaging

Two AX5206 Servo Drives with AX5805 TwinSAFE option cards control the AM8000 OCT servomotors.
Copyright: Bauer Steuerungstechnik, Germany

take note

- PC-based control is necessary for fast, accurate and highly flexible packaging processes.
- Beckhoff's flexible control and drive technology enables the rapid product changeovers necessary in packaging applications.
- The flow pack machine described in the article is able to package products quickly and accurately.

Dipl.-Ing. (FH) Frank Würthner is in Business Management (Packaging) at Beckhoff Automation.
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EH – Energy Harvesting
IoT – Internet of Things

Abbreviations/Acronyms

Internet of Things: Real Situation Revealed

Dr Peter Harrop, IDTechEx

An IDTechEx report – Extensive research on the Internet of Things (IoT) – is described as realistic and analytical, not 'evangelical'.

Researched in late 2016 with ongoing updates, the new IDTechEx report on the Internet of Things (IoT), is intended to assist investors, participants and intending participants and users. The report is mostly in the form of easily assimilated infograms, roadmaps and forecasts. Consequently these forecasts do not repeat the mantra about tens of billions of nodes being deployed in only a few years. The many analysts sticking to such euphoria ignore the fact that, contrary to their expectation, very little IoT was deployed in 2016. They are 'bubble pushing' with their forecasts, predicting ever steeper take-off to the point of physical impossibility. That is a triumph of hope over reality.

A large market will emerge

However, our ongoing global travel, interviews, conferences and research by our multi-lingual PhD level analysts located across the world, lead us to believe that a large market will eventually emerge but not primarily for nodes, where our price sensitivity analysis and experimentation shows commoditisation rapidly arriving. Indeed, as Cisco correctly notes, it is a pre-requisite for success. The money will lie in the systems, software and support examined in this study, though we also look closely at node design to reveal all the impediments to progress as well as the things coming right and the potential for enhanced functionality and payback. For example, the ongoing major breaches of internet security with small connected devices sit awkwardly with system and software manufacturers' claims year after year that they have cracked the problem.

The most primitive IoT nodes have an actuator and no sensor as with connected Raspberry Pi single board computers retrofitted to air conditioning for remote operation. We have talked to the CEO of Raspberry Pi, to systems and node suppliers, academics and many others and assessed their replies.

Internet of People

IoT centres around things collaborating for the benefit of humans without human intervention at the time. It does not include the Internet of People which is a renaming of the world of connected personal electronics operated by humans: it has completely different characteristics and it is cynical to conflate it with IoT. Nevertheless, we show how IoT nodes can be on people and quantify the appropriate part of the wearables market because it is relevant. The report explains further with a host of examples and options, even giving forecasts for agricultural robots following several respondents seeing agriculture as an important potential IoT market. Because we run our own IoT events, we get the inside track first.

As IoT moves to higher volumes – billions rather than millions yearly – the nodes will typically not be hard wired: wireless nodes

will have battery power and increasingly Energy Harvesting (EH) on-board because it will be impractical to change batteries. We consider the unsolved problem of suitable EH and the possibilities for solving it.

The largest potential applications will be multi-sensor so, for many reasons, component count will increase making cost reduction more difficult. We look at expenditure on IoT enabling technology which currently runs to billions of dollars yearly, mainly coming from governments and aspiring suppliers. However, we reveal how most of those reporting these and other IoT figures are puffing their data with things that may never be a part of the IoT scene such as sensor research in general.

Are analysts 'bubble pushing' with their forecasts, predicting ever steeper IoT take-off … to the point of physical impossibility?

Conclusion

Expenditure on buying and installing actual IoT networks is much more modest, contrary to heroic forecasts made by most analysts and manufacturers in the past. IDTechEx was disbelieving about this for the last four years yet even our node forecasts have now been reduced in the light of what has happened, though our systems' figures have been increased. It adds up to $20 billion in actual networks including nodes in ten years from now and rapid progress after that. See the number and dollar breakdown by application. Learn which players do what.

take note

- IoT centres around things collaborating for the benefit of humans without human intervention at the time.
- IoT does not include the Internet of People.
- A new report on the IoT, researched in late 2016, has been published.

Dr Peter Harrop is the Chairman of IDTechEx. The company guides strategic business decisions assisting clients in profiting from emerging technologies.
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CONTROL SYSTEMS + AUTOMATION

ROUND UP

Flush mount models of laser distance sensor available

Banner Engineering, represented locally by **RET Automation Controls**, has added flush mount housings to its rugged, industry-leading series of Q4X laser distance measurement sensors. The new flush mount configuration offers a more compact housing to expand applications and increase mounting flexibility in constrained spaces.

"The new flush mount configuration of the Banner Q4X sensor provides more integration possibilities and greater installation flexibility, especially in applications with tight space requirements." said Brad Ragozzino, Technical Marketing Engineer, Banner Engineering. "The combination of superior detection and measurement reliability, easy set-up, advanced features including delay timers and remote input, and the ability to handle the most challenging surfaces, makes the Q4X a highly versatile, single-sensor solution to solve a wide range of detection and measurement applications."

The Banner Q4X offers superior performance, ambient light resistance and durability, with reliable detection of sub-millimeter changes in distances ranging from 35 to 310 mm. Utilising a CMOS imager for reliable measurements, the Q4X offers dependable performance with highly reflective and multi-colour surfaces, or light-absorbing materials and low contrasts, such as black foams or rubber combined with black plastics or metals. With dual teach mode, the Q4X uses a combination of intensity and distance, making it ideal for error-proofing applications and reliable detection of challenging targets, such as clear packaging and transparent object detection without a retroreflector.

Banner Q4X laser distance sensors are available with discrete, analogue (0 to 10 V or 4 to 20 mA), and IO-Link output options.

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Largest IoT network deployment in Africa

Comsol's open architecture, open platform Low Power Wide Area National network deployment, Comsol IoT, has been launched. Backed by a global alliance and driven by international giants such as Cisco and IBM, the latest generation IoT network offers low cost, long range, low power IoT connectivity, capable of supporting geolocation. The Comsol IoT network will be deployed on the back of Comsol's R1,5 billion Open Access Layer 2 National network investment and will be available for sensor service termination by February 2017 in the major metros.

LoRa Wide Area Network (LoRaWAN) technology solves challenges associated with connecting billions of devices. Enabling a flexible IoT network ideal for the efficient and cost-effective monitoring and management of assets and infrastructure, these low power networks enable wireless connectivity for millions of sensors and smart devices over wide geographical areas.

"IoT offers solutions for smart cities, smart businesses, and even many of the challenges we face as a society, for example managing scarce resources like water. By enabling smart tracking, smart perimeter control, smart agriculture, smart buildings, as well as smart city applications like metering and manhole cover monitoring, IoT is already fundamentally changing how we live. We are proud to introduce the network that is going to empower African utilities, businesses, and individuals to gain the benefits the IoT offers," says Iain Stevenson, Chief Executive Officer of **Comsol**.

Designed to avoid interference, Comsol IoT combines the wide coverage area of cellular networks with low-power radio technology to provide ubiquitous connectivity in a single, cost-effective and secure wireless network. Serving a previously unaddressed market, Comsol IoT offers broad geographic coverage – including urban and rural areas – to create an ecosystem that supports the connectivity of millions of devices.

"Comsol IoT is the ideal solution for applications where power-constrained devices are distributed over large geographical areas. So in the case of water or electricity meters, or agricultural monitoring, to name a few, the network offers wide reach as well as power and cost savings. Battery life of up to 15 years can be achieved for some of these devices due to the relatively small data sets and transmission rates enabled by Comsol IoT. The high costs associated with manual monitoring, replacement of batteries and GPS devices are also no longer factors for organisations wanting to run a smart operation," says Justin Colyn, Executive Head of IoT of Comsol.

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New range of smart power monitoring solutions

BT-SA has introduced a range of smart power monitoring solutions that could save households and companies huge amounts of money due to power outages. This also forms part of its strategy to create an overall Internet of Things (IoT) business environment.

Power trips, load shedding, storms, inadequate general maintenance and bad maintenance of poles are some of the reasons why power could go out and there are many reasons why monitoring power is a good idea.

BT-SA managing director Bertie Strydom points to some typical examples. "If you're away on holiday, you don't want to worry about returning to a fridge or freezer with off food or if you're a business owner with a data centre or a shop owner with large freezers or even a restaurant owner."

"Farmers that pump water using electricity need to know that the process is running smoothly and hatcheries, the pharmaceutical, catering and beverage industries would greatly benefit from knowing about a power outage before it happens. These solutions have many applications in businesses and consumer households," says Strydom.

The cloud or network managed Smart Zero U Power Distribution Units (PDUs) provide active Class 1 metering, so that clients are able to take advantage of energy metering and energy optimisation of cabinets in their data centres. The units also offer the option to add temperature, humidity and fluid monitoring sensors.

He says companies still face challenges with the management of effective power distribution, power protection and power management in their data centre cabinets.

Enquiries: Elsie Potgieter. Email epotgieter@bt-sa.co.za

Pneumatics sales counter opens in Durban

With over three decades' experience in the hydraulic and pneumatics industry and as a Sales Partner of **SMC Pneumatics** in South Africa, Hutchings Hydraulics (KZN) has recently opened its dedicated SMC Pneumatics sales counter, now open at 98 Khuzimpi Shezi Road, Congella, Durban.

Thanks to a large SMC consignment stock holding, Hutchings Hydraulics now boasts over 800 SMC Pneumatics stock items and a dedicated, knowledgeable team who are ready to help solve your automation challenges. The consignment stock holding will ensure shorter lead times and availability of various products in SMC's extensive portfolio.

The seamless collaboration between **Hutchings Hydraulics** and SMC Pneumatics in the KZN region is one which meets both organisations' objectives and aligns closely to their values. Having completed several large installations both locally and on African shores, the partnership between SMC Pneumatics and Hutching Hydraulics ensures an extensive reach and an impressive offering to Hutching's customers.

"Over the past year we have developed a strong relationship with Hutchings and the results have wowed both the SMC team and the industry! SMC South Africa's footprint on both local and African shores is growing and the opening of Hutching's sales counter is the logical next step to meet demand," says Indirect Sales Manager, Coen Pretorius.

Managing Director of Hutchings Hydraulics, Paul Newman, says: "Hutchings Hydraulics has invested heavily into the SMC brand with the opening of their dedicated SMC-inspired counter sales area distribution desk as yet another highlight to its ever-growing portfolio".

Enquiries: Tel. +27 (0) 31 301 6422 or email stores@imsandhh.co.za

3D Smart sensor – assistant on mobile machines

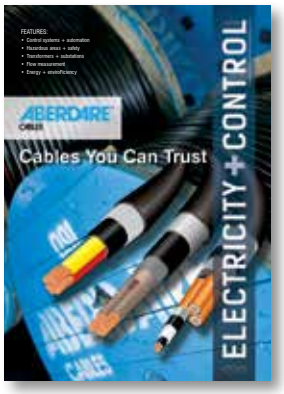
The principle of these 3D sensors is based on **ifm**'s patented and award-winning pmd technology. It was specifically designed for outdoor use and difficult ambient light situations. Even interference such as sunlight or materials with different reflective characteristics do not influence the repeatability of the measured data.

The integrated 2 x 32-bit processor architecture ensures a rapid and reliable calculation of the 3D data and functions directly integrated in the system with up to 50 fps. The complete electronics of the mobile 3D smart sensor is optimised and adapted to the demands and requirements of mobile machines. Besides shock and vibration resistance self-diagnostic functions from the sensor to the IR system illumination unit are of course also available. The mobile 3D smart sensors integrate some functions which enable to solve a multitude of applications. A highly developed algorithm from the automotive industry is used ensuring, for example, reliable automatic object recognition of up to 20 objects. This function can, for example, be used as collision warning. For simple distance tasks typical functions such as minimum, maximum and average distance are available.

The parameter setting of the system and live monitoring of the 3D data are carried out via the easy-to-use ifm vision wizard for Windows. As an alternative, parameter setting can also be carried out via function blocks using the software CODESYS.

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

Aberdare Cables is the largest cable manufacturer in Southern Africa



Aberdare specialises in the manufacture of low and medium voltage electrical cables for application in power generation, transmission and distribution, serving market sectors in rural electrification, transport, renewable energy, mining, large industry, OEM, retail, agriculture and building and construction environments.

Aberdare's three manufacturing sites and eight customer service centres in South Africa enable the business to provide personalised service to its entire customer base. With 70 years' experience, Aberdare's focus remains on its customers, embracing technology and embodying high standards of quality.

The company offers cable design, product development, as well as installation support, commissioning and diagnostic testing through the company's Engineering Services division. In addition comprehensive value added services such as Key Account Management, Customer Relationship Management, product and application training, laboratory testing and a Technical Help desk are offered.

Aberdare Cables is a level 2 BBBEE contributor, under the amended BBBEE codes. This places the company in an advantageous position to secure business in the industry. The emphasis by SOEs and mines has shifted to 51% black owned companies with a preference for black women owned (BWO) or >30% BWO. The industry has seen a significant reduction in volumes since the economic crash of 2008. Volumes dropped in Aberdare Cables as well as the industry and this trend has continued as the South African economy reaches new lows. The local industry is only expected to improve in FY 2018 when Government is expected to implement the various growth plans for the country and also ahead of the National Elections in 2019. This improved demand is expected to continue for a number of years.

Aberdare has continued to change and innovate the business in the changed market conditions.

The key success factors for Aberdare going forward are, achieving acceptable BBBBEE status, effectively and efficiently managing the value chain of the supply of cables and to continue producing the products and services of high quality that you can trust.

Aberdare Cables was recently acquired by a large cable company called Hengtong Fibre Optic Cable Company, a China based company. This brings many opportunities and benefits to the Aberdare Cables' business, through adaptation to efficiencies and best practices of a global cable manufacturer.

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Hydrocarbon Dew Point – Critical Considerations for Natural Gas Turbine Installations: *Part 1*

Jack Herring, Michell Instruments, Inc.

Identifying the major factors that contribute to best practices for measuring the Hydrocarbon Dew Point (HCDP) of the natural gas fuel supply.

Natural gas fired turbine power plants and Cogen plants are required, by the turbine manufacturer, to provide the natural gas fuel to the turbine within certain specifications. Failure to do so can significantly increase emissions, void warranties, damage hot zone components and significantly increase maintenance costs. In addition to these out of pocket costs, there is also an associated loss of revenue incurred during an unplanned shutdown for burner section overhaul. To meet these specifications, conditioning the gas supply as necessary requires accurate and reliable analysis to ensure it is done properly.

Overcompensation for poor analysis techniques or a less than optimum choice of instrumentation will significantly add to operational costs. Reducing turbine maintenance and operational costs will be the result of implementing the best practices of good gas conditioning and measurement. Online instrumentation is available that provides reliable, accurate gas quality information upon which good operational decisions can be made resulting in a reduction of the liability for excessive emissions, turbine damage, unplanned shutdowns and operational costs.

Why Measure HCDP

All turbine manufacturers generally specify that the incoming natural gas fuel meet several criteria. Some of those specifications call out particulate load maximums, chemical contamination limits, pressure and flow as well as temperature with the addition of the term 'superheat'.

Superheat

When DLN (Dry-Low-NOx) turbines first started appearing in the 1990s, operators started experiencing problems that had never been seen in the older versions of gas fired turbines. Part of the reason was the gas being delivered to those older turbines was at a modest pressure of about 200 psig. This reduced pressure required no on-site pressure reduction and thus the fuel burned very predictably. Today with the gas fields ageing and producing richer gas along with the higher pipeline gas pressures, a new mix of issues must be considered for proper operation of a turbine. Generally, superheat is defined as an inlet gas temperature of 50°F (28°C) above the HCDP and Water Dew Point (WDP) temperature. If the HCDP of the natural gas is measured at 15°F, the inlet gas temperature in this example must be elevated to 65°F minimum.

Turbine manufacturer, GE, recommends the following:

Liquid hydrocarbon carryover can expose the hot gas path hardware to severe over-temperature conditions and can result in significant reductions in hot gas path parts lives or repair intervals. Owners can control this potential issue by using effective gas scrubber systems and by superheating the gaseous fuel prior to use to provide a nominal 50°F (28°C) of superheat at the turbine gas control valve connection. Limitations on particulate matter size are defined in [2] as no more than approximately 10 microns. The document [2] calls for the elimination of all liquids at the inlet to the gas turbine control module and specifies the minimum and maximum requirements for fuel supply pressure. Other limitations and qualifications may also apply and the user is encouraged to review the details in this document.

A superheat temperature of at least 50°F/28°C above the moisture or hydrocarbon dew point is required to eliminate liquids. Meeting this requirement may require heating the gas if heavy hydrocarbons are present. Reasons for specifying gas superheat are:

- Superheating is the only sure method for eliminating all liquids at the inlet to the gas control module
- It provides margin to prevent the formation of liquids as the gas expands and cools when passing through the control valves

Why 50 °F/28 °C minimum superheat?

- It is an ASME-recommended standard (Reference 3) that 45°F to 54°F (25 to 30 C) of superheat be used for combustion turbine gaseous fuel
- Calculations show the 50°F/28°C minimum superheat requirement will prevent liquid formation downstream from the control valves and is verified by field experience
- Some margin is provided to cover daily variations in dew point
- Vaporisation time for liquid droplets decreases as superheat temperature increases [3]

ASME – American Society of Mechanical Engineers
DLN – Dry Low NOx
EPA – Environmental Protection Agency
HCDP – Hydrocarbon Dew Point
WDP – Water Dew Point

Abbreviations/Acronyms

- Natural gas fired turbine power plants and Cogen plants are required to provide the natural gas fuel to the turbine within certain specifications.
- Failure to do so can increase emissions, void warranties, damage hot zone components and increase maintenance costs.
- Conditioning the gas supply to meet the specifications requires accurate and reliable analysis to ensure it is done properly.

take note

Protection of turbine burner section

If the fuel is not provided to the turbine at these conditions, serious and costly damage will occur to the burner/hot gas section of these installations. Once damaged, rebuilding these sections forces an unplanned shutdown with its associated loss of production/revenue. Natural gas fuel conditioning systems are often used to perform the function of heating the incoming gas and use many sources of heat for this process. All of these sources require energy, increasing operational costs. This issue is more costly when the dew point of the gas received at the plant is higher and/or when the temperature drops. These conditions require more heat to achieve the required superheat temperature.

When the fuel gas enters the plant at elevated pipeline pressures, it often must be reduced before entering into the turbine burner section. Natural gas temperature drops 7°F for every 100 psig of pressure drop. So if the incoming pressure of the pipeline gas is 800 psig but the operating pressure of the turbine is only 350 psig, the fuel gas temperature will drop 31,5°F [4]. If this Joule-Thompson (J-T) cooling takes the temperature down below the HCDP, then aerosols and liquids drop out inside the burner tubes. The cans and the nozzles coke up and lose their effectiveness resulting in significantly elevated NOx readings. If the liquid dropout condition is allowed to continue, in a short time the burner section will have to be rebuilt. This means a three to five day unplanned shut-down, a large crew on-site around the clock for the expensive rebuild and lost revenue and plant availability. This will dramatically impact the profitability of the plant. Flashbacks are another symptom of excessive liquid dropout. Condensation of liquid hydrocarbons in gas fuel have been identified as one cause of flashback. Therefore, it is incumbent on the power plant operator to monitor the gas fuel supply to ascertain that it is meeting the requirements of the GE gas fuel specification [5]. Under certain transient conditions flashback can occur where flame 'holds' or is supported in the recirculation zone downstream of the premixed gas pegs. This region is not designed to withstand the abnormally high temperatures resulting from the presence of a flame. In the event of a flashback, the metal temperatures increase to unacceptable levels and hardware damage occurs. In some cases, these events have caused forced outages and adversely impacted availability [6]. Preventing flashbacks is so critical to the healthy performance and availability of the turbine that it is partially the reason the 50°F superheat requirement was established.

The turbine experiencing flashbacks must have the load significantly reduced and a recovery procedure must be followed to get the load back up to normal. More revenue and availability is lost. If a remedy for flashback is not implemented, the burner cans and nozzles will coke up, seriously impacting emissions.

Emissions control

As liquid hydrocarbons, from under-processing or compressor lubrication system seal leakage, impact the turbine hot section there will be a proportionate increase in NOx emissions. If these entrained micro-droplets get to the turbine blades, they will burn at high temperatures and in severe cases have been known to burn off the blade tips decreasing the efficiency of the turbine overall. Compliance with EPA emissions restrictions is simple; keep the liquid hydrocarbons out of the turbine.

> *Online instrumentation that provides reliable, accurate gas quality information is available.*

Energy conservation

Overheating the fuel is not a trivial matter. Because online dew point analysis typically is not conducted, the gas is often heated by 50°F continuously. For a GE Frame 7 gas turbine, 50°F of superheat amounts to about 740 kW, which means energy costs can be as high as $324 120 per year. But if the gas is well above its dew point under normal conditions, the additional heating is wasteful [4].

Note: Part 2 of this article will appear in Electricity+Control January 2017. Current methods used for measuring HCDP will be described, as well as, best practices required for all measurement techniques, a reliable detection method, controlling pressure to the cricondentherm, and more.

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Jack C Herring has been in the moisture/dew point measurement industry since 1979 and has published several articles on the subject. He co-authored the Moisture Measurement section of the 'Industrial Instruments & Controls Handbook' by McGraw Hill (1999).
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Raising the Benchmark for Multi-gas and VOC Detection

Suraksha Mohun, MSA Africa

Advances in electronics and software development have resulted in the latest generation of portable multi-gas detectors with increased functionality and sensitivity.

With worker-safety increasingly under the spotlight, especially in the mining industry, the latest technology being incorporated in these instruments has set a new benchmark in the safety-equipment industry. A gas detector is an instrument for the detection of particular gases in a certain area, such as an industrial or mining environment. Often forming part of an overarching safety system, this equipment also has the capability of interfacing with a control system in order to shut down a process automatically in the event of a hazardous situation. The gas detector can sound an alarm to alert operators in the location of the leak, allowing a speedy and safe evacuation.

Gas detectors

Gas detectors are classified according to the operating mechanism, such as semiconductors, oxidation, catalytic, photo ionisation, and infrared, among others. They are available either as portable or fixed devices. Portable instruments monitor the atmosphere around personnel, and are either handheld or attached to clothing via a belt or harness. These gas detectors are usually battery operated, transmitting warnings via both audible and visible signals, when levels of dangerous vapours exceed preset levels. Fixed gas detectors are generally mounted near the process area of a plant or control room.

While the principles behind gas-detection instruments are well understood and applied, the technology itself has gone through various iterations of sophistication, particularly with the advent of advances in electronics and software development. MSA Africa, which offers safety equipment for a range of industries and applications, is constantly introducing new features to its gas-detection instruments, particularly to its portable Altair series.

> *Used mainly for Lower Explosive Limit (LEL) and toxic gas detection, this instrument is capable of detecting emissions from six different gases.*

Advanced PID

The latest in this regard is an advanced PID (Photo-ionisation Detector) option. PID is a requisite for industrial hygiene, HazMat (Hazardous Materials) and specialised detection applications. The particular benefit of this new feature is that PID instrument data can now integrate seamlessly into the company's proven fleet-management infrastructure. This means that the benchmark for gas detection has been raised even higher, as well as meeting the evolving and diverse

- A gas detector often forms part of an overarching safety system.
- It has the capability of interfacing with a control system to shut down a process automatically in a hazardous situation.
- The gas detector can sound an alarm to alert operators in the location of the leak, allowing a speedy and safe evacuation.

take note

HazMat	– Hazardous Materials
HVAC	– Heat, Ventilation, Air Conditioning
LCD	– Liquid Crystal Display
LEL	– Lower Explosive Limit
PID	– Photoionisation Detector
UV	– Ultra Violet
VOC	– Volatile Organic Compound

Abbreviations/Acronyms

requirements for Volatile Organic Compound (VOC) detection. PIDs utilise a high photon energy UV lamp to ionise chemicals in the gas sample. An electron is ejected if the compound in question has an ionisation energy below that of the lamp photons, the end result being that the resulting current is proportional to the concentration of the compound. A wide range of compounds can be detected at levels ranging from a few ppb (parts per billion) to several thousand ppb.

Detectable compound classes (in order of decreasing sensitivity) include: aromatics and alkyl iodides; olefins, sulphur compounds, amines, ketones, ethers, alkyl bromides and silicate esters; organic esters, alcohols, aldehydes and alkanes; hydrogen sulphide (H_2S), ammonia (NH_3), phosphene (PH_3) and organic acids. Standard components of air or mineral acids elicit no response.

Advantages of PIDs

The major advantages of PIDs are the excellent sensitivity and ease of use, while the main limitation is that measurements are not compound-specific. Advances include PIDs with pre-filter tubes to enhance the specificity for such compounds as benzene or butadiene. Fixed, hand-held and miniature clothing-clipped PIDs are used widely for industrial hygiene, HazMat, and environmental monitoring.

VOCs can pose serious health risks if inhaled by those working in harsh environments. XCell sensor technology plays a critical role in reducing the risk of exposure significantly. The latest iteration of this technology has a '5X' fast sensor response, meaning it is 15 seconds faster than a standard sensor. This portable multi-gas detector is known as the Altair 5X.

Most importantly, saving seconds in response time translates into saving lives. Another significant feature is that less calibration gas is used. It requires about half of the test gas used typically for calibration and bump tests. A rapid bump test gives results in under ten seconds for most common sensor configurations. It also boasts a span calibration time of 60 seconds for most common sensor configurations.

Used mainly for Lower Explosive Limit (LEL) and toxic gas detection, this instrument is capable of detecting emissions from six different gases, namely carbon monoxide (CO), H_2S, oxygen (O_2), sulphur dioxide (SO_2), chlorine (Cl_2), and NH_3. Potential markets include chemicals, construction, fire services, general industrial, HVAC, mining, oil & gas, utilities, and water treatment. The main applications are combustible detection, toxic detection, oxygen detection, and confined-space monitoring.

Tough and multi-functional

The instrument is tough, befitting its multi-functionality. A rugged, rubberised polycarbonate housing provides unsurpassed durability, including the capability to survive a 3 m drop. Internally, a field-proven integral pump provides consistent gas flow, without the need for externally-attached components. An ergonomic design, glove-friendly buttons and a high-contrast display make the instrument easy-to-use for a range of applications.

The instrument is configurable with either a high-resolution colour or monochrome LCD display, with 18 languages built-in. A Logo Express Service is available to customise the colour display. Interchangeable plug-and-play slots for XCell sensors means that the aforementioned six gases can be monitored simultaneously.

In addition, the instrument is fully compatible with the Galaxy GX2 automated test system, and Link Pro and Link software, in order to allow for efficient fleet management. By incorporating Bluetooth as a standard feature, the benefits of wireless safety are now a common benchmark. Simply downloading the free App from Google Play transforms any compatible Android device into an enhanced safety and productivity tool. The real secret to the instrument's superior performance is the breakthrough in chemical and sensor technology represented by the XCell sensors. Here sensor-controlling electronics have been miniaturised and placed inside the sensor itself. This means that XCell sensors offer superior stability, accuracy, repeatability, and a typical lifespan that is more than double the industry average.

Conclusion

Exclusive MotionAlert and InstantAlert features make this multi-gas detector ideal for applications such as confined-space monitoring. The former feature is activated when a user becomes disabled and motionless, alerting others quickly to that person's location. With a simple push of a button, the latter feature allows users to warn others manually of potentially hazardous situations.

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Simplified safety compliance testing

Fluke, represented locally by **Comtest**, has on offer a unique tester to market, in that it sources both ac and dc steady-state voltage for Hi-Z and Lo-Z instruments, thus simplifying safety compliance testing.

The Fluke PRV240 Proving Unit provides a safe and convenient method for 'test before touch' TBT verification of electrical test tools without placing the electrician or technician in potentially hazardous electrical environments, which would generally involve using known live voltage sources.

In contrast to using a known live source, using the PRV240 does not require personal protective equipment (PPE) for tester verification. Use of the PRV240 reduces the risk of shock and arc flash compared to verification of test instruments on high-energy sources in potentially hazardous electrical environments because the PRV240 provides a known voltage in a controlled, low-current state in accordance with safe work practices.

The pocket-sized PRV240 sources 240 V of both ac and dc steady-state voltage for testing of both high- and low-impedance multimeters, clamp meters, and two-pole testers, eliminating both the need for multiple verification tools and the use of a known high-energy voltage source for test instrument verification. To avoid accidental contact, the voltage is supplied through recessed contacts that are activated only when test probes are inserted into the modules insulated access points. A single LED indicates the sourcing of the voltage to verify the test tool, simplifying test tool verification without the need for PPE.

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Audible and visual warning for fire, gas and security systems

E2S Warning Signals offers products from its comprehensive range of sounders, loudspeakers, beacons, combined AV units, plus push button and break glass manual call points suitable for use in fire, gas and security systems. The extensive E2S product portfolio includes high output devices to suit noisy or brightly lit environments and wide area coverage, plus intrinsically safe and explosion proof units for use in hazardous areas. Whatever the application, there are E2S products which provide effective delivery of status indications and alarm warnings for fire, gas, security or disaster, to maximise life and property safety.

In addition to its general purpose and industrial fire and security devices, such as Alert-alarm, Alert-alight and Sonora, the company offers new products such as the STEx family which complements the well-established BEx (low copper Aluminium) and GNEx (GRP) families to satisfy an increasing demand for optimum combinations of robust build and resistance to corrosion. Constructed in Stainless Steel (gr. 316L and 316), rated IP66 for ingress protection and certified (ATEX and IEC IECEx) for Zone 1, 2, 21 and 22 explosion proof signalling, the new STEx family includes alarm sounders, PA loudspeakers, Xenon strobe beacons, Rotating Halogen beacons, LED beacons and combined (beacon and sounder in single assembly) units.

Enquiries: Email sales@e2s.com

Risk-based portable appliance testing

The launch of Apollo's 600 portable appliance tester heralds a new era in risk-based portable appliance testing and health and safety management. With built-in risk assessment tools for any workplace hazard and a variety of testing and inspection reports, including portable appliance testing; fire detection and emergency lighting, the Apollo 600 offers an all-in-one solution to managing a risk-based approach to health and safety in any workplace.

Apollo 600 follows in the footsteps of **Seaward**'s long line of trusted PAT testers, offering a comprehensive suite of fast and accurate electrical safety tests to enable any workplace appliance to be tested, including 3 phase equipment and Residual Current Devices (RCDs). Apollo 600 also enables point-to-point testing of fixed appliances as required by the 4th edition of the IET Code of Practice for In-Service Inspection and Testing of Electrical Equipment. In addition to its electrical test features, the Apollo 600 has a built in electrical risk assessment tool which determines a risk-based suggested retest period.

Apollo 600 features a built-in universal risk assessment tool allowing hazards to be recorded, risk scores to be calculated and corrective actions to be planned and documented.

Apollo 600 has a large internal memory capable of storing 50 000 records and an additional 2 000 images. Its compatibility with Seaward's PATGuard 3 Health and Safety Edition software means that complete test records including images can be easily managed on a PC.

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DOMESTIC INDUSTRIAL FLAT

DOMESTIC

ROOF TILE- PV mounting system
Components needed to install **four modules**

10101
LS145420

10201
LS106500

10202
LS106600

30104
LS400215
Roof tile fixing support

30105
LS340284

30103
LS400540

MK001 ROOF Tile
4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30104	8 Roof tile fixing support

MK002 ROOF Tile
4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30105	8 Roof tile fixing support

30312
LS300465

MK003 ROOF Tile
4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30103	8 Roof tile fixing support

MK004 SLATE Roof
4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30312	10 Slate tile support

INDUSTRIAL

KLIP LOK - PV mounting system

Components needed to install four modules

30106
LS700340

10101
LS145420

On-line configuration

Software that allows customers to calculate themselves which and how many components of the mounting systems are required for the construction of their plants

visit:
http://configurator.rodigas.it/step/initial

10201
LS106500

10202
LS106600

MK005 KLIP Lok

4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30106	10 Support for klip-lok roof

30108
LSK102

30107
LSK101

MK006 KLIP Lok

4 x panel requirement

30108	4 Universal lateral clamps
30107	6 Universal central clamps
30106	10 Support for klip-lok roof

10102
LS165420

30101
LS500472

MK007 TRAPEZOIDAL

4 x panel requirement

10102	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps

30102
LS530210

MK008 TRAPEZOIDAL

4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30101	12 Support for metal roof

MK009 UNDULATED

4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
30102	8 Double thread screw

FLAT

FLAT PORTRAIT - PV mounting system
Components needed to install four modules

40103
LSTE14001530

10101
LS145420

10201
LS106500

10202
LS106600

40101
LSTP100
Flat 10° Landscape

20107
LSGPU140

40108
LSI-060185

40106
LSL-195204

MK010 FLAT PORTRAIT
4 x panel requirement

10101	2 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
40103	3 Triangular support

40104
LSCVP1650

40109
LSZTE 250

MK011 FLAT LANDSCAPE
4 x panel requirement

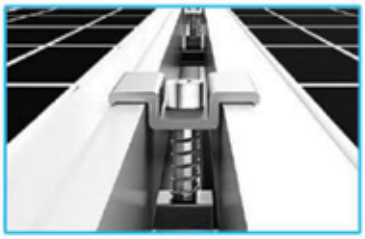
10101	4 Profiles Length 4200 mm
10201	4 Universal lateral clamps
10202	6 Universal central clamps
40102	5 Triangular support
20106	2 linear connections

MK012 FLAT 10° LANDSCAPE
4 x panel requirement

40101	Roof support 10°
10201	Universal lateral clamps
10202	Universal central clamps

Why choose this system
Profiles / pre-assembled clamps. It's a reticular system expressly designed for medium to big plants. The system is also suggested for pv plants which need a low ballast load. Supplied in kit.

About our clamps



Our pre-assembled clamps, final and central, are made in aluminium and stainless steel to be compatible with the frames of the pv panels. The clamps are designed to fix pv panels with thicknesses between 30 and 50 mm.

SOUTH AFRICA SABS STANDARD VERIFIED

Our products have been tested according to European and South African standards. EN 1990 to EN 1999 – Eurocode / EN 755-2: 2013 - Aluminium and its alloys. Extruded rods, bars, tube and profiles. Mechanical properties / SANS 10160-1: basis of structural design and actions for buildings and industrial structures - part 1: basis of structural design / SANS 10160-2: basis of structural design and actions for buildings and industrial structures - part 2: self-weight and imposed loads / SANS 10160-3: basis of structural design and actions for buildings and industrial structures - part 3: wind actions.

MK013 FLAT PERSONALISED
4 x panel requirement

10104	Profiles
10203	Lateral clamps
10204	Universal central clamps
20107	Perpendicular connection
40106	Adjustment flange
40108	Ground fixing flange

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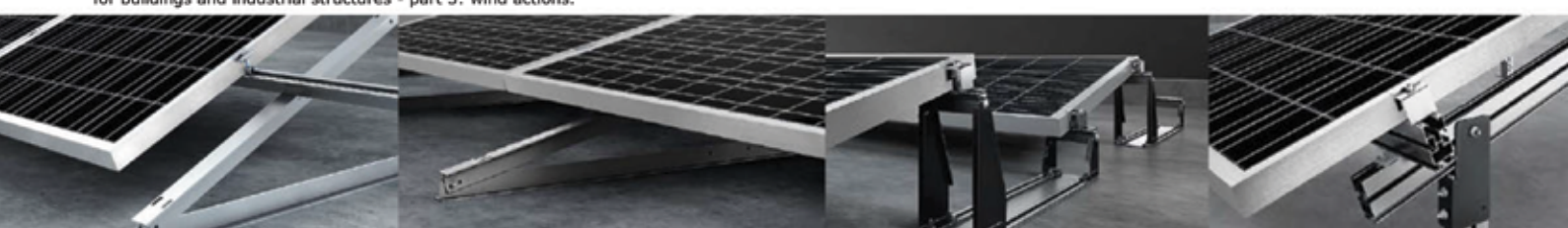

Transformer Core Market in Africa and Asia-Pacific Regions **Promising** Future

Sidharth Sawant, Allied Market Research

A market report published by Allied Market Research offers useful insights related to the transformer core market and highlights the market share, size, and growth.

In the modern era, technology has progressed and developed on a large scale in all the industrial sectors such as IT, defence, electricity, and automotive.

Technological advancements made in the last two decades are commendable. However, it is important to protect and safeguard the environment and comply with industrial policies. Leading manufacturers and market players have realised the need to utilise renewable energy resources to produce energy and electricity.

The transformer core market has also grown over the years owing to high demand for electricity and the rise in electricity production facilities especially in the developing countries. A market report published by Allied Market Research offers useful insights related to the transformer core market and highlights the market share, size, and growth. The transformer core technology enhances the efficiency of electricity production.

Need for improved power supply

Power generation and consumption need to be tracked and monitored. It is important to identify where the resources are being used and what impact the whole procedure has on the environment. Production of large volumes of electricity utilising minimum quantities of resources is the ideal situation for these power producing facilities. Electricity distribution is another crucial aspect that needs to be considered and it is important to find efficient and reliable ways to do so.

An expert in electrical engineering based in Nigeria, Engr. Olice Kemenanabo, throws light on the need to improve electricity supply in the region. He lists the existing challenges that hinder reliability, quality, and vulnerability of the electric power systems. He reveals that improper ways to monitor and evaluate electric supply is the main cause of wastage of resources. Moreover, he explains that the

current transmission facilities and distribution networks are not up to the mark and there is a need to improve them.

Power utilities set up wide area monitoring, control and protection systems that offer fresh insights, which disable cascading outages, enhance efficiency, and also assist operators to manage real-time complex variances in the grid. Apart from the aforementioned advantages, efforts are being put into accurate time-synchronised measurements. The experts will continue to inspect every pole and distribution transformer to find faults, diagnosing the problem and finding a solution. The transformer core technology in the region is widely adopted owing to improvement in the general infrastructure and economy. Non-renewable resources need to be utilised in a cost-effective and energy-efficient manner.

Energy-efficient and reliable electricity production is increasing the demand for transformer monitoring solutions.

Manufacturers turning to distribution transformer monitoring solutions

Several utility companies worldwide are hoping to implement smart metering solutions in the near future. Industrialisation or automation of distribution stations brings to notice low voltage networks and along with that also improves their visibility. Monitoring and tracking of distribution transformers is the stepping stone of distribution automation. It is essential to keep a track of crucial parameters in distribution facilities.

There are several benefits associated with transformer monitoring for manufacturers. Transformer monitoring assists to identify transformers that are on the verge of collapsing. Very often, transformers fail as a result of lack of information related to the functionalities of the particular transformer. Metering solutions enhance the visibility of low voltage power networks and help the companies to distribute good quality electricity to the customers. The new system gives complete information and real time data of all the important parameters, such as voltage, power factor, current, harmonics, and unbalance from the low voltage network. From the information collected from these monitoring devices, companies can find solutions to improve the quality of electricity and improve efficiency of the entire process. The new monitoring system will reduce outage duration significantly. The new system that will be implemented will recognise the transformer that is about to collapse and will set an outage signal to the central system. The new transformer monitoring solutions will help utility companies to improve their service to the customers and improve the overall distribution system in power distribution facilities.

Conclusion

The movement in the transformer market in Africa, especially in Kenya, has caught the eye of leading companies around the world. There is a huge interest coming in from international companies, that deal with manufacturing of meters, transformers, and steel structures, which have expressed their interest to setup factories in the region. Three transformer manufacturers have set up facilities, installed equipment, hired workforce, and rented a place to assemble transformer devices. Kenya is aiming to improve and upgrade the existing network to significantly improve the electricity supply in the country. The whole process will include, replacement of wooden poles with concrete poles, more substations, and installation of transformers to increase the reliability of power. The new changes and developments will create more opportunities and jobs which will improve the economy of the country on the whole.

The Asia-Pacific region is another market with tremendous potential for the transformer core market. The growing demand for electricity in the region and the rise in power projects has created new avenues for the transformer core industry in the region. Along with the aforementioned factors, industrialisation, urbanisation, and the growing importance of use of renewable energy resources in nations such as China, India, and Indonesia, makes Asia-Pacific a realistic market for the transformer core industry.

take note

- The transformer core market has grown over the years owing to high demand for electricity and the rise in electricity production facilities.
- Manufacturers and market players have realised the need to utilise renewable energy resources to produce energy and electricity.
- A report, offering useful insights relating to the transformer core market, has been published.

Sidharth Sawant, is a content writer with Allied Market Research. A writer by day and a reader by night, he has worked personally with industry authorities from various sections including automotive and transportation, information technology, life sciences, construction and manufacturing, energy and power.
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IN CONVERSATION

In Conversation ...

Crown Publications editor, Peter Middleton, talks to Warwick Jackson about the company's pivotal role in a project associated with the SKA radio telescope.

SKA Project

The SKA project is an international effort to build the world's largest radio telescope, with a square kilometre or one million square metres of collecting area.

The scale of the SKA represents a huge leap forward in engineering and research and development and will deliver a correspondingly transformational increase in science capability when operational.

Deploying thousands of radio telescopes, the system will enable astronomers to monitor the sky in unprecedented detail and survey the entire sky thousands of times faster than any system currently in existence.

The SKA telescope will be co-located in Africa and in Australia. It will have an unprecedented scope in observations, exceeding the image resolution quality of the Hubble Space Telescope by a factor of 50, whilst also having the ability to image huge areas of sky in parallel.

Local fabricator, specialist designer, manufacturer and maintenance service provider, The Efficient Engineering Group, is more than halfway through the manufacture, integration and testing of 64 yokes and pedestals for the MeerKAT antennas, a pre-cursor project to Phase 1 of the Square Kilometre Array (SKA) radio telescope.

Efficient Engineering is a dynamic engineering solutions company based in Gauteng, Africa's economic heartland. Since its founding as a fabricator of earthmoving and materials handling equipment, the company has grown to occupy facilities spanning in excess of 28 500 m^2 in Gauteng and in the Western Cape and has diversified into a broad-based engineering solutions provider.

In recent times, Efficient Engineering has been pioneering turnkey, accelerated offsite construction and the design of modular, integrated, portable or prefabricated construction solutions, which are assembled, optimised and tested prior to delivery to site.

How has the scope of the project changed?

We were initially awarded the contract for the fabrication of the MeerKAT yoke and pedestal structures. The initial scope of the contract was limited to the structural steel fabrication. Based on a recommendation from a slew manufacturer, who knew of our success with modular plant, our project scope has grown to include the manufacture and integration of a host of sub-assemblies as well as the full integration and testing of the mechanical and electrical performance of the assembled yoke and pedestal positioners.

Driven by the desire to achieve over 75% local content, we have walked the road with a number of the world's best global and local project participants: the local project leader, primary sub-contractors from the USA and Germany, and the client. The success of systems and the expansion of the local scope of work, I believe, can be attributed to an amicable, open, honest and cooperative approach to resolving technical problems. Initially asked to complete the structural build for the first two prototypes, Efficient Engineering systematically worked through all of the design glitches in the most amicable and cooperative way. There were post-qualification design enhancements, and via positive cooperation, we developed an excellent relationship with all of the participating companies, including Stratosat, Datacom, General Dynamics and Vertex Antennentechnik. We developed an excellent relationship with Stratosat Datacom, as well as their sub-contractors, General Dynamics and Vertex Antennentechnik. Stratosat Datacom won the tender as prime bidder for the MeerKAT project.

Soon into the project, you became more than a steel fabricator?

Early in the developing relationship, it became apparent that Efficient Engineering was much more than a steel fabricator. We began to be offered more of the integration work – work that was expected to be beyond the scope of South African manufacturers. So, from building the yoke and pedestal structures, we were asked to meet a difficult

Peter Middleton

Warwick Jackson

take note

- The SKA project is an international effort to build the world's largest radio telescope.
- The initial scope of the project described in this article was for the fabrication of the MeerKAT yoke and pedestal structures.
- In reality, the work undertaken has gone far beyond the initial scope.

paint specification. And while we did battle, through transparency, involvement and an open way of working with the designers and clients, we developed a way to get it right. For success in collaborative projects such as these, it is important not to hide behind issues. By getting the South African, US and German companies all aligned, a level of trust emerged that enabled us to get involved in tasks that were outside of our original scope – most notably, the vast array of sub-assemblies.

To maximise local content, we were tasked with sourcing local equivalents for standard sub-assembly components available overseas – and we ended up exceeding expectations in terms of delivery times and quality.

This led to us being offered the opportunity to install and integrate the sub-assemblies into the yoke and pedestal structures – the slew rings, the universal joints, the torque tube down the centre of the structure and a host of fittings and bracketry. The work involved significant numbers of machined parts and specialised stainless steel components. While the servo drive systems were being manufactured in Germany, Efficient Engineering also rewired electronic modules for the first four units to resolve design compatibility issues.

Why is off-site integration and testing preferable?

All this led to one of the best decisions of the whole project for Efficient Engineering – to complete the integration and testing of all units off-site. Through our experience with modular plant, we have long been convinced of the many advantages of completing as much work as possible in the factory environment. A significant number of the delays and cost overruns associated with site-based construction can be avoided if fully functional and tested plant modules can be delivered to site. The idea is to deliver a plug-and-play solution that can be placed on a pre-prepared plinth, connected to the required utilities and immediately brought into operation. Debugging a system after installation on site can be a nightmare.

So for the MeerKAT antennas, following full electrical and mechanical integration, the functionality and mechanical accuracy of each unit is tested and signed off at Efficient Engineering's Germiston premises.

Fill us in on some of the technical detail?

We use a highly accurate 3D laser tracker to ascertain the various geometries of the slew bearing. The information is fed into a Roma Arm positioner and this enables us to accurately install the mounting brackets for the position encoders. A tolerance to within 50 µm is required in the x-y and z directions relative to the slew bearing's angular position.

The slew ring is rotated by electric motors driven by a servo system. It is critical for the integrity of the antenna's reception that no Electromagnetic Interference (EMI) noise from the drive is allowed to interfere with the receiver equipment. So the slew bearing and its drive are housed in a shielded compartment, which traps EMI interference, preventing it from reaching the radio telescope. The interesting part of this shielding system is the door of the compartment. Called an

EMI door, it was developed by Interference Testing and Consultancy Services, another local company. It consists of a stainless steel door with a specialised copper leaf interlocking system. Sprung copper strips are used for excellent electrical continuity between the shields that trap the interference.

The inlet air filter system is an EMI filter that uses particular wave-guides sized to restrict the wavelengths and frequencies of the interference. The air vents block the EMI signals while allowing airflow in and out of the compartment. For testing the integrity of the whole system, we place an EMI generator inside the compartment and we use a 'sniffer' outside to measure the levels of EMI attenuation and to certify that the compartment is sealed to the degree required. It has been fascinating to have been involved in so many interesting facets of this project and we are proud of the quality results we have achieved.

How far is the project to date?

So far, Efficient Engineering has completed and delivered over 38 of the 64 units. We are completing the remaining yoke and pedestals at a rate of four a month, which is well within the delivery deadlines – and we have exceeded the 75% local content target. It goes to show that, with the right attitude and approach, South African companies can work with multi-nationals across different continents and produce world-class quality equipment using local resources.

To achieve this, integrated teams need to be established so that people don't differentiate between their own colleagues and those from other participating companies. A united team pursuing an honest and blame-free approach can develop solutions quickly. Hiding behind limitations or mistakes is a disaster in this environment.

We at Efficient Engineering have been able to contribute to such teamwork – on the technology side, to the design and, for production, implementing enhancements to make the build easier and more practical. Overall, this has been very good for us and for the MeerKAT project.

What about the training that is involved in a project such as this?

Validating Efficient Engineering's role in the development process, the company is currently providing industry training for three technicians from the local Carnarvon area that have participated in the technician training initiative offered by SKA SA. The goal is that these apprentices will receive their National Diplomas and, hopefully, end up working on MeerKAT operations in the Karoo.

Training is a cornerstone of our approach. We have experienced millwrights, boilermakers and other artisans who can pass on the valuable information they have to the younger generation. Including the three SKA apprentices, we have a total 36 young people currently engaged in apprentice programmes, which plays a big role in our B-BBEE level 2 status on the new codes. When Stratosat suggested training some of SKA SA people, there were absolutely no objections.

What have you learned from this project?

We have the skills and resources in South Africa to be competitive on the global stage. We are capable and the world is at our feet. It has been great to be involved from the beginning and to see how our capabilities and confidence have grown. The most important lesson learned from the SKA project is that we need to believe in ourselves.

> *"The most important lesson learned from SKA project is that we need to believe in ourselves.*

New enclosures – easy installation, high performance

Legrand's new freestanding and wall mounting Linkeo 19" enclosures have been designed for easy installation, high performance and optimum safety in commercial sector installations.

Linkeo 19 enclosures are supplied with a wide range of accessories to offer a complete solution for all projects," says Sonja Leibbrandt, marketing and pricing manager, Legrand SA. "These metallic extendable freestanding and wall mounting cabinets ensure the ordered arrangement and optimum protection of electrical components like terminal blocks, switches and sockets, fuse carriers, safety transformers and circuit breakers.

Linkeo 19 enclosures have a textured polyester coating which provides excellent resistance to corrosion and scratching. An IP 20 Index protection rating guards against solid objects and liquids and an IK08 rating offers protection against mechanical impacts. "Cabinets and equipment are supplied ready-assembled or as flatpack solutions in stackable wooden cases, depending on customer requirements."

Linkeo 19 freestanding cabinets have a reversible front door with a safety glass window and removable side and rear panels. For added security, all four sides can be locked with a key lock. These units are equipped with 2 x 19" uprights, which are adjustable in depth. There are pre-cut top and bottom cable entries and a cut-out at the top for fan kits.

These freestanding enclosures, with a loading capacity of 400 kg, are equipped with levelling feet and an earthing kit. Extension cabinets are supplied with a baying kit for safely joining the cabinets.

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

CE mark and RoHS 2 compliance

TDK Corporation has confirmed that the TDK-Lambda Genesys10 kW and 15 kW series of programmable power supplies are RoHS 2 compliant. All models having an output voltage between 30 V and 1 500 Vdc and those with less than 30 V output (with an input voltage of 208 Vac or 400 Vac) now carry the CE Mark in accordance RoHS2 Directive 2011/65/EU in addition to the 2014/35/EU and the EMC Directive 2014/30/EU previously covered.

Carrying a five-year warranty, the Genesys 3U ac-dc programmable power supply series share common front panel features and compact dimensions (3U (133 mm) high and 19" (483 mm) wide). A wide choice of output voltage and current combinations is available including 7,5 V at 1 000 A to 1 500 V at 10 A models, and all units will operate in either constant voltage or constant current modes.

Programming methods include built-in RS232 and RS485, as well as optional LAN, GPIB and isolated analogue interfaces. Input voltages include 3-phase 208 Vac, or a 3-phase 400 or 480 Vac and have passive power factor correction. These high power systems address the requirements for applications in the OEM, industrial, aerospace and ATE markets including: semiconductor and automotive test, component test and burn-in and magnet supplies.

Enquiries: Tel: +27 (0) 11 454 8053 or email sales@vepac.co.za

Energy efficient solution for Yanfolila

Access to an OEM that can cover the full electrical scope of supply for mill applications is a major advantage and this is exactly what secured the Zest WEG Group the contract for the supply of an energy efficient solution to drive the mill at Yanfolila Gold Project in Mali.

Yanfolila Gold Project is being developed by Hummingbird Resources as a low cost, high grade open pit mining operation. Its first gold production is targeted for 2017.

Following close collaboration with the mill Original Equipment Manufacturer (OEM), **Zest WEG Group** provided an optimum solution which will meet the performance parameters of the milling circuit while ensuring cost efficient operation.

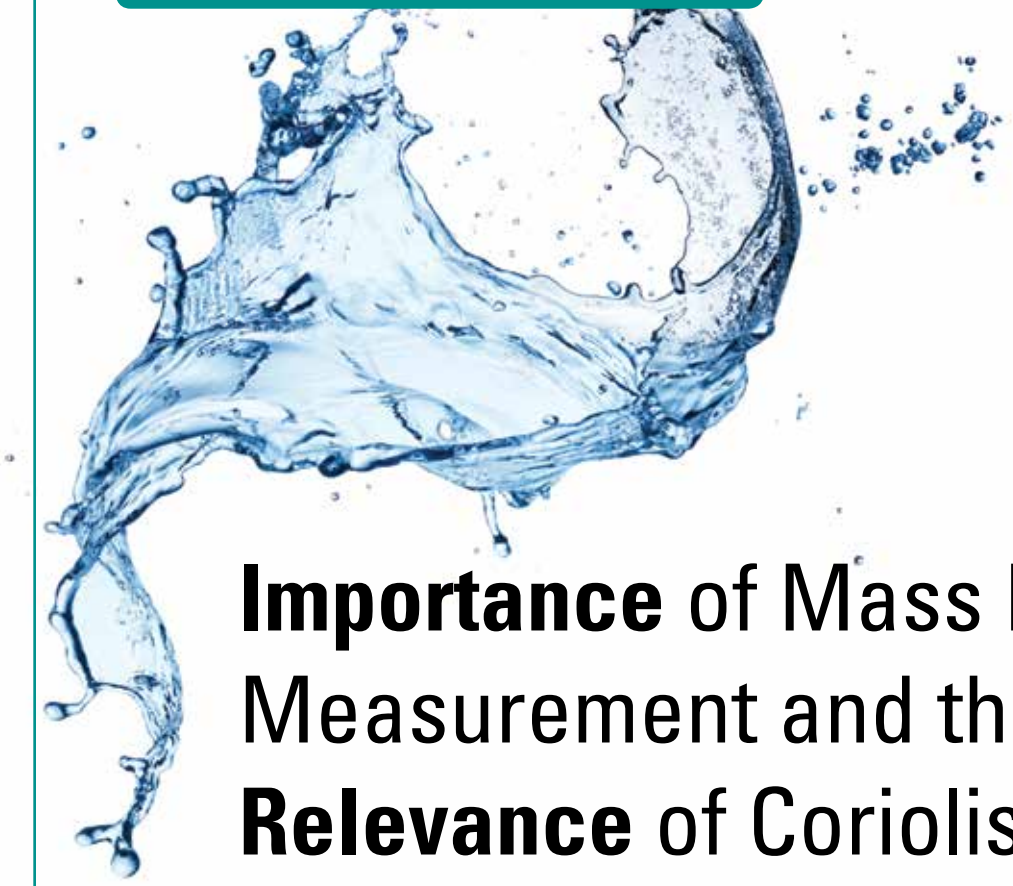
David Claassen, executive at Zest WEG Group, says that this is a good example of where the group is able to leverage not only its extensive expertise in electrical solutions for mill circuits, but its access to a comprehensive range of quality products.

Claassen says that Zest WEG Group is in the enviable position of being able to exercise absolute control over the packaged solution including shortening lead times and offering customers the flexibility in meeting exact application requirements.

The electrical solution for Yanfolila Gold Mine includes a 2 000 kW, 6 pole, 6,6 kV squirrel cage WEG electric motor, a medium voltage WEG Variable Speed Drive and a dry type phase shift transformer. The VSD and transformer will be housed in a custom engineered and manufactured substation. The substation will be manufactured and fully tested at Zest WEG Group's substation and panel facility in Johannesburg.

"Another very important advantage to the customer is that in dealing with a single OEM, the fully completed electrical solution will be shipped to site as a plug-and-play solution," Claassen says.

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



Importance of Mass Flow Measurement and the **Relevance** of Coriolis Technology

Ashley Buck, Bronkhorst UK

Why is Mass Flow Measurement important within process industries and what are the strengths of Coriolis Flow Meters and Controllers?

Measurement of the flow of a fluid, either liquid or gas, is commonly a critical parameter in many processes. In most operations this can be linked to the basic 'recipe' of the process – knowing that the right fluid is at the right place and the right time. Equally, it can be linked to asset management, keeping the fluid in motion or even simple tank balancing. Some applications, however, require the ability to conduct accurate flow measurements to such an extent that they influence product quality, health and safety, and ultimately can make the difference between making a profit or running at a loss. In other cases, the inaccurate measurement of flow, or even the failure to take such measurements, can cause serious or even disastrous results. With most liquid and gas flow measurement instruments, the flow rate is determined inferentially by measuring the fluid's velocity or the change in kinetic energy. Velocity depends on the pressure differential that is forcing the fluid through a pipe or conduit. Because the pipe's cross-sectional area is known and remains constant, the average velocity is an indication of the flow rate. The basic relationship for determining the liquid's flow rate in such cases is:

$$\mathbf{Q = V \times A}$$

where
Q = fluid flow through the pipe
V = average velocity of the flow
A = cross-sectional area of the pipe

Other factors that affect liquid flow rate include the liquid's viscosity and density, and the friction of the liquid in contact with the pipe. With the many variations of flowmeter technology available it can be very hard for an operator to make a decision on which technology is right for the application. Industry experts claim that a majority of flowmeters in the field are selected incorrectly. An important and perhaps overlooked question, is what the instrument is supposed to do versus what is it able to do? When selecting a flowmeter technological improvements can sometimes get overlooked through historical knowledge of what has been possible in the past – in a way, experience working against you.

Direct mass flow measurement is an important development across industry as it eliminates inaccuracies caused by the physical properties of the fluid, not least being the difference between mass and volumetric flow. Mass is not affected by changing temperature and pressure. This alone makes it an important method of fluid flow measurement. Volumetric flow remains valid, in terms of accuracy, provided that the process conditions and calibration reference conditions are adhered to. Volumetric measuring devices, such as variable area meters and turbine flow meters, are unable to distinguish temperature or pressure changes.

One method of Mass Flow measurement employs the phenomenon of Coriolis force. This force is a deflection of moving objects when they are viewed in a rotating reference frame. Coriolis force is proportional to the rotation rate and the centrifugal force is proportional to its square.

> *Measurement of the flow of a fluid, either liquid or gas, is commonly a critical parameter in many processes.*

This long understood principle is all around us in the physical world; the flow of water down the sink, the Earth's rotation and its effect on the weather. The principle, and mathematical formula developed back in the 1800s, was further developed during the 1970s and then applied to the measurement of fluid flow. The operating principle is basic but very effective. A tube, or tubes, with a known mass is energised by a fixed vibration. When a fluid passes through the tube(s) the mass will change, the tube(s) will twist and the inlet and outlet sections will result in a phase shift. This phase shift can be measured and a linear output derived proportional to flow. As this principle simply measures whatever is within the tube it can be directly applied to any fluid flowing through it, liquid or gas. Furthermore, in parallel with the phase shift in frequency between inlet and outlet it is also possible to measure the actual change in frequency. This change in frequency is in direct proportion to the density of the fluid – and a further signal output can be derived. Having measured both the mass flow rate and the density it is, interestingly, therefore possible to derive the volume flow rate.

The Coriolis principle, applied as a mass flow meter, therefore has its place within fluid measurement and control within the traditional Process Industry. Perhaps more importantly though, the additional features of the technology allow for an extension of the accuracy and precision into other, more non-traditional, applications.

Take, for example, filling and dosing applications across a great many industries and the replacement of both weighing scales and the gravimetric method. Traditionally, the dosage of mass/volume was achieved by using a shut-off valve with a weighing scale/balance. The weighing scale is located under a valve outlet nozzle and, after a zeroing procedure once the vessel being filled is in position, the valve will open. The weighing scale will send a signal to the PLC or control unit and, once the batch has been reached, the valve will close. Multiple dosing, building up a recipe, is achieved by moving the vessel to the next dosing point in line and repeating the process. The alternative solution of simultaneous mass flow dosing/filling significantly reduces the amount of time needed, and the loss of volatiles, whilst increasing productivity, quality and repeatability.

Another example of process improvement has been seen within the field of specialist chemicals. The customer was unaware that low to ultra-low flow control was possible with a Coriolis instrument resulting in the raw ingredient being mixed with water to create a carrier volume. This higher volume was then metered and dosed into the main product flow. The process added cost to the production method and, as the dilution step added variability to the concentration of the additive, product quality was often compromised with a resulting additional cost of re-work. Furthermore, the final process step saw the bulk material being heated and stirred to evaporate the added water to reduce volume and increase concentration. The energy requirement to do so was significant and the operational stock-holding was high. Further complications were added by the need for the 'dosing system' to handle multiple additive doses with stringent cleaning needed between batches resulting in yet more wastage and high additional cost. By understanding the extended capabilities of Coriolis instruments it was possible to establish that the concentrated raw ingredient could be added via a highly accurate low flow Coriolis Flow Meter directly coupled and controlling a precision pump. This solution ensured that the costly addition and removal of

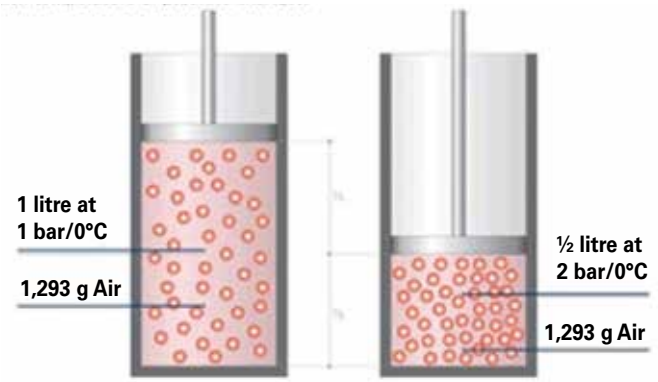


Figure 1: Difference of mass of gas by volume with changing conditions.

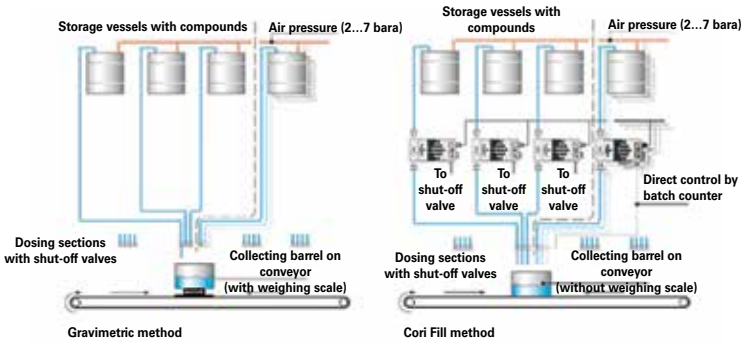


Figure 2: How Coriolis technology can help with process improvement.

the water could be eliminated and that very close tolerances on the dosage rate, and hence final product quality, could be maintained. The inclusion of multiple synchronous injection points eliminated the costly clean-down process and the reduction of working process volume also reduced the stock holding inventory further reducing operational costs. Re-producible product quality has been increased, productivity has been increased, wastage has been reduced, energy consumption has been reduced and operational costs have also been dramatically reduced.

Although currently configured for control via the client DCS the Coriolis flow meter can, if needed, be 'paired' with the main process line flow meter to act in master/slave mode. Standard on-board firmware can be utilised to immediately match the required dosage rate to any variability within the main flow line. This facility eliminates any time lag in process response and further enhances the very tight tolerances on product quality. A host of secondary benefits have also been utilised within the solution. The density of the concentrated natural raw ingredient is measured, recorded and trended thereby allowing tracking of the natural innate variability and further fine-tuning of the control process. The pump steering signal is utilised for condition monitoring and as a preventative maintenance tool. This, together with dry-running protection, will ensure less emergency break-down and catastrophic down-time.

A further example illustrating where Coriolis flow technology can benefit the customer has been seen with the dosing of performance chemicals within the Oil and Gas Industry. The traditional method of chemical injection, a piston pump with check valves on the inlet and outlet, is tried and tested and works well for quite long periods of time. However, on occasion the check valves can foul and begin to 'pass'. Also, out-gassing or entrained air can cause an air-lock within the piston chamber that is simply compressed/decompressed in situ rather than pumped. In each of these cases the pump appears to be still working but there is no actual transfer of chemical into the pipeline. The only way to verify actual flow has been via a graduated gauge and a stop-watch; an empirical measurement but time consuming.

Another issue with the traditional method of injection is actually changing the flow rate. This can only be done manually by changing the stroke length of the piston – a process that is 'trial and error' and only verifiable using the graduated gauge as above. Fine tuning of injection rates, for example to compensate for day/night changes in temperature across a field, is virtually impossible as the labour required to do so is prohibitive. This results in the injection rate being set for worst case thereby resulting in overdosing during normal conditions – a very expensive waste.

Conclusion

Modern communications networks now allow for technology to arrive at diffuse production fields. The Coriolis flow system can be installed at each injection point and real-time monitoring, control and logging of injection rates can be achieved. This allows for remote checking of flow rates, remote instantaneous re-setting of those flow rates, on-board auto-alarm for status checking (for example, empty tank alarm and pump protection shut down), density change alarm, single point totalisation, multi-point (total field) totalisation for cost per barrel calculations and pump steering signal monitoring as a guide to preventative maintenance. In short, a very powerful tool within field management. With these applications it can be seen that Coriolis Flow Technology can be a benefit to the user especially when the extended product capabilities are employed. Process improvement, cost reduction, real-time measurement and greater accuracy can all be achieved.

Acknowledgement

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take note

- Inaccurate measurement of flow, or the failure to measure flow, could have serious and disastrous results.
- One method of mass flow measurement employs the phenomenon of Coriolis force.
- Coriolis flow technology can benefit the user especially when the extended product capabilities are employed.

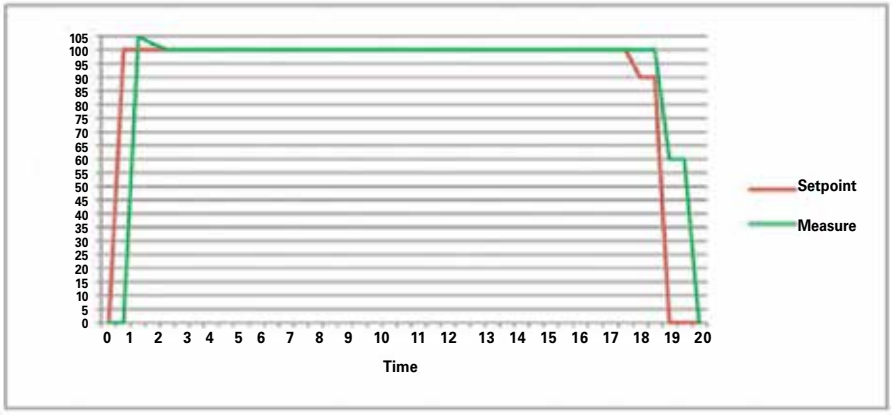


Figure 3: Flow Rate profile of the meter for the example application.

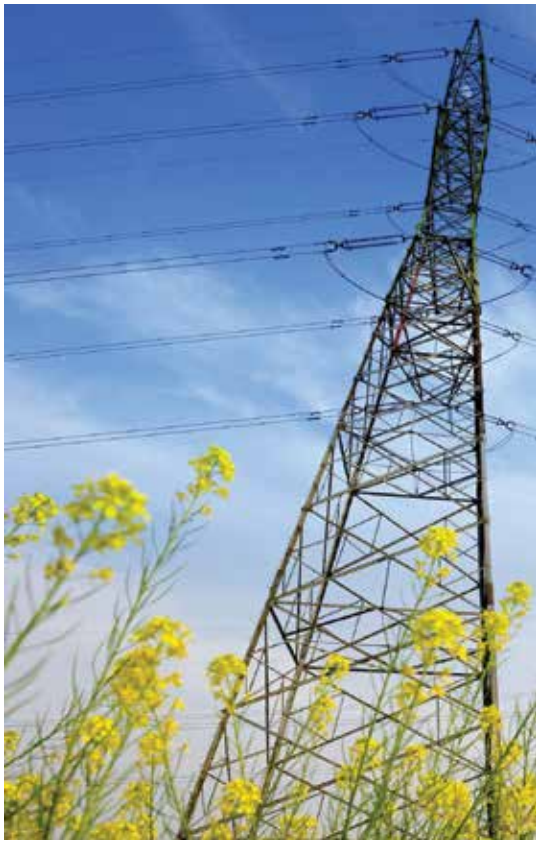
Ashley Buck has been in the process industry for many years, and has experience in working with all types of instrumentation. He started as internal sales engineer at Bronkhorst. He later moved to product management in 2013.
Enquiries: Mecosa. Email measure@mecosa.co.za

Reinventing to create value

Yokogawa's Africa User's Conference 2016 took place at the end of October with resounding success expressed by both delegates attending the event and exhibitors participating in the Automation Exhibition. Over 160 people took part in the 3 day event from 19 to 21 October at The Fairway Hotel, Spa and golf resort, Kersi Aspar, Vice President and Head of Global Sales Centre from Yokogawa Electric Corporation in Tokyo, Japan, reflected on Yokogawa's glorious past, highlighting the many 'World First' technologies by the company in order to contribute to society and industry in general. These included the Optical Spectrum Analyser, the eight channel Digital Oscilloscope, the Digital Power Meter, the Digital Transmitter with Silicon Resonant Sensor Technology, the Vortex Flowmeter and the CENTUM Distributed Control System with 99,99999% availability. He hinted at how these technologies will be developed further to offer our customers more advanced solutions in future.

Enquiries: Email Christie.Cronje@za.yokogawa.com

Delegates at the event. From left: Wenzile Dube, Eskom, Reggy Mali, Eskom, Andrew Bharath, Systems Sales Engineer Yokogawa South Africa, Bongani Magwaza, Eskom, Anthony Tukker, Front Sales Engineer Yokogawa South Africa, Erens Phokane, Eskom.



Preserving your Standby Generator Investment

Dave Warren, Master Power Technologies

Take good care of your generator … and it will probably be with you for the next 20 years.

When faced with the potential losses involved in load shedding or general electricity outages because of poorly maintained infrastructure, many businesses in South Africa have made the investment in their own power management solutions. Central to these solutions is the diesel generator which stands ready to kick in when the power dies.

Purchasing a generator is not a simple or an inexpensive decision and businesses need to be sure they obtain value from their investment by being able to continue operations when the power utility fails. The problem with purchasing a generator is that it is a grudge purchase and the temptation is to keep costs to a minimum.

The ideal is that your generator will sit quietly until a blackout or a brown-out occurs, when it will start up and supply power without a glitch. But how often do we hear of generators that did not start when needed?

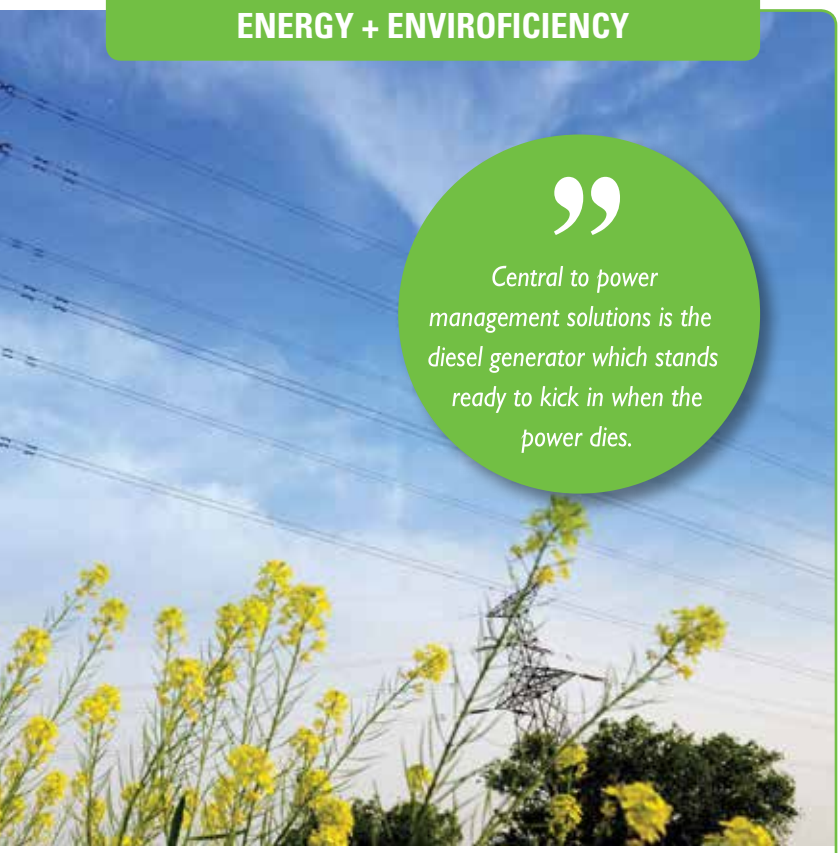
The reasons for this failure are generally due to economics.

- In the **first** instance, people try to cut costs by saving on the initial generator purchase price. Putting it bluntly, this means they are prepared to sacrifice quality and reliability to save a few rand
- **Secondly**, failures are more often caused by a lack of maintenance. Like any mechanical and electronic devices, generators need regular maintenance (or servicing) to ensure they function optimally for a long time. Skimping on this maintenance will reduce the lifespan of the generator, which reduces the return on investment attainable

A generator investment should deliver at least a 20-year return on investment if the system is cared for properly. These are a few tips to ensure your generator stands the test of time:

- **Batteries:** Lead acid, lead calcium (maintenance free) and alternatives should be tested regularly to ensure they can handle the switch-over load when required
- **Fuel storage:** Diesel fuel must be of the best commercial quality available, low sulphur fuel of less than 50 ppm is the standard. Nonetheless, when diesel is delivered, it always contains suspended water and catalytic fines. These contaminants descend to the bottom of a fuel storage tank over approximately seven days. Any movement of fuel in the tank will re-agitate the fuel and elevate the contaminants. It is good practice to install 'fuel polishing' systems to filter and centrifuge these contaminants out before the fuel gets to the engine and its filters
- **Oil levels:** Operators of standby generators often forget to check lube oil levels. Note that lube oil, as approved by the engine manufacturer, has to be used
- **Fuel levels:** Many 'fail to start' call outs are due to low fuel levels. Make sure you have enough fuel to keep the engines running. If necessary, install an automated system to alert you when the diesel hits a critical level
- **Coolant:** No diesel engines should be run with water in the radiator. The engine manufacturer recommends coolants and additives, and these should be strictly adhered to
- **Weekly exerciser:** A timer can be installed which will start, run and stop the generator on a simulated mains failure operation. There are two options organisations can choose from:
  * Run off load and maintain the utility supply
  * The change-over system can be controlled to throw the demand onto the generator set

  The latter is preferred as it tests the integrity of the whole system
- **Maintenance contracts:** Several competent employees should be aware of the scheduled maintenance requirements of their generators and the supplier must train these people to the standards required. This would normally cater for up to three months of weekly inspections based on a pre-prepared maintenance check list
- In addition, a quarterly maintenance contract is recommended from the generator supplier's service division. Staff training can be re-enforced at this stage and all necessary fluid and filter changes can be undertaken as per the manufacturer's recommendations
- **Emergency call outs:** Most failures of diesel generator sets happen when a widespread utility power failure has occurred. Needless to say your pleas for help will be sent to the back of the line if you don't have any form of service contract with the generator supplier. With a bi-annual or quarterly service contract,



> *Central to power management solutions is the diesel generator which stands ready to kick in when the power dies.*

you could expect preferential treatment. For mission critical applications, you could take out an 'Emergency Call Out' sub-contract to guarantee low response times on a 24/365 basis

Conclusion

These are just a few tips worth considering to ensure your generator is geared to deliver optimal service over the long term. Caring for your generator need not be expensive, but it can extend its useful life and ensure its 'best before date' is more than 20 years down the road.

take note

- Purchasing a generator is often a grudge purchase and the temptation is to keep costs to a minimum.
- Caring for your generator need not be expensive.
- A generator investment should deliver at least a 20-year return on investment.

Dave Warren was a student apprentice and a technical staff trainee with the Central Electricity Generating Board in England. With more than 50 years' experience, Dave Warren (IEng MIIE) has covered all means and facets of power production. Since 1974, Dave's experience and skills have been at the disposal of Sub Saharan Africa customers. Basic standby solutions up to multi-set 120 MW power stations have been the order of the day. Energy sources have covered diesel fuel, methane gas, landfill gas, water, solar and wind.
Enquiries: Tel +27 (0) 11 792 7230 or email dave@kva.co.za

Launch of new global GRI Sustainability Reporting Standards

GRI has launched, in South Africa, its new GRI Sustainability Reporting Standards. South Africa is just the third country to hold an event launching the new standards, following events in the United States and Brazil. The launch took place at the Aurecon Centre in Tshwane.

GRI is an international, independent, standards organisation based in the Netherlands. "The GRI Sustainability Reporting Standards give companies a common language for disclosing non-financial information with the goal of enhancing corporate transparency worldwide. The Standards represent the global best practice for sustainability reporting," says Bastian Buck, Director Standards, GRI.

The new Standards, replacing the GRI G4 Guidelines, are a set of 36 modular standards that facilitate corporate reporting on topics such as greenhouse gas emissions, energy and water use, and labour practices. The new format allows GRI to update individual topics based on market and sustainability needs, without requiring revisions to the entire set of GRI Standards.

Sonja De Klerk, **Aurecon**'s Head of Quality, Environment and Sustainability, said: "Sustainability reporting encourages companies to be more transparent, in an age when organisations are no longer evaluated solely on the money they generate for shareholders, but the shared value they create for communities and the way in which they tackle issues such as environmental protection."

Enquiries: Email Jeff.Isaacson@aurecongroup.com

Bastian Buck, Director Standards, GRI.

Sonja De Klerk, Head of Quality, Environment and Sustainability, Aurecon.

Low-Technology Innovation competition

Thursday 10 November 2016 was the final of the Low-Technology Innovation competition held in Midrand. The students, in teams of up to three members per team – were challenged to create a low-tech environmentally friendly innovation using natural, recycled, used or new components to provide a lighting solution.

The Low-Technology Innovation competition was held in partnership with the **Schneider Electric Foundation** and Nomade des Mers Expedition. The **French Ministry of Education** initiated the partnership between France, the **Vaal University of Technology (VUT)** and Schneider Electric.

Launched by the Low-Tech Lab, the Nomade des Mers expedition is a three-year sailing expedition around the world to promote, test and prototype low-technologies, as well as to develop the international low-tech stakeholder and user community. Low-technologies, also known as appropriate or frugal technologies, are simple DIY systems that meet basic needs such as access to water, energy and food.

The crew of Nomade des Mers is therefore experimenting with self-sustainability on a boat thanks to those systems. At each stopover the crew organises workshops and conferences to share knowledge about technologies. Each discovered system is then tested on the boat and documented in order to share it online on the Low-Tech Lab website. The final goal is to create a global database of low-tech systems as well as a global community of designers, engineers and handymen to work collaboratively on the improvement of existing systems or to solve issues raised by partner NGOs.

The winner of the €500 prize was the Flip Lamp by Team Owl-eye tech (F'SASEC, VUT). This light works as you turn it vertically. Each time you turn it, it lights up for 18 seconds and it is powered by pressure, wooden piston in the pipe. No electricity was used. The material used comprises a two litre plastic bottle, a plastic pipe, wire, wood and a LED light.

Enquiries: Thabang Senona. Email thabang@moshatemedia.co.za

The winning team: Clayton Maartens, Luvo Dubula, and Lafras Magabe with their Fliplamp.

Louis-Marie de Certaines, Hugo Daniel and Elina Reynaud (Nomade des Mers Expedition) with Professor Alexandre Sebastiani, representative of the French Ministry of Education, Higher Education and Research and director of the F'SASEC (French South African Schneider Electric Education Centre).

Times tough for the consulting engineering industry

The **Consulting Engineers South Africa (CESA)** Bi-annual Economic and Capacity Survey for the period January to June 2016, just released indicates that times remain tough. Confidence levels amongst firms have deteriorated over the last few years, alongside modest increases in fee earnings. The outlook for gross fixed investment has deteriorated and expected to fall behind GDP growth in the next three years. Over 537 firms employing just over 24 315 staff, who collectively earn a total fee income of R2 billion per annum, are members of CESA.

Three key factors continue to influence the global outlook – these are the gradual slowdown and rebalancing of the Chinese economy; lower prices for energy and other commodities; and the gradual tightening of US monetary policy.

The South African economy has faced several headwinds in 2016, some of which were expected, while others were not. Global factors play a much bigger role than may be suggested, with the sluggish global economy offering little relief in the demand for South African goods and services which has waned considerably over the last two to three years. Contractors have for some time reported on the slow pace by which contracts are awarded, as well as the slow roll out of government projects.This creates disconnect between opinions expressed by engineers and contractors, where projects are in planning stages, supporting earnings in the consulting engineering industry, but implementation is slow.

With industry confidence levels well below average, there are many challenges to overcome. Regulation issues, including the procurement of consulting engineering services, remain one of the biggest challenges faced by the industry. Unrealistic tendering fees remain a concern for members, while the extended time it takes in which to finalise a proposal is affecting profitability in the industry. The quality of technical personnel is argued by some firms to have deteriorated, putting greater risk on the built environment sector. Skills shortage is regarded as one the most significant institutional challenges faced by the private and the public sector. The involvement of non-CESA members in government tenders and procurement continues to threaten the standard and performance of the industry. Firms from across South African borders are tendering at rates that are not competitive for local firms.

Unlocking greater private sector participation is seen as a critical element to fast track delivery, service delivery, especially at municipal level remains a critical burning issue, fraud and corruption is affecting the ethos of our society, with a lot of talk and little action accompanying the growing evidence of corruption.

Enquiries: Dennis Ndaba. Tel. +27 (0) 11 463 2022 or email dennis@cesa.co.za

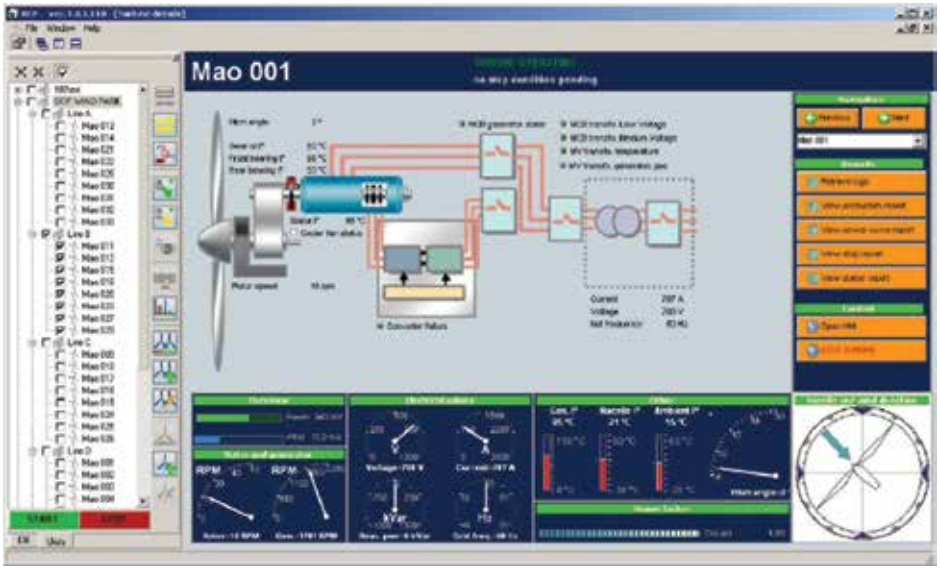
CESA CEO, Chris Campbell.

Reliable electric power generation

Vert Energy has positioned itself at the forefront of the energy sector in Southern Africa. The company offers solutions for traditional petrol and diesel power generation and also has a range of products for renewable energy sources, such as hydro, wind, natural gas and solar.

"This range of premium branded products, which ensures reliable electric power generation solutions, is enhanced by a technical advisory and support service, to ensure there is no interruption in power supply, as a result of load shedding or mains failure," says Vert Energy's managing director, Grant Robertson. "The company's focus on renewable energy sources to produce 'green' energy as a reliable source of electricity, encompasses sustainable solutions for wind power, hydroelectricity, photovoltaic (solar) and natural gas energy production.

"Vert Energy's extensive range of power generation components for the production of wind power caters primarily to domestic and light commercial applications using the NSM range of low voltage permanent magnet generators (PMG), to full scale power plant production for independent power producers and utilities, incorporating low, medium and high voltage Leroy Somer alternators and DEIF generator controls for wind applications."



Leroy Somer alternators – which are available exclusively throughout Sub Saharan Africa from Vert Energy – are known in the wind power generation sector for high electrical efficiency, reliability and strict compliance with environmental constraints. (Leroy-Somer is ISO 14001 and ISO 9001 certified).

Enquiries: Ryan Robertson. Tel. +27 (0) 11 453 9669 or email ryan.robertson@vertgroup.co.za

20 Years – think global, deliver local

A-Gas South Africa celebrates its 20th anniversary this year. A-Gas South Africa has played a role in ensuring that the local HVACR industry meets the requirements within the regulatory framework established under the Montreal Protocol, which is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances responsible for ozone depletion, Managing Director, Johnny Scott, explains. "Through the wider A-Gas network, we see ourselves as being able to think globally and deliver locally. Our global knowledge and reach, combined with significant investment in bulk storage, equipment and cylinders, ensures we can deliver the latest technologies and products," Scott comments. The growing trend for environment-friendly products has resulted in A-Gas South Africa actively promoting 'cradle-to-grave' product stewardship. "We have a unique environmental service offering," Scott says. A-Gas South Africa has established long-standing relationships with key suppliers and customers over the past 20 years. Metraclark has played an integral part in the A-Gas journey since inception. Another key company associated with A-Gas South Africa is RB & Son Transport Group.

A-Gas South Africa's Managing Director, Johnny Scott.

Enquiries: Tel. +27 (0) 11 392 4791 or visit www.agas.com

Fast electrical circuit lockout

With the new TAGLOCK **Brady**'s unique TAGLOCK lockout solution enables operators, mechanical engineers, maintenance and safety personnel to quickly and easily lock out electrical circuits in order to prevent accidental engagement while maintenance is ongoing. With TAGLOCK, the risk of electrocution and other accidents related to re-energising can be reduced. TAGLOCK blocks circuit breakers in the off-position to prevent accidental re-engagement while maintenance is ongoing. By securing circuit breakers in the off-position during maintenance, the risk of electrocution and other, re-energising related, accidents with potentially severe consequences can be reduced. Up to four workers can use the circuit breaker lockout device simultaneously, each with their personal, colour-coded cable tie. When their part of the job is complete, each worker can remove his personal tie and tag. When maintenance is done, the last worker also removes the circuit breaker lockout device to allow circuit breaker re-engagement. TAGLOCK can be installed quickly and easily. Apply the circuit breaker lockout device, run a cable tie through its hole and add a tag. The TAGLOCK lockout devices are small enough to be applied on most circuit breakers that are positioned next to each other. Run a nylon cable tie through the holes of the applied circuit breaker lockout devices to block all circuit breakers involved in the off-position. A padlock can be attached for extra security when needed.

Enquiries: Tel. +27 (0) 11 704 3295 email Brady at emea_request@bradycorp.com

Global OEM awards contract for large condenser

Successful completion of challenging electrical rotating machinery refurbishment projects has long been the hallmark of **Marthinusen & Coutts**, a division of ACTOM. And it is this reputation that secured Marthinusen & Coutts the contract to complete the reassembly and recommissioning of a very large synchronous condenser in the Democratic Republic of Congo (DRC).

The repair contract was awarded to Marthinusen & Coutts early last year by an international electricity equipment company currently engaged in an upgrade project on the hydroelectric power supply system for the DRC's power utility, Société nationale d'électricité (SNEL).

Richard Botton, divisional chief executive at Marthinusen & Coutts, says that most significant about this order is the fact that it was placed on Marthinusen & Coutts by an international OEM who is a global leader in electrical engineering.

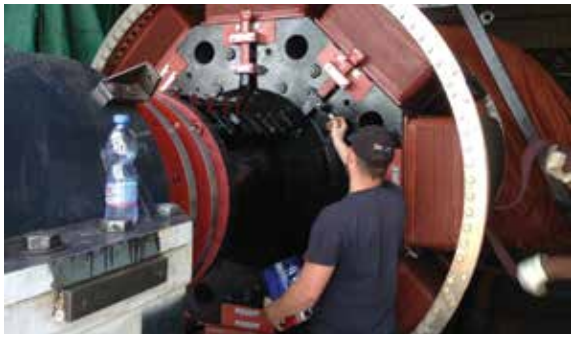
Botton says that Marthinusen & Coutts had previously repaired two of the Kolwezi power station condensers in earlier contracts a few years ago. "Part of the repair work on the third condenser had been done when the international company commissioned us to complete the job; this based on our experience and our successful complete refurbishment of the other two condensers," he says.

The synchronous condensers are critical components of the dc/ac converter station in Kolwezi in the DRC, which converts the dc power transmitted on a 1 700 km transmission line from a converter at the Inga hydroelectric power station on the Congo River in the north. The power from the Kolwezi converter feeds the energy intensive Copperbelt in the Katanga Province.

The synchronous condensers supply the necessary reactive power, which cannot be transmitted via the dc transmission line or provided by the converter station. The inertia of the rotating assembly of the condenser provides the necessary energy to stabilise the power system in the region, which aids the overall stability of the grid.

The repair work undertaken on the 90 ton rotor of the 70 MVA condenser involved conducting a thorough inspection of the rotor forging and bare rotor by Marthinusen & Coutts' on-site repair team. This was followed by the refurbishment of the bearings, and testing and fitting new salient poles that had been manufactured earlier by the international company to replace the original salient poles. This aforementioned company had also earlier rewound the stator as part of its portion of the repair work on the condenser.

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



SABS adopts IEC 61511

The **South African Bureau of Standards (SABS)** has officially adopted IEC 61511 Functional safety – safety instrumented systems for the process industry sector (as SANS 61511). This further entrenches IEC Functional Safety Standards as best engineering practices in South Africa for the application of Safety Instrumented Systems in hazardous processes, and is a big step for the determination of required safety integrity levels in such processes. This now becomes the applicable standard for protection instrumented systems across such process industries as petrochemical refining and storage; biofuels; chemical; pharmaceutical; power generation; pulp and paper; and bulk fuels storage.

For exida South Africa, this is the formalising of a standard that has underpinned the company's core business focus since its inception in 2004. The company sits on the SABS mirror committee at which the standard was adopted. "Fundamentally this standard is about defining safety targets of a plant through risk analysis, and then designing Safety Instrumented Functions to meet those targets," explains Owen Tavener-Smith, Managing Director, **exida South Africa**. If the initial risk analysis is poorly executed, incorrect safety targets are defined, which ultimately results in a flawed, inherently unsafe plant design and major cost wastage. "Risk analysis needed to determine safety targets is a complex specialisation and requires a lot of skill, but the consequences of getting it wrong can be catastrophic."

"Our last three projects all entailed correcting dangerously inaccurate process safety targets that were derived from poor-quality risk analyses," he continues.

This is why the adoption of IEC 61511 is a landmark moment for South Africa's process industries, as it will compel companies to implement optimum levels of functional safety systems in their process designs.

Enquiries: Owen Tavener-Smith. Tel. +27 (0) 31 267 1564 or email owen.tavener-smith@exida.com

New range sub meters

WoodBeam has introduced the ULYS range of energy management sub-meters - ideal for industrial and commercial consumers. Four quadrant meters for single or three phase applications. Various versions run either from a CT or a direct connection (up to 80 A) and provide a dual tariff energy index and energy rebilling function. These great little meters can integrate with a building management system (BMS) using the existing communication interface be it either Modbus or Ethernet. With the software available it is simple to collect the data via an automatic remote data-retrieval unit and control energy consumption.

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

Bizz Buzz

You could be paying too much for electricity

Many South African businesses are paying too much for electricity as a result of incorrect billing. This according to Mila Loubser, Head of Energy Reporting at **Energy Partners**, who says that businesses that have reduced their electricity consumption, could qualify for substantial tariff reductions with their local municipality. Loubser comments that businesses should not assume that their tariffs will automatically be lowered once they have reigned in their energy consumption. "Municipalities often do not detect that a business has reduced its energy footprint, either because they are using old equipment such as mechanical meters, or they have a billing platform with little flexibility to accommodate changes in the tariffs," she says.

Enquiries: Tel. +27 (0) 21 941 5140 or +27 (0) 11 974 3899

Delta OHM joins GHM Messtechnique

Specialist environmental measuring technology company, **Delta OHM**, recently joined the **GHM Messtechnik grou**p of companies, enabling the latter to expand their technology and product offering to include the niche environmental measuring sector. Italian-based Delta OHM supplies environmental measuring technology solutions for applications across all industrial sectors. These solutions are specifically designed to meet the needs of niche requirements such as complete weather stations and individual measuring devices for the detection and evaluation of temperature, humidity, pressure, light, air speed, CO_2, acoustics, vibration, data loggers WBGT microclimate and water analysis.

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

Progress in fight against electricity and cable theft

Eskom, through the Operation Khanyisa campaign, is making progress in the fight against electricity and cable theft. For the six months period to 30 September 2016, efforts resulted in 50 arrests of electricity theft suspects and the opening of 26 cases on the court roll. Furthermore, Eskom Security Investigations made 144 arrests, and goods to the value of R29 M were recovered during the period. In South Africa, electricity theft remains one of the most serious but under-reported crimes, in spite of its consequences, including deaths that result from dangerous illegal connections. Eskom urges everyone to keep on reporting anonymously to Crime Line on 32211.

Enquiries: Eskom Media Desk. Tel: +27 (0) 11 800 3304/3343 or email: mediadesk@eskom.co.za

Oompah fun had by all

Endress+Hauser has two companies based in South Africa, the original referred to within the group as a Sales Centre (SC) and the Temperature Factory, Pyrotemp, as a Product Centre (PC). Pyrotemp's roots originate from Product Centre (PC) Wetzer, the temperature product centre in Bavaria, Germany. Pyrotemp South Africa holds an annual Oktoberfest to allow its customers join in the celebrations of its Bavarian heritage. This year it was held on 6 October. Customers had the opportunity to visit the Product Centre in Benoni, South Africa, and enjoy an eventful day filled with a variety of Bavarian foods, drinks and a live oompah band.

Enquiries: Su-Anne Willemse. Tel. +27 (0) 11 262 8080 or email suanne.willemse@za.endress.com

Endress + Hauser's Suanne Willemse, Kgomotso Makhobela, Rob MacKenzie and Cezanne Gonsior.

Ivan De Waal, Cezanne Gonsior, Glen Cook, Hennie Blignaut, Jacques Fouche and Dave Robinson.

Phoenix Contact 'flying high'

Phoenix Contact's new facilities at the Randburg offices were officially opened at a function on 2 November 2016. Carsten Tonk, Head of Corporate Sales Network Export Europe, Maghreb and West Africa gave Peter Mauff, General Manager at Phoenix Contact South Africa a gift at the opening. The event had an airline theme.

Enquiries: Sheree Brits. Tel. +27 (0) 11 801 8200

Dereck Styane; Carsten Tonk and Peter Mauff piloting Phoenix Contact to new heights.

2016SAEEC – 'Keen on Green'

The theme of 2016SAEEC was 'Keen on Green' ... and so successful was the convention, that participants were pretty much 'Keen on Everything'! Held over two days, 8 and 9 November, at Emperors Palace, 2016SAEEC comprised an excellent line-up of speakers, and a buzzing exhibition ... we left with much food for thought and a positive outlook for 2017!

NERSA:
Elizabeth Taylor.

Technopol SA: *Zahn Reynders, Hardus van der Westhuizen and Susy Martins.*

Energy Training Foundation: *Tina Maile (Maile Solutions) and Yolanda de Lange.*

EWSETA: *Khaya Gqamane, Khetsiwe Dlamini and Tsholofelo Mokotedi.*

Spirax Sarco:
Andre van Niekerk.

Veritek:
Lee-Anne Lewis and Izak Potgieter.

Solsquare:
David Suping.

African Instruments:
Richard Steyn and Justin Clarkson.

GridCars*:*
Winstone Jordaan.

ABB

Timo Ihamuotila, Chief Financial Officer
Photograph courtesy Aki Rask, Akifoto

SMC Pneumatics

Kristly McCarthy recently joined SMC Pneumatics as Marketing Coordinator

Arup

Deon Gerber has been appointed as leader, Arup Energy Business in South Africa

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DIARY MUSTS

Africa Energy Indaba
21 – 22 February 2017
Sandton Convention Centre, Johannesburg
The Africa Energy Indaba will host the Sustainable Energy for All Initiative (SE4ALL) countries that will be showcasing their High Priority Renewable Energy Project Opportunities, identified at country level as the 'High Priority Projects' to provide energy to the respective country. The actual project owners (country government representatives) will be providing the full Investor Prospectus at the Africa Energy Indaba and showcasing the High Priority Project Opportunities to the private sector to consider for investment.
Enquiries:
Email liz@energyindaba.co.za

Power & Electricity World Africa 2017
28 – 29 March 2017
Sandton Convention Centre, Johannesburg
Incorporates 'The Solar Show Africa' (meet with the right customers in the solar industry), 'The Water Show' (discover the latest services and innovation) and 'Energy Efficiency World' (bringing together buyers from across the energy spectrum).
Enquiries:
Email Courtney.Harty@terrapinn.com

*** CALL FOR PAPERS ***
POWER-GEN & DistribuTECH Africa 2017
18 - 20 July 2017
Sandton Convention Centre, Johannesburg
Sustainable power generation and distribution in a constrained market is a top of mind issue across Africa. Seeking to share knowledge and catalyse development that helps address Africa's power challenges, PennWell Corporation, the organisers of POWER-GEN & DistribuTECH Africa, have issued a Call for Papers. The abstract submission deadline is 5 January 2017.
Enquiries: Leigh Angelo.
Email leigh@tradeprojects.co.za

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