

Partnering with industry to **Drive** the **Fourth Revolution**

ELECTRICITY + CONTROL

FEATURES:

- Analytical instrumentation
- Control systems + automation
- Drives, motors + switchgear
- Sensors, switches + transducers
- Standby + back-up



**COUNTAPULSE
CONTROLS**

Four automation milestones ...

Integrates HMI in Visual Studio®: TwinCAT HMI



Simple, open HTML5-based: TwinCAT HMI for Visual Studio®

... expecting you ...



Simple and standardised cloud communication

... at the Ticketpro Dome, Booth D22 ...



XTS. eXtended Transport System: Drive Technology – Rethought

... on 6 – 8 June.



One Cable Automation: Reduce costs and installation effort

www.beckhoff.co.za

This year, Beckhoff will exhibit numerous innovations at Africa Automation Fair in all technology areas. As an expert in One Cable Automation, Beckhoff shows how users can reduce installation and material costs significantly: for example, with the new EtherCAT P technology for the field level. Another highlight: the integrated in Visual Studio®, TwinCAT HMI: in just a few steps without programming, a platform independent user interface can be created. It also adds new TwinCAT modules for Industrie 4.0- and IoT-projects.

We look forward to seeing you at the Ticketpro Dome, Booth D22!



Beckhoff Automation (Pty) Ltd
Randburg 2194, South Africa
Phone: +27 (0)11 795 2898
info@beckhoff.co.za

New Automation Technology **BECKHOFF**

With all the dust blowing about, I have to pause to reflect that this country is made up of the most remarkable people. One meets them everyday. There is inspiration in so many, as well as in so many of the companies in our industry; our corporate leaders, thought leaders and regular folk.

Yet there is growing frustration – possibly borne of the sense that individuals in positions of power do not truly appreciate the consequences of their actions. It is inconceivable that this observation has any merit at all as it is not possible that the consequences are not imminently predictable.

Let's be honest about this year – nothing has come as a surprise and nor should it have. All actions, reactions and consequences could have been foreseen – which suggests that some or other law of physics could well emerge from what we have witnessed.

Whereas I become indignant when anyone else, who does not understand, dares to judge us, the truth of the matter is that the consequences are real, and they are significant. They may in all probability also force us to snuggle up to others who may be able to provide finance. The cynic wants to suggest that this may have been an anticipated, and even desirable, consequence.

South Africa has been rated 'Junk' by some ratings' agencies; as have our state owned companies, our banks, and other entities. The impact that this has on cash flow, and on borrowing, has been shrouded in mist and confusion – the relevance of which is only beginning to dawn. If you think that this affects your business and your lifestyle – imagine being less fortunate, and dependent upon the state for support. These are the areas where the impact will be most felt.

Is all of this new? Have we not been here before? Is this the worst that any of us can recall? Fact is, things are way better than they were two decades ago.

In a technical magazine like this, one topic that should be avoided is politics. The trouble is that politicians can certainly interfere in business operations. In many cases that is great – and policies are put in place to really see that change and development occur. That is to be commended.

While many people moan because they feel they will be affected, I am finding it exceedingly difficult to come to terms with some of the issues that have emerged in the public domain.

Our 'Junk' status, the slowing economy – where the grant payment system almost terminated due to inaction – will have a significantly negative impact on the poorest of the poor.

Go back in time ... in the late 1990s our prime rate was more than twice what it is now and we were labelled the dreaded 'Junk'. It is only in this century that we were able to make our way out of that territory.

Unfortunately, we are back there again, but ... we have seen this movie before.

Get out the popcorn, and let's positively influence the storyline!

Ian

Ian Jandrell

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



Editor: Wendy Izgorsek

Design & Layout: Adél JvR Bothma

Advertising Managers:
Helen Couvaras and Heidi Jandrell

Circulation: Karen Smith

Publisher: Karen Grant

Deputy Publisher: Wilhelm du Plessis

Editorial Technical Director: Ian Jandrell

Quarter 4 (October - December 2016)

Total print circulation: 4 739



Published monthly by: Crown Publications cc

Cnr Theunis and Sovereign Sts, Bedford Gardens

PO Box 140, Bedfordview 2008

Tel. +27 (0) 11 622 4770

Fax: +27 (0) 11 615 6108

e-mail: ec@crown.co.za

admin@crown.co.za

Website: www.crown.co.za

Printed by: Tandym Print

Electricity+Control is supported by:



The views expressed in this publication are not necessarily those of the publisher, the editor, SAAEs, SAE, CESA, IESSA or the Copper Development Association Africa



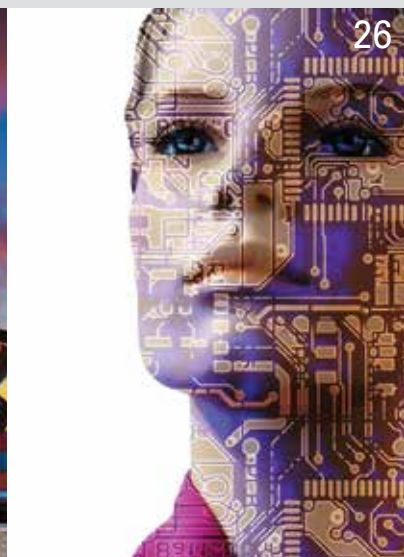
4



10



16



26

Analytical instrumentation

- 4 Intelligence and Cost Efficiency = Smart Transmitters *Jens Baar, WIKA*
- 6 Round UP

Control systems + automation

- 10 Performance Leap for Embedded PCs *Andreas Thome, Beckhoff Automation*
- 12 Round UP

Drives, motors + switchgear

- 16 Driven by Drives: Energy Efficiency for a Better Tomorrow *Anna Hildebrand Jensen, Danfoss*
- 20 Total South African Drive Solution for Kazakhstan Gold Mine *Rudi Swanepoel, SEW EURODRIVE South Africa*
- 21 Round UP

Sensors switches + transducers

- 26 Sensors Play Key Role in Pushing Industry into Fourth Age *Gerry Bryant, Countapulse Controls*
- 28 Round UP

Standby + back-up

- 32 In Conversation ... Case for Diesel and Gas Engines *Crown Publications Editor, Peter Middleton, talks to Kenny Gaynor, Director of Power Generation at Cummins Southern Africa*
- 36 How Battery Technology is Redefining the Future of Energy Supply *Ken Boyce, UL LLC*
- 38 Round UP

www.electricityandcontrolmagazine.co.za



Cover

The Hengstler Acuro X65, available from the official southern African distributor, **Countapulse Controls**, is billed as the explosion proof absolute encoder that will fit where other encoders won't. *Read more on page 31.*

Regulars

- 1 Comment
- 31 Cover article
- 39 Light+Current
- 39 CESA News
- 41 Bizz Buzz
- 43 Social Engineers
- 44 Clipboard



Visit our innovative online technical resource for the engineering industry.
www.eandcspoton.co.za

HIGH RELIABILITY, REAL-TIME, MOTOR MONITORING, PROTECTION & CONTROL

NEW

LSis Metasol New IMP – Intelligent Motor Protection Relay

The Metasol Intelligent Motor Protection Relay is a digital device with on-board MCU (Microprocessor Control Unit) which guarantees high reliability with real-time data processing and high precision.

The optimal solution for protecting and monitoring your motor, in complex industrial fields for high safety and productivity. The unit comes with a detachable display for remote fitment with password protection.

FEATURES

- Wide and accurate electronically controlled current setting with option of internal or external CTs
- RS485 Modbus or 4-20mA communication
- Inverse and or definite time mode protection
- Ground fault protection
- Fault storage for easy check-up
- Applicable to inverter circuits 20-200Hz frequency
- Manual, automatic and electric reset functions for customer convenience
- 3-Phase digital ammeter



Metasol

Contact one of our branches for more information.

Cape Town 021 531 2033

Durban 031 573 9200

Johannesburg 011 314 0620

info@voltex.co.za

www.voltex.co.za

voltex

LS IS

 facebook.com/VoltexSA

 twitter.com/voltexsa

 SAFE HOUSE
Suppliers you can trust

 Proudly Bidvest

Intelligence and Cost Efficiency = Smart Transmitters

Jens Baar, WIKA

'Smart transmitters' are in a class of their own. With them, the use of the 4-20 mA output signal in process control can be exploited to the maximum. Alongside their intelligence, this new generation of instruments has the advantage of lean handling. This pays off.

Many industrial companies have established powerful Process Control Systems (PCSs) to direct their complex processes. The PCS collects the data from hundreds upon hundreds of participants or instruments in the field and carries it to powerful processors, which then execute extensive control tasks. The communication between the control system and the end devices takes place on the basis of standardised protocols that alongside the core data such as measured values, provide increasingly more information – for example, instrument status and diagnostic information.

For the management of data traffic in industrial processes, various fieldbus protocols have been on the rise for more than a decade. The widely used HART protocol has by no means been outstripped by them – HART itself continues to experience an increase in demand. Through the various integration tools for the protocols, configurations can be made directly from the PCS and information exchanged with the end devices. In addition to the DD (Device Description) and DTM (Device Type Manager), ever more frequently these are also software components that are based on the new FDT (Field Device Tool) technology.

In addition to the PCS, with increasing central intelligence and extensive levels of communication, the share of proven systems continues to grow, which work exclusively with the long-used 4-20 mA output signal and are clearly more straightforward when compared to a PCS. They offer an alternative for smaller-size systems or autonomous elements of a large system in which either the complexity of the measurement and control tasks is not as extensive or the processes are less critical. In these cases, the

implementation of a complex PCS, with respect to the cost/benefit ratio, is often not justified. With process control, along with the demands for increasing quality on the measurement technology to be used, cost efficiency also comes increasingly to the fore.

Against this background, it is clear that both system concepts must also be reflected in the sensor technology, in this case in the transmitters. All renowned manufacturers have suitable instruments for each type in their portfolios. Thus, at the upper end of the performance scale rank the BUS and HART transmitters, smart transmitters in the middle and the analogue instruments at the lower end. The latter are losing more and more ground as technology progresses. They are mainly being replaced by their digital 'colleagues' in the smart category.

The advantages of this change are obvious. Smart transmitters have similar features as the high-end devices mentioned. However, despite the high quality of their measurement technology, their prices are not in the same league and are therefore far more attractive for less demanding applications.

The cost advantage is primarily achieved through their design, which does not require complex firmware and consequently leads to a smaller and therefore lower-cost processor. For smart transmitters, as an example, manufacturer-specific protocols and the modems suited to them can be used. By using such non-standard protocols, the connection to the process

“
Alongside their intelligence,
this new generation of
instruments has the
advantage of lean
handling.”

Source 106461124_L_@Lyudmyla V_Fotolia.com

Fastest electrical connection through the MagWIK configuration adapter. Source: WIKA



control system, the associated integration tools and expensive certifications for a standard protocol are all dispensed with. Therefore, the communication element of the instruments can be sleeker and thus made more cost-effectively.

Without the connection to a PCS with the appropriate protocol, smart transmitters must be set to the respective sensor type and measuring range using separate tools and specific software. This step is often carried out prior to installation in the plant. It can also constitute a considerable cost factor. The more complicated and problematic such programming is, the more time a technician must spend on site.

To facilitate such a process, WIKA has developed a new configuration model. It is currently used in the new model T15 temperature transmitter. The instrument features a large clamping range, captive screws and a printed circuit diagram for rapid handling already during the probe connection. In parallel, the electrical connection and the programming of the T15 has been speeded up as much as possible.

The mechanical part of the configuration is being advanced, mainly, by the magWIK magnetic quick connector, developed and patented by WIKA. With it, the transmitter can be connected to the modem via the loop terminals in seconds. This eliminates the time-consuming loosening and tightening of screws or the often very complicated opening of the interface cover. The quick connector supports the head mounting version of the T15. The rail mounting version can be connected, at the same speed, via two connectors accessible from the front.

The second pace-setter is new software (WIKAsoftTT). The program can run without a separate driver on all current versions of Windows. With its assistance, within a few seconds, the desired configuration can be intuitively selected and stored in the instrument. The software can be activated as an option – via a standard .exe file or via a drop-in version, for which no installation is necessary. By using the drop-in file, the users do not need to have any special IT knowledge, nor do they need to seek admin rights in advance.

The T15 counts as a smart transmitter, which offers users – as already known from the high-end devices – another economic advantage as a result of its digital features. These instruments can be combined with different sensors and can switch to the desired measuring range respectively. They contribute to the minimisation of variants and thus the optimisation of stockholding and order management.

Conclusion

It is obvious that the new generation of smart transmitters combines more and more of the benefits from the high-end devices with the cost efficiency of earlier analogue instruments. It is not purely about technology-driven developments. The user-friendliness is the decisive factor – keyword 'usability'.

DD	– Device Description
DTM	– Device Type Manager
FDT	– Field Device Tool
IT	– Information Technology
PCS	– Process Control System

Temperature transmitter T15 (head and rail mounting version). Source: WIKA



Configuration software WIKAsoft-TT (for digital temperature transmitters). Source: WIKA

- For smart transmitters, manufacturer-specific protocols – and the modems suited to them – can be used.
- In this way, the connection to the PCS, the associated integration tools and expensive certifications for a standard protocol, are dispensed with.
- Smart transmitters are in a class of their own.

take note



Jens Baar is Product Manager (CoE Europe Electrical) Temperature Measurement at WIKA Alexander Wiegand SE & Co. KG. Enquiries: WIKA Instruments. Tel +27 (0) 11 621 0000 or email sales.za@wika.com

The Right Wavelength

Endress+Hauser completes its portfolio of radar instruments with Micropilot FMR60, FMR62 and FMR67. The new Micropilot series provides the first instruments with 80 GHz technology which have already been developed according to the safety-by-design concept of IEC 61508. Furthermore, they belong to the first generation of level instruments which, like many flow instruments of Endress+Hauser, support Heartbeat Technology.

Jan Gerritsen, Product Manager at Endress+Hauser, presents the new level campaign. He realises that nobody can do anything with 113 GHz. He just added the frequencies of existing instruments to demonstrate the overall competence of Endress+Hauser in the radar range. The new level campaign is called '113 GHz + Your Wavelength'. Jan Gerritsen describes the idea: The challenge is to find the respectively fitting frequency for each application. In order to accomplish that, we have to listen very carefully to the requirements of our customers so that we can give them really good advice. The aim is to find a common Wavelength that is a common understanding."

In the area of tank gauging, Endress+Hauser launched Micropilot NMR81, the first highly accurate instrument with 80 GHz technology for the oil and gas industry. Now, the company is adding Micropilot FMR6x to serve other industries. Also in this case, accuracy is at stake but first and foremost safety and the provision of simpler processes for customers. For the first time, an 80 GHz process radar is available which pursues the safety-to-design concept, thus making the life of customers much easier in terms of safety. In addition, the product offers a wide selection of ex-approvals. Improved focusing of the radar signal as well as dynamic algorithms provide reliable, stable measurements with a measuring range of up to 125 metres and an increased measuring accuracy of

± 1 . The measurement is unaffected by baffles or obstacles at the tank walls. Due to the innovative antenna design, build-up and condensate do not impair the measuring result either. The interactive commissioning software makes this task fast and easy.

Heartbeat Technology

Instruments with their own pulse beat, Heartbeat Technology, have been only available at Endress+Hauser in flow instrumentation thus far. The preconditions for predictive maintenance and documented verification have already been created in the new Micropilot. This means that every measuring point can be verified and documented in assembled condition and without any interruptions. A simple, pre-defined procedure leads the maintenance staff through the verification and documents the verification results in an unambiguous manner. The guided SIL proof test according to the safety manual and included documentation also save time and costs. An automatically generated test protocol supports the evidence concerning regulations, laws and standards. The monitoring area of Heartbeat Technology provides instrument and process data, thus facilitating trend recognition for predictive maintenance. The aim is always the optimisation of processes in a targeted manner. Therefore, a combination of instrument and process parameters provides all important details for a respective analysis.

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



Handheld solarimeters for PV and thermal installation control

New to **ASSTech's** product line-up from French manufacturer Kimo, is handheld solarimeters dedicated to photovoltaic and thermal installation control. The SL 100-SL200 can be used for the following functions:

- Insolation study (exposure to sun rays) - direction and masking effect
- To specify type of generator to use (photovoltaic or thermal)
- To specify optimal direction for the solar panel installation
- To control installation conformity
- To control installation in use and efficiencies expected

Technical specifications:

- Measurement and spot check of solar power from W/m^2 to $1\,200\ \text{W/m}^2$
- Spectral response – from 400 to $1\,100\ \text{nm}$
- Calculation of energetic exposure in Wh/m^2
- Values saved (SL100) and values recorded (SL200)

Kimo has also developed the CR 100 to allow for continuous monitoring under stationary conditions.

Enquiries: Anastas Schnippenkotter. Email info@asstech.co.za





Schneider Electric Partner Portal for Electricians

Growing your business has never been easier!

Don't miss this fantastic opportunity to register for Schneider Electric's all-new digital platform! Redesigned based on our clients' specific business needs and requirements, packed full of new tools, resources and programs to grow and manage our partners' businesses.

The key benefits of this exciting portal are:

- new business opportunities and networks
- flexible business management from mobile devices
- simplified project management
- exclusive membership programs
- super-fast access to digital platform
- enhanced support capabilities

See what the partner portal can do for your business...

Explore now!



www.schneider-electric.co.za

Life Is On

Schneider
Electric

Improved engineering function for configuring fire and gas systems

Yokogawa Electric Corporation has developed an enhanced version of the ProSafe-RS safety instrumented system. The R4.03.00, includes an improved engineering function for configuring Fire and Gas Systems (FGS) and new operation faceplates for the FGS operation and monitoring screens. These enhancements make it easier to adopt and use ProSafe-RS in FGS applications.



In the oil, natural gas, petrochemical, chemical, and other energy and basic materials industries, various safety measures must be taken to prevent accidents and protect the environment. This includes the use of a safety instrumented system, which can secure plant safety by functioning as an Emergency Shutdown system (ESD) that detects abnormal conditions and safely initiates emergency shutdowns, and by functioning as an FGS.

Yokogawa's ProSafe-RS safety instrumented system can be integrated with the CENTUM VP integrated production control system and is widely used mainly in ESD applications all over the world.

Based on an April 2017 Yokogawa survey, ProSafe-RS is one of the top selling safety instrumented systems

on the market today. Since releasing this system in 2005, Yokogawa has continued to strengthen its functions to satisfy a variety of customer needs. In response to the rising need for FGS solutions, this latest release includes features that make it easier to adopt and use this system in such applications. And by adding a new Input/Output (I/O) module and enabling the use of an alternate control network topology, we are giving our customers a greater range of choices in their ESD and FGS applications. Cybersecurity has also been strengthened.

- Easier adoption and use in FGS applications
- New I/O module
- Ring network topology
- Improved cybersecurity

Enquiries: Visit www.yokogawa.com/za

Is the medium flowing or not?

To check the flow processes in pipeline systems, flow indicators are frequently required which give an immediate visible answer to the question: 'Is the medium flowing or not?'

Kobold, represented locally by **Instrotech**, has their type DKB flow meter with a ball, used especially for checking the flow of small quantities of liquids. The method of operation of this unit is astonishingly simple: the flow makes the white ball 'dance' to-and-fro under the glass dome.

If the flow stagnates, the ball drops back into the rest position out of the field of view. With this design, it is possible, even in conditions of poor visibility and for cloudy and dirty media, to have a clear indication of cooling water circulation, lubricant flow, air supply and other media. The unit's simple construction has only one moving part, thus guaranteeing reliable and interruption free function.

Type DKB flow indicator is designed specifically for use horizontally running pipes, and is offered in sizes from G 1/8 up to G 1. At flow rates as low as 0,05 l/min for water for example, the ball lifts up and will be visible in the glass dome. In the standard version with a brass housing and glass dome made of impact resistant borosilicate glass, the units are suitable for use in temperatures up to 120°C and pressures up to 6 bar.

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



New barcode scanner range

Managing your inventory and tracing assets can be a laborious and time-consuming process, especially in hazardous areas. Extronics offers a cost-effective solution to help you out; the new iSCAN range of intrinsically safe barcode scanners. Enable your staff to work smart; the iSCAN range's rapid scan rate records information quickly and efficiently. Light enough to be easily carried around yet rugged enough to withstand being dropped onto concrete, the iSCAN range provides a practical way to improve productivity whilst reducing the risk of errors. ATEX and IECEx Zone 1 certified, the iSCAN range can be safely used in hazardous areas. The wide scan line and good read range makes it easy to scan barcodes in awkward and hard to reach locations, saving time and allowing workers to maintain a safe distance. The iSCAN range can connect with your current systems to give you better oversight of your operations, and can also be used with smart devices such as the Rough Pro range via Bluetooth. Fully scalable, it is available in several different options, giving you the flexibility to choose the version that's best suited for your application. **Extech** is the sole agent for Extronics in Southern Africa and will provide local IA certification.

Enquiries: Tel. +27 (0) 11 791 6000 or email sales@extech.co.za www.extech.co.za

Pressure transmitters for demanding applications

Turck, supplied locally by **RET Automation Controls**, has introduced the PT2000 line of pressure transmitters, which offers a welded stainless steel measuring cell for increased durability and increased chemical compatibility. The PT2000 offers a solution that has no elastomer seals and all wetted materials are 316L stainless steel. This makes the solution uniquely capable to meet the environmental needs in water pumping, hydraulic, and refrigeration applications. The transmitter housing is gel filled, eliminating problems caused by condensation in applications with a wide range of temperatures, such as pumping ground water. Additionally, the housing is more compact than existing solutions, suiting it for more applications with space constraints. The PT2000 is also capable of handling pressures up to 1 000 bar as well as process media up to 135°C.

The PT2000 comes equipped with a standard M12 connector that is available in multiple wiring configurations to allow for easy integration into existing applications. The new pressure transmitter is also available with process connections such as NPT, BSPP and SAE, which are commonly used in North American hydraulic applications. "The PT2000 line gives customers a robust, stainless steel solution in a compact, economical package," says Rich Tallant, Product Manager for sensors. "Furthermore, with a variety

of connection options, it provides a valuable solution for a wide range of applications." The PT2000 offers multiple output signals to provide additional options for customers and allowing the offering to adapt to users' existing control circuitry; 4-20 mA, 0-10 V, ratiometric, 1-6 V, and 0-5V. Additionally, it carries an IP67 rating, and has an operating temperature range of -40° to 135°C.

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



Visit us at: **Stand B2**



6 - 8 June 2017
The TicketPro Dome | JHB

**EXTREMELY
ROBUST**

PART OF YOUR BUSINESS FOR PRESSURE, TEMPERATURE, LEVEL & FLOW MEASUREMENT

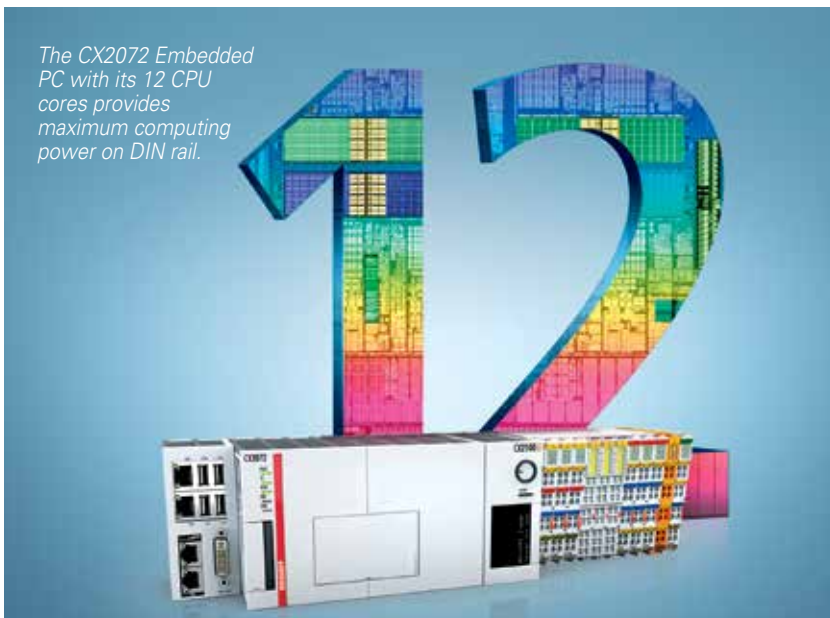
As a family-run business acting globally, with over 7,900 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement. The company also sets the standard in the measurement of level and flow, and in calibration technology.

Founded in 1946, WIKA is today a strong and reliable partner for all the requirements of industrial measurement technology, thanks to a broad portfolio of high-precision instruments and comprehensive services. www.wika.co.za

WIKAI

Part of your business

The CX2072 Embedded PC with its 12 CPU cores provides maximum computing power on DIN rail.



Performance Leap for Embedded PCs

Andreas Thome, Beckhoff Automation

In time for the 30th anniversary of PC-based control technology from Beckhoff, the company presents a new generation of Industrial PC devices in the high-end performance segment.

These devices are an extension of the CX series Embedded PCs for DIN rail mounting with directly connected I/O components. The product expansion comprises three new controller versions.

Table 1: Controllers differ in terms of the CPU.

CX Type	CPU	Cores	LL Cache	Clock	RAM
CX2042	XEON D-1529	4	6 MB	1,3 GHz	8 GB DDR4
CX2062	XEON D-1539	8	12 MB	1,6 GHz	16 GB DDR4
CX2072	XEON D-1559	12	18 MB	1,5 GHz	32 GB DDR4

As Table 1 shows, the controllers differ in terms of the CPU: These are processors of type Intel Xeon D, each with 4, 8 or 12 CPU cores in the fifth Intel Core microarchitecture generation, manufactured using 14 nm process technology.

Intel classes its Xeon D-type CPUs as 'mid-range server' CPUs. This explains how they constitute the link between client CPUs and genuine Xeon server CPUs, which – unlike Xeon D CPUs – can be used to set up multiple CPU systems with NUMA (Non-Uniform Memory Access) architecture.

In contrast, Xeon D processors function independently, offering the advantage of a simpler system design, as they already incorporate another chip that is typically required – the Platform Controller Hub (PCH). In other words, these are so-called SoC variants (System-on-a-Chip).

The end result is that these chips enable the design of extremely compact industrial motherboards, saving space in the control cabinets of end users. For example, the motherboard developed by this company for the CX20x2 series measures only 8,5 cm x 20,5 cm.

Despite its small dimensions, this Embedded PC series incorporates two independent 1-Gbit Ethernet MAC/PHYs (instead of internal 10-Gbit Ethernet ports, which are still quite rare in automation) which are compatible with, or even use the same chips as, the Ethernet controllers in the CX2000 Embedded PCs.

Embedded PCs enter a new dimension of performance

Where conventional Core i7 CPUs reach the limit of their performance class with 4 cores per CPU, all Intel Xeon D CPUs offer up to 16 cores. Since the 16-core variant is not currently available as a thermally stable eTemp SKU, it has not been included in the newly extended CX series. This is because these new devices are intended to withstand operation in ambient temperatures from -25°C C to +60°C.

However, the 4, 8 and 12 cores used in the new device series offer sufficient processor power and parallelism for extremely demanding automation tasks. TwinCAT 3 automation software makes it possible to distribute individual tasks of the control process to the various processor cores, so that the CPU load can be planned in fine detail for a number of cores. When used together with EtherCAT as the high-performance fieldbus, it is possible to achieve task cycle times of 100 µs on the individual cores.

Another important aspect of the increased performance is the separate graphics card. Since Intel Xeon CPUs do not incorporate graphic cards, the CX20x2 is provided with an integrated graphic card equipped with a separate 2 GB of RAM. Separating the CPU RAM from the GPU RAM prevents the two computing units from interfering with one another.

The high power density from the CPU and GPU being located so closely together makes it necessary to incorporate a fan for heat removal. However, the fan speed is regulated and can be continuously monitored by TwinCAT PLC. Thus, any irregular behavior can be detected early on, allowing a scheduled replacement of the fan if necessary. This kind of service is very easy for the user to accomplish because the fan is simply plugged in without cables.

Continuity in the system toolbox

The three new controller types are integrated seamlessly into the CX2000 Embedded PC family. The housings extend 6 cm further along the DIN rail than the previously largest CX2040 controller, but at 205 mm x 100 mm x 91 mm, it is still extremely compact for the high processing power it offers. All announced versions use an identical housing, regardless of the specific type of Xeon D processor they contain. All the original basic interfaces from the CX2000 series are still available on the new devices – 2 x Gbit Ethernet, 4 x USB 3.0,

- The introduction of a new generation of Industrial PCs in the high-end performance segment, coincides with Beckhoff's 30th anniversary of PC-based technology.
- The new devices are an extension of the CX series Embedded PCs for DIN rail mounting with directly connected I/O components.
- These devices offer unprecedented processing power on DIN rail.



CB	– Current Branch	PC	– Personal Computer
CPU	– Central Processing Unit	PCH	– Platform Controller Hub
DIN	– Deutsches Institut für Normung (German Institute for Standardisation)	PLC	– Programmable Logic Controller
GPU	– Graphics Processing Unit	RAM	– Random Access Memory
I/O	– Input/Output	SKU	– Stock Keeping Unit
IoT	– Internet of Things	SoC	– System-on-a-Chip
LTSB	– Long-Term Servicing Branch	UPS	– Uninterruptible Power Supply
NUMA	– Non-Uniform Memory Access	USB	– Universal Serial Bus
		VGA	– Video Graphics Array

Abbreviations/Acronyms

DVI-I (including VGA), as well as the flexibly configurable multi-option interface. This last interface offers a way to extend the device in the factory. In each case, this is made possible by an additional interface, e.g. an EtherCAT slave, RS232, RS485, various older fieldbuses as master or slave, or a second DVI-D or display port output.

All the existing CX2000 plug-in modules – including those installed from the left and right – can be used on the new devices. This gives the user the wide selection of pluggable Ethernet, USB 3.0, RS232, RS485, PoE, PROFIBUS master/slave and CAN master/slave interfaces on the left, and the choice of CFast, hard disks and USB distance transfer modules on the right.

The new devices use the same standard power supplies as the existing CX2000 series, namely the CX2100-0014 and CX2100-0914. The latter offers a method of using an electrochemical battery to create an Uninterruptible Power Supply (UPS). This makes it possible to maintain power for 15 to 25 minutes – which is sufficient for an orderly shutdown of the entire system in the event of a power failure, or even to bridge an outage completely.

Another familiar feature is automatic recognition of connected I/O terminals that can be attached to power supply units. Whether these are I/O terminals of the E-bus type (EtherCAT Terminals) or K-bus (Bus Terminals), each component is detected automatically and quickly forms the I/O system for the application.

For these new Embedded PC devices, this company aims to provide long-term availability: 10 years as a new device followed by a further 10-year service period. Our many years of industrial experience have taught us that in spite of always using latest-generation PC technologies – or maybe even because of it – our equipment can operate in the field far longer than that.

TwinCAT 3 on the basis of the Windows 10 operating system

Microsoft Windows 10 IoT Enterprise is used as the operating system in the so-called Long-term Servicing Branch (LTSB). This designation refers to a fully equipped Windows 10 Enterprise system, but

“
Beckhoff introduces a new generation of Industrial PC devices in the high-end performance segment.”

one that allows more control over the installed updates: on the one hand, updates will not be installed automatically, and on the other hand, these systems only receive error corrections and safety-critical patches. Unlike the CB version (CB = Current Branch), LTSB does not include any functional extensions or later additions. This is intended to ensure that the operating system retains its functional availability.

It completely removes the component-based scalability from Windows 10 – this version of the operating system is monolithic, providing users an advantage in that they no longer need to inquire whether or not specific components required for their software are contained in the operating system.

CX2042, CX2062 and CX2072 devices are available only with the 64-bit version of this operating system. Newly-developed projects will certainly be based on TwinCAT 3 and a 64-bit operating system in order to facilitate multi-core task allocation and the ability to address more than 4 GB of RAM – both major limitations of 32-bit systems.

‘Server processing power’ in a DIN rail-mounted format

The CX series devices equipped with the new Intel Xeon CPUs are high-performance industrial control systems that are modular, flexible, robust, versatile and available for the long term. Their CPUs, each with up to 12 cores, and their separate graphics hardware, enable these devices to offer unprecedented processing power on DIN rail.

Acknowledgement

Images – courtesy Beckhoff Automation.



Dipl.-Ing. Andreas Thome is Product Manager PC Control at Beckhoff Automation. Enquiries: Kenneth McPherson. Email kennethm@beckhoff.com



Embedded PCs in this new high-end series accommodate the full spectrum of existing CX2000 plug-in modules.

Farms increase safety and productivity through asset tracking

With workers and machines occupying the same working area in busy farming operations, Proximity Detection Systems (PDSs) are becoming vital tools to promote safety and productivity.

According to Anton Lourens, managing director of PDS supplier **Booyco Electronics**, the technology allows for intervention where a potentially dangerous situation exists between a pedestrian and a machine like a tractor.

Essentially, the PDS is a sensing device that detects the presence of an object, an interface that provides an audible and/or visual alarm to the equipment operator, and wiring between the two.

Both the vehicle operator and the pedestrian can then be warned of potential collisions and danger. Warning zones are stable and predictable, and can be adjusted

to suit the specific agricultural application and standardised to particular equipment.

In addition to avoiding accidents on a site, the data from the PDS can be analysed for patterns, allowing farm managers to identify unsafe behaviour and design an appropriate intervention.

In terms of productivity, monitoring of machine movements by the PDS can also help managers to make better use of equipment at work, for instance by optimising cycle times.

Linking the proximity detection hardware products and the monitoring devices is Booyco's Electronics Asset Management System (BEAMS) – a web-based application used on a robust database. BEAMS is essentially a central information hub, and provides a reliable single source of information that can be leveraged for greater insight

into all aspects of the operation. "BEAMS provides an effective asset management solution that will allow farming operations to feel secure in the control of their assets," Lourens explains.

Enquiries: Anton Lourens. Email anton@booyco-electronics.co.za



Concentration measurement technology bolsters flow portfolio

Endress+Hauser has acquired SensAction AG, a manufacturer of innovative systems for measuring the concentration of liquids. With this move, the Switzerland-based Group intends to strengthen its quality measurement portfolio. SensAction will remain headquartered in Coburg, Germany and will keep their current staff.

SensAction will operate as a division of the Endress+Hauser Centre of Competence for flow measurement technology headquartered in Reinach, Switzerland. "This innovative technology is an excellent fit with our modern flow measurement portfolio," says Dr Bernd-Josef Schäfer, Managing Director of Endress+Hauser Flowtec AG. "It allows us to further expand our range of products for measuring quality parameters."

Coriolis flow measurement devices from Endress+Hauser can already determine not only mass flow, but density as well. Electromagnetic instruments are capable of measuring conductivity parallel to the volume flow. "These physical analysis parameters create direct value-add for the customer," emphasises Bernd-Josef Schäfer. Endress+Hauser plans to integrate the SensAction instruments into its own program and open up new markets via the

Group's international sales structures. In addition, plans are in place to eventually combine the technology direct with Endress+Hauser's flow instruments.

Innovative technology

The systems from SensAction measure the concentration of liquids with the help of surface acoustic waves, which are high frequency sound waves whose behavior can be compared to seismic waves created by earthquakes. By analysing the transmission time and amplitude, the acoustic parameters of the liquid, such as sound wave velocity, impedance and density, can be measured in order to quickly and precisely determine the concentration. Because they contain no moving parts, the systems are maintenance-free and do not suffer from wear-and-tear.



Apart from developing and manufacturing concentration measurement systems, SensAction also offers supplementary services, such as software products that rely on a laboratory measurement to provide a high degree of accuracy and user-friendliness for the customers' applications. The key fields of application for the SensAction instruments include concentration measurements for liquid process media.

The acquisition of SensAction will be effective retroactively from 1 January 2017. Both parties have agreed to not disclose the details of the transaction. Stefan Rothballer and Michael Münch, two of SensAction's founders, will continue to manage the innovative company's business.

Enquiries: Frans van den Berg. Tel. +27 (0) 11 262 8000 or email frans.vandenberg@za.endress.com



Managing Directors of SensAction, Stefan Rothballer (left) and Michael Münch.

Data analytics and the future

Data is the new oil. In the field of data analytics, innovation and foresight are essential to success. Even more so, perhaps, is the ability to look beyond the traditional scope of analytics, with the understanding that knowledge is power and information can change the world. The possibilities truly are endless in a data driven world.

At the recent Qlik Southern Africa Summit 2017, entitled: 'Does your world make sense', one key message reverberated like an undercurrent across all presentations; for data analytics tools to be effective, they must work at the speed of thought (and accurately so). In a world that changes with every passing second, waiting months, weeks, days, or even hours for a report simply is not good enough.

"Business intelligence is not an event," confirms Jane Thomson, Managing Director at South Africa Qlik Master Reseller. "It's not something one can work towards and tick off a list. It has no beginning and no end; it must constantly evolve and continue to provide valuable information as the company (and the world) changes from one minute to the next."

Utilising data analytics to change the way we work and the world around us is possible; if the solution is fast, intelligent, accurate, reliable, interactive and offers only one version of the truth. "If all available, relevant data is brought together and analysed as a unit, there can be only one final answer. This eliminates ambiguity in terms of interpretation or manipulation, and helps companies to manage their futures more effectively," adds Thomson.

At the Summit, Futurist, Graeme Codrington gave attendees a view into the future. Qlik's experts discussed how to make data driven possibilities possible, the African perspective on data analyt-

ics, and product insights. Partners from various industries shared their valuable case studies, and the Directors of KPI Management Solutions shared their knowledge on determining how to maximise operations through people and processes. Break Away sessions ensured that attendees from various industries were well looked after, and the SA Qlik Partner Awards were held at a Cocktail Event.

Enquiries: Email perfectword@trinitas.co.za

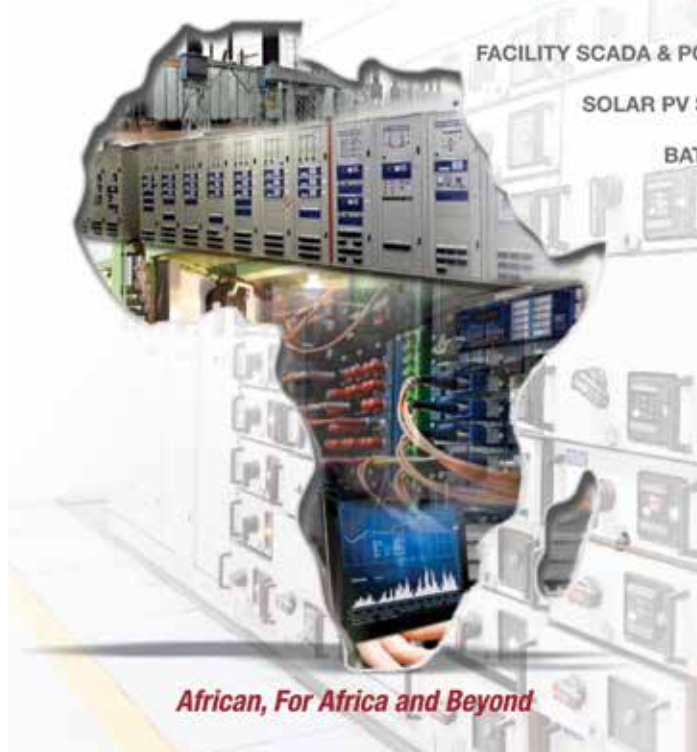
*Jane Thomson,
South Africa Qlik
Master Reseller.*



Futurist, Graeme Codrington.



Your complete energy solution experts



African, For Africa and Beyond

- FACILITY SCADA & POWER PLANT CONTROLLERS FOR POWER PLANTS
- SOLAR PV SOLUTIONS - COMMERCIAL ROOFTOP & UTILITIES
- BATTERIES, CHARGERS & DC DISTRIBUTION BOARDS
- YARD MARSHALLING KIOSKS & JUNCTION BOXES
- CONTAINERISED SUBSTATIONS & E-HOUSES
- PROTECTION & AUTOMATION SCHEMES
- MCC's & LV AC DISTRIBUTION SYSTEMS
- TELECOMMUNICATION APPLICATIONS
- SETTINGS & GRADINGS STUDIES
- SUBSTATION AUTOMATION
- CONTROL CENTRES
- INTELLIGENT HMI's
- COMMISSIONING
- AUDITS

Compact combi switchboxes with high air output

GEMÜ, a manufacturer of solutions for valves, measurement and control systems, has adapted its range of products in the area of combi switchboxes.

With the addition of two new product types and the adaptation of an existing type, the company completes its product range and thereby offers its customers an even more customized selection. This enables a combi switchbox to be selected which is even better adapted to specific requirements.

In comparison to external types, the integrated pilot valve offers both functional and cost benefits, such as fast reaction times, automatic programming of end positions and lower compressed air consumption. GEMÜ combi switchboxes therefore not

only enable precise position detection, they also provide efficient activation of the respective process valve.

With immediate effect, the GEMÜ 4242 combi switchbox is also available with an increased air output, which means that it is possible to equip valves with a stroke of 2 to 75 mm with this product. The new size also comes with the same well-known features. This includes a high visibility display and position indicator, various interfaces such as AS-Interface, DeviceNet, IO-Link and 24V, as well as fast commissioning using automatic end position programming, both on-site and externally. Detailed diagnosis options make operation easier and simplify fault analysis.

Both new GEMÜ 4240 and GEMÜ 4241 types work with mechanically adjustable

sensors and offer a cost effective alternative compared to versions with electronic position detection.

Enquiries: Ivona Jovic.
Email ivona.jovic@gemue.de



Customised stud press solution for automobile manufacturer

Tectra Automation, part of the Hytec Group, has successfully designed and fabricated a tailor-made stud press for use in manufacturing components for Ford's Ford Ranger and Ford Everest vehicle ranges. Commissioned for the project by Auto Industrial, the provider of machining and assembly of various automotive components, the stud press is used to insert the wheel studs into the front and rear hubs for these two vehicle types. With no standard stud press on the market that could meet the customer's requirements, Tectra Automation was ap-

proached to provide the solution. The stud press is required to press-in each stud effortlessly using a maximum of 56 kN force and it must also record an accurate data capture of each press in cycle while providing a production rate of 175 000 hubs per annum. In addition, Auto Industrial requested that the press be able to assemble at least two studs at once while controlling the force and distance travelled accurately, and the specifications required tight tolerances after assembly. Furthermore, the press was required to perform an infrequent press-out test as part of the quality assurance process.

To achieve these requirements, Tectra Automation designed and manufactured the stud press frame from the Rexroth range of basic mechanical elements. "The studs are pressed in using two Rexroth EMC100XC actuators each driven by a Rexroth MSK060C motor through standard 20:1 GTM100 gearboxes," explains Kevin Lombard, General Manager, Tectra Automation. "A turntable to rotate the hub is driven by an MSK040C motor through a 20:1 GTE80 gearbox and control is provided by a Rexroth CML25.1 PLC. Control for the HMI front-end with onboard PC is enabled by the IndraControl VEP 40.5. Additionally, we used customised load cells to measure the exact force and we designed the program to operate and record the data inhouse."

Enquiries: Kevin Lombard.
Tel. +27 (0) 11 974 9400 or
email kevin.lombard@tectra.co.za

Georg Venter, Divisional Manager – Electric Drives and Controls at Tectra Automation, pictured with the completed tailor-made stud press.



HB Systems

Factory Automation
&
Electrical

Solution Partner

Automation Drives

SIEMENS ACCREDITED ENGINEERS

ISO 9001:2015
REGISTERED COMPANY

Contact us for more information:
H B Systems Pty Ltd
T: +27 21 852 1189
M: +27 82 920 4979
www.hbsystems-electrical.com
info@hbsystems-electrical.com

Stainless steel encoders with IO-Link

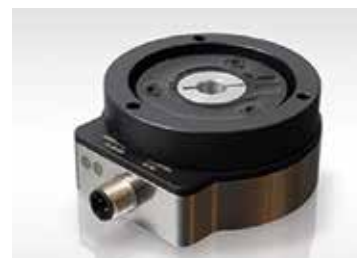
Turck is completing its range of contactless EQR24 stainless steel encoders with an IO-Link variant. A variant with an IO-Link interface completes from June Turck's portfolio of wear-free stainless steel encoders. The robust stainless steel variants of the contactless QR24 inductive encoder series are specially designed for operation in applications with particular requirements for cleaning or for extreme environmental conditions, such as in the food and beverage or heavy industry. The EQR24 series consists of models with SSI, incremental, analog

and IO-Link outputs. With a V4A stainless steel housing (1.4404) and an active face made from PA12-GF30 plastic the device can withstand even the harshest chemicals and pressures in the cleaning process.

As with all QR24 models, the sensor and positioning element are fully potted and cast as two totally sealed independent units that can withstand any vibration or shocks of the shaft. Wear-intensive ball bearings or seals which lead to machine downtimes and thus long maintenance times are not required. Thanks to its intelligent mounting concept

using adapter rings, the permanently sealed IP69K encoder can be fitted on all standard shafts with diameters up to 20 mm.

Enquiries: Brandon Topham. Email brandon.topham@retautomation.com



Latest solutions, IOT devices at African Automation Fair 2017



Omron's EtherCat solutions and Internet of Things (IOT) devices will take centre stage at the African Automation Fair (AAF) from 6 - 8 June 2017 at Ticketpro Dome in North Riding, Johannesburg. In particular, a new IOT EtherCat module will be launched.

There will also be a strong emphasis on Omron's Sysmac motion solutions, comprising robotics and

visual inspection control, Victor Marques, Country General Manager, highlights. "Historically, AAF has always had a good reach into all of our relevant industries. Of course, we also have the correct target market attending our stand."

The scope of AAF 2017 has evolved with the inclusion of IOT as one of the latest and most pervasive trends in the automation industry. This is an exciting outcome of the digital revolution that is changing the way we live and work.

Marques highlights that Omron's presence will appeal directly to customers on the lookout for cost-effective and highly-innovative solutions that meet, and even exceed, their requirements. "We are looking to target OEMs in particular, and food and beverage end-

user customers," Marques points out. The Omron product range on display at AAF 2017 includes Sysmac motion and PLC control, NX remote I/O, vision systems, safety products, servos, Variable Speed Drives (VSDs), Human Machine Interface (HMI), and general control components.

"We have strong experience and references in areas such as motion and drive control, PLCs and HMI, automation networks, and visual inspection control and robotics," Marques reiterates. Omron Field Sales Engineers will man the stand at AAF 2017 to familiarise customers with the latest technology.

"We will also have Application Engineers on hand with a wealth of experience to field high-end technical questions. Different managers will also be present on different days to showcase our commitment in meeting our customers' needs from the top down," Marques concludes. Visit Omron at Stand E25, E28, AAF 2017.

**Enquiries: Omron Electronics.
Tel. +27 (0) 11 579 2600 or email
info.sa@eu.omron.com**



Victor Marques,
Omron Country
General Manager.

Miniature encoder for mobile equipment

The contactless resonator measuring principle enables the compact Ri360-QR20 to be wear-free and permanently sealed. Turck's compact and wear-free Ri360-QR20 miniature encoder is especially designed for use in mobile machinery. The new encoder series with IP68/IP69K protection exceeds the e1/E1 requirements and comes in a compact 71 x 64 x 20 mm housing. It is based on the contactless resonator measuring principle like its "big brother", the QR24. The key feature: The housing fully surrounds the positioning element and provides it with full protection from the outside. Alternatively, the positioning element can also be positioned above the sensor. This

design principle not only reduces the planning work for the designer, but also offers mechanical protection, as well as protection from dust and moisture. The housing is also permanently sealed. Even the often problematic potential points of leakage such as LED lenses are eliminated since the QR20 uses a translucent plastic.

Available from **RET Automation Controls**, the encoder offers interference immunity of 100V/m and is protected from line-conducted interference according to DIN ISO 7637-2 or SAE J113-11, the so-called load dump. Salt spray or rapid temperature changes, as well as diesel, kerosene or vibrations have no effect on the device. With a temperature



range from -40 to +85°C there are virtually no climatic conditions that could be critical for the QR20. The Ri360-QR20 offers a 12-bit resolution on the output side, corresponding to around 0,09 degrees. The output signal ranges from 0,5 to 4,5 Vdc (LU4). If the sensor does not detect a positioning element, the value jumps to 5 V.

Enquiries: Brandon Topham. Email brandon.topham@retautomation.com

Driven by Drives

Energy Efficiency for a Better Tomorrow

Anna Hildebrand Jensen, Danfoss

How ac drives improve efficiency, the advantage of choosing ideal components over pre-bundled packages, and total cost of ownership considerations.

Sceptics have their doubts about the viability of energy efficiency. They point out that energy efficiency is expensive in our times when energy costs are falling, and ask for the proof that the benefits of improving energy efficiency outweigh the costs. In the industrial sector where electric motors account for 30% of global final energy use [1], they argue that it requires significant investment to upgrade motor efficiency class or install ac drives to optimise existing motors for energy efficiency. At the rate of development today, will the investment break even before the technology is obsolete? They argue that energy efficiency competes with renewables in a detrimental manner. Or – when based in Germany and dependent on the energy supply to run a business, I get a tax break on my energy bill anyway. So why spend money reducing consumption? It will cost me more in the long run since I will no longer qualify for the rebate [2].

Fortunately there are heavyweight proponents of energy efficiency, who know without a doubt that energy efficiency does pay. The German Chancellor in the context of maintaining economic growth despite the Brexit vote in June 2016 recently pointed out, 'We must concentrate on efficiency and growth'[3].

The International Energy Agency (IEA) [4] and the European Union (EU) have set ambitious targets for energy savings, and regard cutting back consumption as a vital first step in achieving these targets, following the principles of the Efficiency First concept.

An energy source in its own right

According to the IEA, we should prioritise energy efficiency as the 'first fuel', and this is the foundation of the Efficiency First concept. As an energy source, energy efficiency is broadly defined in two categories: demand side or supply side. Investments in energy efficiency either contribute to avoiding energy consumption (for example, motor efficiency performance standards) or to avoiding energy losses (for example, legislation to regulate power distribution). Energy efficiency as a fuel can be difficult to visualise or quantify, but nonetheless it dominates the energy market. In 2013, the IEA

demonstrated its significance by showing that energy savings from efficiency measures exceeded the output of every other fuel in 11 IEA countries from 1974 to 2010 [5].

Ac drives have a role on both demand and supply sides of the equation. They primarily act to reduce electricity consumption drawn by motors under torque loading. Ac drives can also be configured to run in regenerative mode where they feed braking energy back into the line power, instead of it being lost as heat.



Figure 1: Energy savings from Efficiency First

Where are the best opportunities?

The EU is engaged in a broad range of initiatives aimed at achieving its 2020 energy efficiency targets. It enforces them via the Energy Efficiency Directive (EED), which states: The 2012 Energy Efficiency Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption [6].

Potential energy savings arise from a range of opportunities at consumer and industrial level, some more worthwhile to pursue than others. The EU has already identified motors and variable speed control of motors using ac drives as huge opportunities for saving energy. Today about 25% of motors are equipped with drives, and the potential where it makes sense to install further drives is 40-50% of motors.

- IEA – International Energy Agency
- EU – European Union
- EED – Energy Efficiency Directive
- LCC – Life Cycle Costing
- TCO – Total Cost of Ownership

Abbreviations/Acronyms

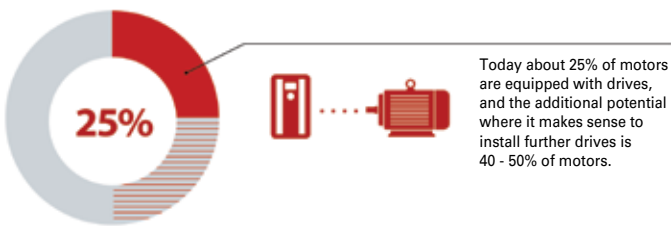


Figure 2: Potential for improving motor efficiency using drives.

Today about 25% of motors are equipped with drives, and the additional potential where it makes sense to install further drives is 40 - 50% of motors. The achievable energy reductions in generalised form are:

- 10% by improving motor efficiency
- 30% by implementing speed control using ac drives
- 60% by optimising the system [7]

Motor efficiency measures are already in place, with additional measures currently in review. To date, the EU has focused on improving motor efficiency, but the other opportunities are not yet in scope. The greatest prizes lie in speed control using ac drives, and system optimisation, so let us take a closer look at these.

Speed control using ac drives

Where are the greatest benefits to be won in variable speed control of motors using ac drives? There are numerous reasons for adjusting the speed of an application:

- Save energy and improve system efficiency
- Match the speed of the drive to the process requirements
- Match the torque or power of a drive to the process requirements
- Improve the working environment
- Reduce mechanical stress on machines
- Lower noise levels, for example from fans and pumps

Depending on the application one benefit or another is predominant. However, speed control is proven to bring significant efficiency ad-

vantages in many different applications. The ac drive acts in differing ways at different stages of operation:

- **Start-up current:** Three-phase induction motors require a high start-up current. An ac drive reduces start-up current and enables speed control
- **Number of start-ups:** The ac drive also contributes to energy savings by reducing the number of start-ups. For example, for pumps, motor start-ups account for 5 - 10% of overall energy consumption [8]
- **Constant load torque:** The load does not vary much with the speed. This applies to conveyor belts, hoists or mixers. Speed control enables process optimisation, energy savings, favourable transmission ratios, and reduced mechanical wear and tear.
- **Quadratic load torque:** Many but not all pumps and fans have a quadratic load torque. Power consumption is a cubic function of the motor speed, which means speed control almost always leads to significant savings. For example, 20% less speed results in approximately 50% reduction in energy consumption.

The comparable economy of investing in ac drives as opposed to high efficiency motors is shown in *Figure 3*. The investment in an ac drive is higher than in an energy-efficient motor. However, the benefit is often considerably higher, meaning that after the initial payback time, the ac drive is the most economic means to generate energy efficiency. It is more advantageous even than an IE3 class motor. This interesting observation demonstrates that certain investments are more valuable than others, and leads us to the next topic, system optimisation.

- Sceptics have their doubts about the viability of energy efficiency.
- Among many arguments is: It requires significant investment to upgrade motor efficiency.
- Fortunately, there are heavyweight proponents of energy efficiency who know that energy efficiency does pay.



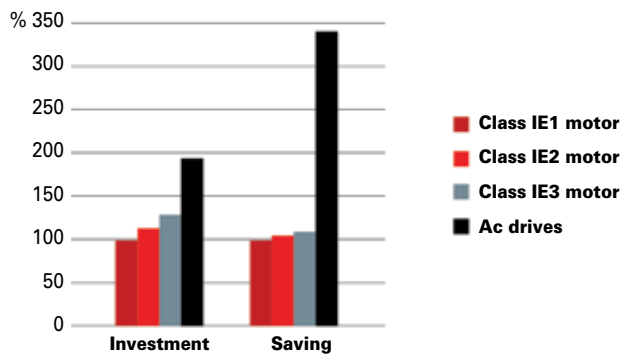


Figure 3: Cost/benefit comparison of motors of various efficiency classes, and ac drives.

Pre-assembled or adapted assignment?

Pre-assembled drive packages firmly link the drive to the motor, offering maximum savings for a specific theoretical situation. This is a safe selection but inflexible. No alternative components will do, and this can become a nasty trap in the form of potentially limited availability in delivery bottlenecks or export.

In contrast, the adapted assignment where drive and motor are combined on a case-to-case basis remains flexible to customer requirements and technology trends. It demands a once-off expense and the result is the ideal optimisation for energy efficiency and high performance, tailored to the application, where components are easy to replace.

For example, any local motor can be retrofitted, worldwide. Using an adaptable ac drive, capable of optimising many different motor technologies, it is easy to retrofit to a different motor technology. This ability is a great advantage in reducing downtime costs. An adaptable drive, when combined with diverse motors is able to reach system efficiency equal to that achievable with the majority of dedicated packages.

To optimise operation of the 'new' high-efficiency motor concepts such as permanent-magnet or synchronous reluctance motors, an ac drive is always required. In fact, without the existence of ac drives, these motor concepts would not have been developed.

Efficient components do not necessarily create an efficient system

System optimisation comprises a multitude of different energy-saving approaches. Put simply, to evaluate the efficiency of a system, first measure the efficiency of the components, then multiply. Choosing the most efficient components is not enough, however. They do not always combine to create the most efficient system. A good example of this is the very compact fan, where the motor is directly mounted inside the centre of the fan and acts as its hub. Unfortunately this placement results typically in a disturbance of the airflow which reduces the efficiency of the whole system. The further inside the fan the motor is positioned, the more compact the device gets and the more the disturbances increase. The typical components in a power drive system are the ac drive, motor, transmission and the load machine. For some components, IE classes (International Efficiency) and

even statutory minimum values are partly defined. However, they do not give an indication of the efficiency under partial load. In the standards motor efficiency is only defined for full load. In practice, motors run most of the time at part loads, where constant mechanical and electromagnetic losses cause motor efficiency to deteriorate. The degree of deterioration depends on the motor torque and speed.

The entire drive train

The starting point in improving energy efficiency is to establish the current state of the planned or existing system. This involves calculating the energy consumption, clarifying which processes are suitable for speed control, and pinpointing where reasonable savings could be made. This process will also highlight synergies. Once the initial state is established as a baseline, then the effect of any optimisation steps taken will be quantifiable. By documenting the initial state, operators are equipped to verify that theoretical savings have been achieved in practice, and whether the potential for savings has been fully exploited, after implementing the system optimisation.

Analysis of the system layout, length of piping, pneumatics, the energy sources used, power losses, central or decentral control, availability of spare parts and their storage - all these factors influence the overall lifetime system efficiency. Consider also the total electromagnetic interference, and whether internal or external filters are required. Here it is vital to concentrate on actions which are cost-effective and sensible. With the advent of efficiency legislation Ecodesign Directive in the EU, machine builders have to pay more attention to the overall efficiency of their systems and equipment. For their own survival they have to carefully maintain the technological edge in the global market while remaining competitive in cost and effort. A regulation must therefore always ensure that the expense and effort required are in equilibrium with the commercial benefits.

”
Always apply this principle: Save energy, but not at any price.

Save energy, but not at any price

Opportunities to save energy await us in almost all sectors, and in applications as diverse as building services, conveyor belt systems and chemical processes. However not all opportunities are equal. Some are dramatically better than others. The challenge lies in identifying the potential and in finding the (economically) optimum implementation. To assess and compare different measures for improving efficiency, it is vital to pay special attention to the benefits each method brings. Always apply this principle: Save energy, but not at any price. To ensure that energy efficiency does pay, it is therefore necessary to examine all aspects – technical, commercial and logistical – in the perspective of the entire system lifetime, before making an investment decision.

From cradle to grave

To make an informed decision on an energy efficiency investment, use a recognised method to analyse overall cost over the system lifetime, from cradle to grave. Some alternatives are Life Cycle Costing

(LCC) which calculates total costs within a life cycle, and Total Cost of Ownership (TCO) which calculates total costs over a period. The basic idea of both concepts is to consider not only the purchase costs, but also the running costs such as energy, repair and maintenance costs. Over the entire lifecycle, energy costs often account for most of the running costs, as shown in Figure 4.

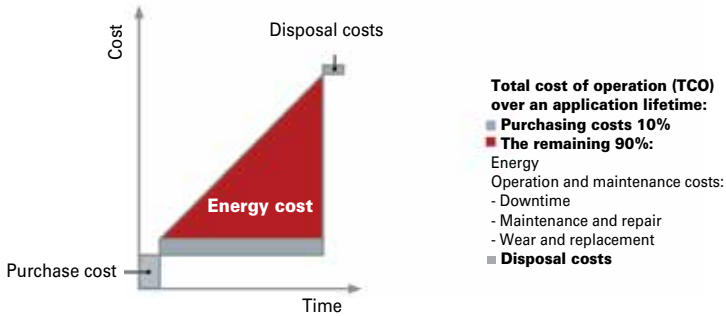


Figure 4: Total cost of a system over its lifecycle, including initial investment, running costs and disposal costs.

Measured over the lifetime of a machine or plant, initial costs usually account for only 10% or less of the TCO. To perform a thorough assessment of system optimisation, management of the remaining 90% of lifecycle cost factors has by far the greatest influence:

- Energy
- Downtime
- Maintenance and repair
- Wear and replacement
- Disposal costs

Therefore a device with a high purchase cost and low energy consumption may turn out to be the most economic over its total service life than a device which is more affordable initially, but consumes a larger amount of energy in operation. When analysing overall cost, consider also product availability. When a device breaks down during use, costs will arise, for example due to a loss of production. To minimise production downtime, the operator requires storage space for one or several replacement devices. Establishing the storage space involves decisions on the size of the storage space required, which in turn depends on how quickly the product manufacturer can deliver new devices when required. These are examples of just some of the factors to be considered.

One of the biggest issues when it comes to investment in energy efficiency is still the initial purchasing cost, even though payback times are often less than 24 months. Product availability is another element of the equation. The failure of a device in operation can incur costs due to production downtime. Therefore a spare parts stock plan, based on lifetime and replacement part delivery time, is an essential element of a system optimisation strategy. Components, such as variable speed drives, which are globally sourceable and which possess broad compatibility with diverse motor technologies and control systems are valuable elements in planning for optimal productivity.

Conclusion

Energy efficiency is documented to save resources and save money. It is rightly prioritised as the first fuel. When we make energy supply

decisions based on this principle, society has the most to win [10]. However, introducing energy efficiency measures requires investment. Sometimes the costs outweigh the benefits, and therefore not all potential energy efficiency measures are viable or wise. Not all legislative decisions support energy efficiency in practice, and not all investment decisions act to save energy in the long run. To stay on track and ensure that energy efficiency does pay, requires assessment of all the relevant factors when making every individual decision:

- Every measure has side effects. Weigh the side effects up against the advantages
- Consider lifetime cost. Low purchase costs seldom mean automatically low operating costs
- Consult experts where necessary to clarify technical advantages and disadvantages

Only then can we make good choices that enhance our industries and our society, keep us in the energy-efficiency race, and ultimately create a better tomorrow for our future generations.

References

- [1] World Energy Outlook, International Energy Agency, November 2016.
- [2] The Renewable Energy Sources Act (EEG), Germany, 1 April 2000.
- [3] Daily Mail, UK, 30 June 2016 <http://www.dailymail.co.uk/news/article-3667663/Germanys-Kohl-tells-EU-dont-pressure-UK-Brexit-vote.html>
- [4] The International Energy Agency is an independent agency with 29 member nations, founded by the nations in order to evaluate and forecast the development of energy consumption globally. Read more here: www.iea.org
- [5] Energy Efficiency Market Report 2013, International Energy Agency, October 2013 https://www.iea.org/publications/freepublications/publication/EEMR2013_free.pdf
- [6] European Commission <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive>.
- [7] Energy Efficiency with Electric Drive Systems, ZVEI - German Electrical and Electronic Manufacturers' Association, April 2015.
- [8] Handbook of energy conservation, The Working Group under the PSO - Research and Development Project 336-055, March 2006. http://euroec.by/assets/files/danfoss/Handbook_Energy_AQUA_202.pdf
- [9] Cost: ErP Lot 30 Tasks 2 – 5, last updated August 2014. Saving: Regulation (EU) 640/2009, guidelines: https://ec.europa.eu/energy/sites/ener/files/documents/20141211_GuidelinesElectricMotor
- [10] Efficiency First: A New Paradigm for the European Energy System, European Climate Foundation, June 2016.

Anna Hildebrand Jensen is a Senior Writer in Global Market Communication for Danfoss Drives. Enquiries: Email Roland Sargent. Email sargentr@danfoss.com

Total South African Drive Solution for Kazakhstan Gold Mine

Rudi Swanepoel, SEW-EURODRIVE South Africa

One of the largest orders in the history of SEW-EURODRIVE South Africa for its MC Series industrial gear units for a gold-mining project in Kazakhstan, will see the assembly and supply of 31 of these units.

The OEM won the order from a local specialist in the design and supply of equipment to the metallurgical industry. What made it such a unique project for the company was the low ambient temperatures that had to be accommodated according to the specification.

These industrial gear units for mixing and agitating applications require high torque ratings and function under a wide temperature range. They feature a modular design with a specific housing concept to ensure an optimal solution for diverse applications.

The low ambient temperatures in Kazakhstan meant that special oil tanks with heaters had to be fitted to the units. While this is available as a standard feature, it is not a run-of-the-mill requirement. Other features that had to be installed as well included flow switches. The required loads of the application, which are considerable in terms of agitators, had to be met.

The MC Series of industrial gear units comprises particularly compact helical and helical-bevel gear units. The torque range of the seven sizes is 6 kNm to 65 kNm. The parallel shaft design offers plenty of flexibility in system design, in addition to requiring remarkably little space. This makes it ideal for a range of applications, from materials handling to transporting heavy loads, mixing, crane drives, and shredders. A version with Extended Bearing Distance (EBD) and reinforced output shaft is also available for more specific applications.

The collaboration with the client in fulfilling this order for Kazakhstan represents a latest trend in the increasing internationalisation of projects. It sends a positive message about the manufacturing experience and expertise of this company, which is increasingly sought-after the world over.

The MC Series is designed for a small torque range of up to 65 kNm, with special features such as limited space requirements and high availability. The gear units are suitable for horizontal, vertical, and upright mounting on the customer's machine. The MC series is particularly suited for medium gear ratios.

The modular concept includes a great variety of optional accessories, including motor adaptors, belt drives, and backstops. Standardised applications solutions are available for bucket elevators, cooling towers, and agitators. The company's EBD concept allows for stronger bearings within the gear unit itself, which means that in many

- Kazakhstan represents an important mining market for this company as it tackles projects outside its borders.
- The low ambient temperatures in Kazakhstan had to be accommodated for this project.
- For this type of project, it is important that customer-specific applications and tailor-made solutions can be provided.



take note



The Republic of Kazakhstan is the world's largest landlocked country by land area, bigger than all of Western Europe. The country reportedly holds the second-largest uranium, chromium, lead, and zinc reserves, as well as the third largest manganese deposits, and is number five globally in terms of copper reserves. The country is also said to rank in the top ten for iron and gold, and is a well-known diamond exporter. It also has the 11th largest proven reserves of both petroleum and natural gas.



”

Industrial gear units for mixing and agitating applications require high torque ratings and function under a wide temperature range.

cases separate bearings are no longer required in the agitator, while oversizing can also be avoided. An optional drywell seal prevents leakage at the output shaft, and therefore a standard mounting flange can be used.

Conclusion

When it comes to large-scale equipment such as at Kazakhstan, it is imperative that customer-specific applications and tailor-made solutions can be provided. The key to a real competitive advantage lies in creating innovative, safe and energy-efficient concepts, from the comprehensive modular system and its drive components to solutions-orientated, and cost- and function-optimised packages with a high degree of adaptability to specific applications.

Kazakhstan represents an important mining market for this company as it tackles projects outside its borders. Business Monitor reports that Kazakhstan’s mining industry could soar to \$29,5 billion this year. This growth is being spearheaded by the coal, gold and copper sectors, which together account for the bulk of the value of the Central Asian nation’s mining industry.



Rudi Swanepoel is Head of Projects at SEW-EURODRIVE. Enquiries: Jana Klut. Email JKlut@sew.co.za www.facebook.com/SEWEurodriveSA

ROUND UP

Power quality and motor analyser

Fluke, represented in southern Africa by the **Comtest Group**, has on offer the Fluke 438-II Power Quality and Motor Analyser, adding key mechanical measurement capabilities for electric motors to the advanced power quality analysis functions of the Fluke 430 Series II Power Quality Analysers. They measure and analyse key electrical and mechanical performance parameters such as power, harmonics, unbalance, motor speed, torque and mechanical power without the need of mechanical sensors.

The 438-II is the ideal portable motor analysis test tool, locating, predicting, preventing, and troubleshooting power quality problems in three-phase and single-phase power distribution systems, while giving technicians the mechanical and electrical information needed to effectively evaluate motor performance.

- Measure key parameters on direct-on-line motors including torque, RPM, mechanical power and motor efficiency
- Perform dynamic motor analysis by plotting of motor de-rating factor against load according to NEMA guidelines
- Calculate mechanical power and efficiency without the need of mechanical sensors, just connect to the input conductors and you’re ready to go
- Measure electrical power parameters such as voltage, current, power, apparent power, power factor, harmonic distortion and unbalance to identify characteristics that impact motor efficiency
- Identify power quality issues such as dips, swells, transients, harmonics and unbalance
- PowerWave data technology captures fast RMS data, and shows half-cycle av-

- erages and waveforms to characterise electrical system dynamics (generator start-ups, UPS switching etc.)
- Waveform capture function captures 100/120 cycles (50/60 Hz) of each event detected event, in all modes, without set-up
- Automatic transient mode captures waveform data at 200 kS/s on all phases simultaneously up to 6 kV

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



Comprehensive regional drive service workshop

On 30 March 2017, **ABB** launched the Regional Drives Service Workshop (DSW) at ABB's offices in South Africa's Longmeadow facility in Modderfontein. This world-class facility aims at providing value to ABB customers all over Africa by ensuring excellent service and producing rapid turn-around time on drive units.

Test capabilities

"Historically the Drives Service workshop was occupied mostly by local repair units and was not recognised by ABB Global as a regional service Centre" says ABB's Drives Service Manager ZA Nols Muller. In the past 18 months ABB has invested in test capabilities of the workshop costing up R2 M and has put other measures into place such as enclosing the complete test facility, changing internal procedures to accommodate the enclosure and putting up to four levels of isolation between the tester and the equipment thus ensuring safety. ABB has also developed 12 staff members to work in the facility. "The highly skilled facility has gone through a rigorous certification process in order for it to be permissible to repair and work on drive units and has been globally certified by ABB", mentions Muller.

To run the comprehensive facility, ABB Southern Africa has one of the best drive service training centres globally and multiple trainers and is certified across the whole product range with both low voltage and medium voltage drives. The training centre is one of only three certified training centres globally that can do load commutated inverters training, with the other two residing in Switzerland and China.

Service throughout sub-Saharan Africa

The Longmeadow facility serves as a regional workshop which means it provides a repair service to customers throughout sub-Saharan Africa. To ABB customers, the new workshop effectively means that the quality control is 110% better than it was previously thus allowing all repaired units to leave the workshop in top condition. All units that come in from African countries are quoted within 24 hours and are given a maximum turnaround time of 10 days when all logistics run smoothly.

Looking into the future ABB Southern Africa aims at locally manufacturing Service Exchange, which is a standard product that is currently being imported from the Finish Logistics Centre in Finland. The manufacturing of this product is set to begin at the end of 2017. (See *Social Engineers*, page 43).

Enquiries: Nols Muller. Email nols.muller@za.abb.com



Driving emergency borehole pumps

Rockwell Automation sub-Saharan Africa was contracted by Eco Projects, a Rockwell Automation Namibian systems integrator, for equipment to power borehole pumps in Windhoek, Namibia. The borehole development is the first phase of 17-month plan designed to alleviate the critical water supply shortage experienced by the City due to southern Africa's current drought conditions. Rockwell Automation's scope of work was to engineer and deliver eight Allen-Bradley PowerFlex 753 low voltage ac drives varying from 250 kW to 132 kW.

The PowerFlex drives are needed to automate the pump systems that transfer water from the boreholes to various reservoirs in the municipal area. "To make sure our drives could safely and adequately power the submersible pumps installed at depths of 150 to 250 metres, we made use of CP Automation, a global member of the Rockwell Automation PartnerNetwork, to engineer the correct sine filters. The VFD and sine wave filter combination allows the motor to run at continuously adjustable speeds and the torque is adaptable to varying mechanical loads," says Pieter Briel, Industry Account Manager, Rockwell Automation. "Due to the significant cable length from the PowerFlex 753 drives to the motors, it was necessary that sine filters also be installed to reduce the parasitic capacitances that result from such long cables lengths and result in reactive power."

The Rockwell Automation order was placed in the latter part of October 2016 and delivery took place during November. Eco Projects was responsible for total electrical installation including construction of switchboards, installation and commissioning. Six boreholes were commissioned in December 2016.

Enquiries: Pieter Briel. Email pbriel@ra.rockwell.com



Equipment for penguin research

Bosch has joined a range of eminent South African companies in sponsoring equipment for an initiative to conduct research into the Snow Petrel and the near-threatened Emperor Penguin in Antarctica. Craig Blanckenberg from Solutech, a solutions provider based in Cape Town, travelled to Antarctica onboard the SA Agulhas II, which departed in November last year. He is working alongside a team of scientists investigating the status biology and ecology of these bird species. As a leading provider of power tools, accessories, and measuring tools, with a strong focus on innovation and ongoing product development, Bosch is proud to be associated with this unique endeavour, according to Sebastian Johannes, Bosch Measuring Tools Brand Manager. "We are an environmentally-aware and socially-responsible company, and therefore this sponsorship represents an important contribution on the part of Bosch to the sustainability of the planet and its future generations," Johannes comments.

Enquiries: Tel. +27 (0) 11) 651 9600 or email Sebastian.Johannes@za.bosch.com

Systems integration as a total project solution

SEW-EURODRIVE is punting system integration as a new area of differentiation in order to increase the uptake of its products in the marketplace. This will also help promote the OEM as a total solutions provider for entire project lifecycles. The main aim behind system integration is to bring together companies that supply automation components and technology, like SEW-EURODRIVE, with system integrators, who invariably tackle entire projects. The key here is that products from different suppliers can be used in a single system or project, Hendri Oosthuizen, Mechatronics Sales Engineer, explains.

“Although we would like to supply SEW-EURODRIVE products as far as possible to our clients, there may be a requirement for something we do not supply, such as a PLC or pneumatic component,” he points out.

However, the total solution is predicated on SEW-EURODRIVE technology, in addition to any additional requirements. The system integrator is essentially tasked to integrate all of these disparate elements in order to be able to present the end user with a complete solution,” Norman Maleka, National Sales Manager, comments.

The opportunities for system integration run the gamut from mining to automation and food and beverage. “For example, if an end user wants to set up a typical process or assembly line, the system integrator will supply all of the necessary products he is familiar with that meet these specific requirements. The end result is a total solution that integrates the mechanical, electrical, and even data needs,” Oosthuizen highlights. SEW-EURODRIVE’s systems integration push is an attempt to ‘shake hands’ with potential customers

and introduce them to the wide range of technology and solutions available from the OEM.

“Our aim is to establish two-way partnerships with companies specialising in automation, and to sell our extensive range of electronic and automation components to them. Not only will this help these companies in meeting the diverse daily needs of their own end users, it will build confidence in the broader marketplace as to SEW-EURODRIVE’s competency and expertise in this arena,” Maleka outlines.

Enquiries: Jana Klut. Email JKlut@sew.co.za



SEW-EURODRIVE’s Johan van Graan, Hendri Oosthuizen and Dylan Enslin.



Zest WEG Group has been servicing the agricultural sector for more than 35 years with its range of robustly engineered products.

WEG products, designed using modern technology, offer farmers optimum reliability coupled with excellent energy efficiency. From WEG Premium Efficiency electric motors to WWash electric motors with WEG Variable Speed Drives, all have developed a reputation for solid performance in the most demanding conditions. Low maintenance requirements as well as ease of serviceability allow reduced total cost of ownership to the agricultural sector.

As a market leader, Zest WEG Group offers access through WEG Brazil, to international best practice in electrical solutions for the agricultural sector. The Zest WEG Group operates a strategically situated network of branches and distributors to ensure optimum availability of product and parts.

RELIABLE ENERGY SOLUTION

for the entire agricultural sector.

- 1 Diesel Generator Set
- 2 WWash Motor
- 3 Invicta Vibrator Motors
- 4 Indoor Customisable Control Panels
- 5 Overhead Lines
- 6 Transformers
- 7 All Weather Outdoor Control Panels
- 8 Pole Mount Transformers
- 9 Premium Efficiency Motors
- 10 Variable Speed Drives
- 11 Soft Starters
- 12 Direct Online Starters (DOL)
- 13 Motor Protective LV Switchgear
- 14 Pushbuttons and Pilot lights



Tel: +27 11 723 6000

www.zestweg.com

Complete drive packs help boost productivity at Limpopo platinum mine

A major drive to boost productivity at a platinum mine in Limpopo Province has resulted in drive engineering specialist **SEW-EURODRIVE** supplying a number of complete drive systems with industrial gear units to the project.

The drive packs are specifically for three different conveyor systems, Rudi Swanepoel, Head of Projects at SEW-EURODRIVE, explains. The first drive system has two 220 kW drives, while the remainder have three 360 kW and one 300 kW drives respectively.

The drive systems form part of the OEM's X Series, covering torque ranges from 6,8 kNm to 475 kNm. The large quantity of predefined accessories available for the X Series allows for a great deal of flexibility in catering for diverse mining applications. "A special requirement on this project was the extremely short delivery time, placing

us under tremendous pressure to have the first drive system assembled and on the mine by the beginning of March," Swanepoel explains.

The tight timeframe was due to the fact that the mine has specific shutdown periods for proactive maintenance requirements. In order to facilitate the schedule, the complete drive systems were assembled at SEW-EURODRIVE's Nelspruit facility and transported directly to the platinum mine.

Delivery of the drive systems for the second conveyor system is scheduled for April, and the last conveyor system in May, for which the gear units are being airfreighted especially from Germany to meet the deadline.

The X Series industrial gear units feature high- and low-speed couplings, motors and base plates. These preassembled units rep-

resent significant cost-savings and reduced downtime, as the power pack is supplied with the input coupling shaft with the alignment already carried out.

Enquiries: JKlut@sew.co.za



Vertical gearmotors installed in pump stations protect against flooding

When completed, the Permanent Canal Closures and Pumps (PCCP) project will be able to pump over 55 billion litres per day from New Orleans' three outfall canals into Lake Pontchartrain, preventing another natural disaster like the devastating Hurricane Katrina.

In August of 2005, a brutal storm hit the Gulf Coast of the United States burying more than 80% of the city of New Orleans under 15 feet of water and debris. With more than 1 800 dead and millions of people left homeless, Hurricane Katrina is considered one of the worst natural disasters in US history.

To prevent something like this from ever happening again, the U.S. Army Corps of Engineers put a temporary pumping system in place, then awarded approximately \$615 M for the New Orleans Permanent Canal Closures and Pumps (PCCP) project to keep the city's three main drainage outfall canals from being overwhelmed in future storms.

Nearly completed pump stations at the mouth of the 17th Street, Orleans Avenue and London Avenue canals feature 17 ABB vertical gearmotors (VGM) that will power massive pumps supplied by Patterson Pump Co. The project also includes 17 ABB ACS 1000i and 5000i MV drives to control the pump start-up.

The VGM integrates proven Dodge planetary gear technology with **ABB** standard low-pole-count motors and is designed for low-speed vertical pumping applications with high-power requirements. According to Mike Myers, Global Business Manager for Dodge specialty and large gearing, the product offered key advantages for the PCCP project.

"The VGM is more efficient than typical pump technologies that utilise high-pole-count motors or right angle reducers with horizontal motors," said Myers. "Not only is the VGM a more cost competitive than other technologies, it's also smaller and lighter, which meant substantial savings associated with the civil work required at the pump stations."

The higher power factor delivered by the VGM design ensures more efficient use of electrical power with less reactive power drawn by the system. Utilising the reducer to accommodate thrust load is

also more cost effective than designing this functionality into the motor. Beyond savings, the VGM also provides maximum pump performance. By using the specific gear reduction ratio required for a specific application, optimised pump speeds can be attained.

"Being able to provide the exact output speed means you can lower vibration levels, decrease radial and axial loads, and create optimal discharge pressure," Myers says. "This efficient design also results in improved reliability and reduced maintenance. The VGM is an ideal solution for the New Orleans pump stations, but can also be used for circulating water in power plants, desalination plants, irrigation systems and wastewater pumping systems."

The PCCP project is scheduled for completion in late 2017. When fully operational, the three stations combined will be able to pump 24 300 cubic feet per second. That's enough water to fill an Olympic-sized swimming pool in 3,63 seconds.

Enquiries: Email vilma.lindell@fi.abb.com



Robust RJ45 modules for industrial applications

Phoenix Contact has now launched new RJ45 socket modules on to the market, in a compact design, suitable for industrial applications. Versions for DIN rail mounting as well as for integration into existing panel mounting frames allow use in a wide range of possible applications.

The socket modules are suitable for use as coupler modules between two RJ45 connectors as well as for direct connection of solid and stranded conductors (AWG26 ... 24). All versions are designed for 10GBASE-T applications, thereby enabling data rates of up to 10 Gbps over cabling distances of 55 metres in the case of coupling modules according to CAT6, up to 100 metres in the case of cable connection modules according to CAT6A.

The zinc die-cast housing of the installation modules is free of halogens and heavy metals, in accordance with RoHS 2.

Enquiries: [Email info@phoenixcontact.co.za](mailto:info@phoenixcontact.co.za)



Connect to power faster in the field

In harsh environments, energy has to be distributed safely even under difficult ambient conditions. This is where the QPD installation system from Phoenix Contact comes into its own as a robust solution for power distribution. Installation is quick, easy, and flexible. This represents on-site time savings of up to 80%.

Thanks to the convenient IDC insulation displacement connection, cables of up to 5 x 6,0 mm² can be connected without special tools. Voltages of up to 690 V and currents of up to 40 A can be transmitted with ease. Thanks to the high degree of protection (IP68/IP69K), the installation system also guarantees a safe and robust connection in harsh environments.

The QPD installation system product range includes connectors and cable connectors, H- and T-distributors, and panel feed-throughs. This means that users can implement their own individual installation right through to the point of use.

Enquiries: [Email info@phoenixcontact.co.za](mailto:info@phoenixcontact.co.za)



YOUR 24/7 SERVICE PARTNER

MARTHINUSEN AND COUTTS - LEADERS IN ELECTRIC MOTOR AND POWER GENERATION REPAIR, MAINTENANCE AND SPECIALISED MANUFACTURE.



- Large AC / DC Motors
- Small AC / DC Motors
- Traction & Flameproof Motors
- Transformers
- Power Generation

ON SITE SERVICES

- Removal repair and re-installation
- On site testing and breakdown repair
- Root cause analysis
- Condition monitoring
- Preventative and predictive maintenance
- Motor management programme

CUSTOMISED ELECTRICAL AND MECHANICAL DESIGN

- Reliability improvements/enhancements
- Efficiency improvements
- Performance upgrades
- Power savings



Marthinusen & Coutts
Your Assets. Your Needs. Your Service Partner.

Sensors Play Key Role in Pushing Industry into Fourth Age

Gerry Bryant, Countapulse Controls

Automatic and multifunctional sensors and intelligent controls are relied upon more than ever by manufacturing enterprises.

As manufacturing enterprises become increasingly automated, tighter control will have to be exercised over processes and equipment to ensure high quality, low cost output and minimum waste. The 'Fourth Industrial Revolution' – with sensing technology at its heart – is paving the way to achieving this.

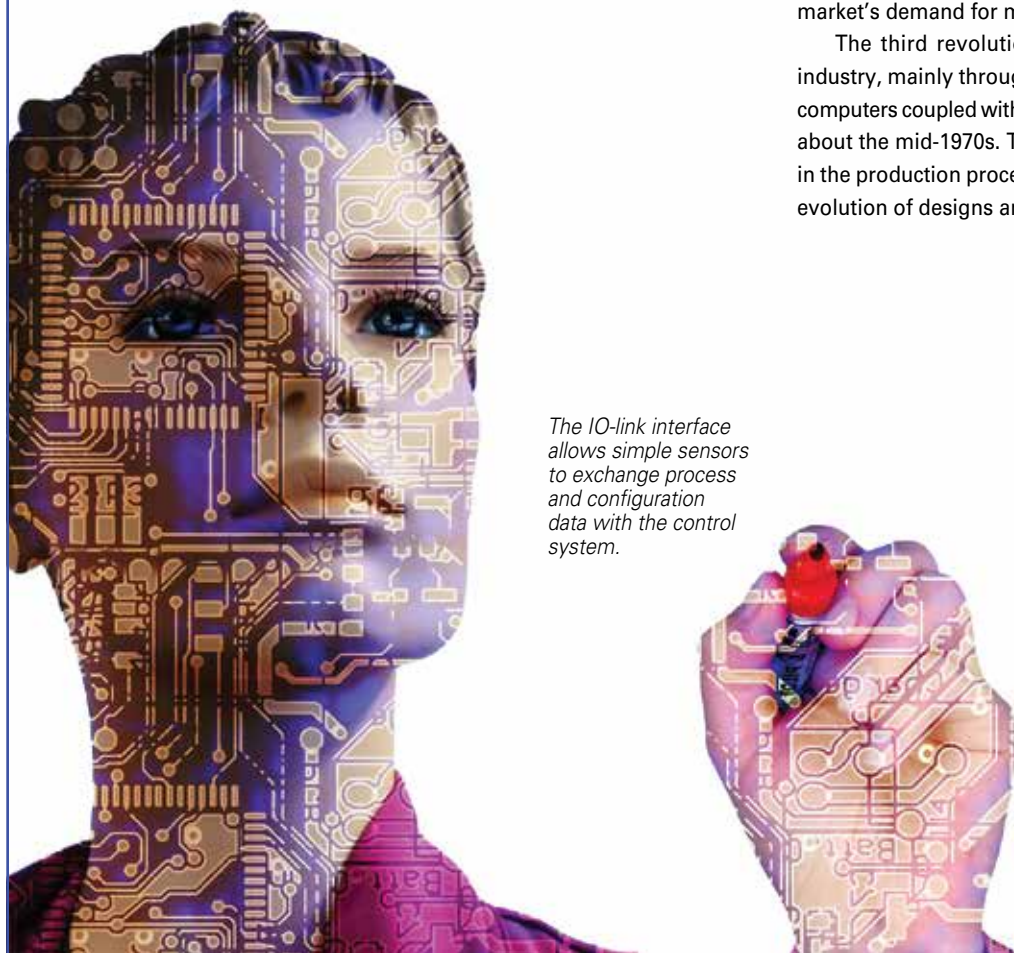
Automatic and multifunctional sensors and intelligent controls are today relied upon more than ever by manufacturing enterprises, on both the process and enterprise levels. The design, manufacture, optimisation and effective deployment of these systems will be critical to industry in the next century.

But what is the Fourth Industrial Revolution and how does it compare to previous 'revolutions' in the way our industries have evolved?

Mechanisation brought what we now call the first industrial revolution, through the application of steam engines to functions previously conducted in small workshops. The result was large factories that fuelled production levels to scales as yet undreamed of, and new ways of working that defined the industrial age.

The movement to mass production techniques and machinery in the early 20th century ushered in the second industrial revolution; an era consumed by the commitment to productivity. Widespread employment of conveyor belt technology and the adoption of the assembly line drove up production to new heights while reducing unit costs. Consumer goods historically reserved for the wealthy, like motor vehicles, became more affordable, further driving up the market's demand for mass produced goods.

The third revolution came with the advent of automation in industry, mainly through the increased use of micro-electronics and computers coupled with CNC control systems on the factory floor from about the mid-1970s. This automation also allowed finer tolerances in the production process and a higher quality of output, feeding the evolution of designs and technology across all sectors.



The IO-link interface allows simple sensors to exchange process and configuration data with the control system.

A pioneer on the road into the future is global sensor company Leuze, represented in South Africa by Countapulse Controls, which was recently instrumental in the design of the world's first commercially attractive interface: the IO-link. This interface allows simple sensors to exchange process and configuration data with the control system, and is another step towards achieving the full benefits of the Fourth Revolution, when process, configuration and diagnostic data is available not just in the control system but all the way up to the cloud.

Internet of things – and sensors

In the Fourth Revolution, the paradigm is shifting towards machine-to-machine (M2M) communication, as the automation of processing steps becomes more and more complex. The traditional 'automation pyramid', where data from the field level passes through other levels up to the control level to be gradually aggregated, is now breaking down.

In its place is the internet environment, where data is available on all levels and can pass directly to a public or private 'cloud'. Participants within a network will now exchange data with each other using internet technologies. Significantly, this networking will not be simply between machines in a plant or factory, but will also be between these machines and all sorts of sensing and monitoring devices and systems.

There will be growing integration across entire operations of information technology (IT) and operational technology (OT); by OT is meant the hardware and software that can detect or cause a change through the direct monitoring and control of physical devices, such as those comprising packaging lines.

Access to high levels of accurate information will allow companies to optimise processes, increase productivity and reduce costs through, for example, automated condition monitoring and predictive maintenance.

These efficiencies will be driven – indeed, they will be demanded – by changing patterns of customer preference. As consumers place increased value on 'individualised' products (from automobiles to breakfast cereal), production systems must be capable of manufacturing smaller batches with greater productivity. Manufacturers must now convert their production systems more frequently to accommodate a new product range; this in turn leads to more complex value chains between producers, and with more complexity comes a higher possibility of faults.

Efficient solutions that can avoid these faults must incorporate better networking and intelligence of the systems, to deal with the complexity of the demands.

Keeping up with the revolution

Sensing technology has been evolving to keep pace with these de-



Automation also allowed finer tolerances in the production process.

velopments in the manufacturing and production sectors; even as the manner in which information is transmitted changes from cable to wireless, the inherent characteristics of these devices will remain largely intact.

A range of production parameters are tracked by modern sensors. Typically, the sensing technology monitors and communicates events ranging from basics like position, shaft rotation, temperature and humidity, right up to quality control functions where the sensor is able to detect anomalies in respect of colour or type. The sensing technology is able to convert this raw data into meaningful information which is then transmitted via the internet interface.

As part of this evolution, new sensor combinations are emerging, with a single device capable of monitoring more than one function in an application. An example is a pressure sensor that is also capable of monitoring temperature and humidity; this not only reduces the overall cost of the sensor but also offers the end-user a value add sensing solution. Similarly, safety laser scanners such as those in the

”

Sensing technology is at the heart of the Fourth Industrial Revolution.

- The First Industrial Revolution comprised Mechanisation which was a new way of working; this made way for the Second Industrial Revolution, which could be described as a 'commitment to productivity'.
- The Third Revolution came with the advent of automation in industry.
- The Fourth Revolution shows a shift towards Machine-to Machine communication as the automation of processing steps becomes more complex.

take note

Leuze RSL 400 family incorporate two autonomous protective functions in one device.

Miniaturisation of sensors is another important development for industry; the Leuze 2 Series throughbeam photoelectric sensors, for instance, are smaller than a matchbox. While this first started within the aerospace and medical sectors (where there was a call for minute and lightweight devices), it has carried across to other markets. Smaller sensors which provide high levels of functionality, reliability and performance are in demand. These devices can be installed in areas and on machinery which would previously not have been considered suitable due to space constraints.

Conclusion

Sensors are likely to play a continued and important role in the productivity of all manufacturing sectors and will remain a key component in smart manufacturing facilities as the world progresses through the Fourth Industrial Revolution.

Gerry Bryant is the Managing Director of Countapulse Controls, southern African supplier of sensing, measurement, counting, switching, monitoring and positioning instrumentation. In operation for many years, the company has the full backing of its German principals and offers a complete technical advisory service for the most effective use of its products in automotive and other branches of engineering. Enquiries: Tel. +27 (0) 11 615 7556 or email Bryant@countapulse.co.za



There will be growing integration across entire operations of information technology (IT) and operational technology (OT).



Access to high levels of accurate information will allow companies to optimise processes.

Smooth speed regulation with high precision

The new Hengstler Acuro AX73 is a class leading optical encoder that offers smooth speed regulation with high levels of precision. Its compact dimensions make it suitable for installation in areas where there are space constraints.

Available from the official Hengstler distributor for southern Africa, **Countapulse Controls**, this absolute rotary encoder is ideal for ATEX-rated applications. The Acuro AX73 encoder carries ATEX and IEC Ex certification for gas and dust explosion proof requirements.

This advanced optical encoder offers benefits for a myriad of applications including on winches, cranes, drill and other oil and gas industry equipment, as well as in paint plants, petrochemical facilities, bottling plants and grain mills.

The connection configuration on the encoder allows the routing of cabling with the encoder installation in separate steps. This provides significant cost and time savings during installation, as cabling can be completed in advance. This type of installation allows the quick replacement of a spare encoder during maintenance and servicing activities. Another feature that facilitates ease of maintenance is the use of just two screws for the connection hood. Many comparable encoders use six or even eight screws, while insufficient corrosion protection makes such units difficult to uninstall. Special patented screws are used to protect the unit against dust, water and corrosion.

The optical scanning system provides a highly accurate 22-bit resolution sensor signal for wherever precision or smooth

speed regulation is necessary. Johannesburg-based, Countapulse Controls has an in-depth understanding of the application of absolute rotary encoders and is able to assist the market in selection of the best fit solution for a given application.

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



ACURO®- AX73
Xproof

Valve feedback sensor with easy wiring

End position feedback on quarter-turn actuators

The unit contains two inductive sensors in a potted and sturdy housing with protection rating IP 67. It signals two end positions. It is equipped with a solenoid connection replacing the additional cable to the solenoid valve.



The actuator interface is optionally equipped with a standardised M20 x 1 gland. The spacious terminal chamber allows quick and easy wiring. Since the terminal block can be removed, no new wiring is required if the sensor is replaced. A UL approval for this product is currently in progress.

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

Newly developed electromagnetic inductive flowmeter for conductive fluids

KOBOLD, represented locally by **Instrotech**, has on offer a newly developed electromagnetic inductive flowmeter for conductive fluids – the model DMH with a standard accuracy of $\pm 0,3\%$ of reading stability of zero. It is used specifically for the measurement and monitoring of the volume flow rate of acid or alkaline fluids, potable (drinking) water, waste water, pulps, pastes and other electrically conductive materials, without loss of pressure.

When an electrically conductive medium passes through a directional magnetic field, a voltage is induced in accordance with Faraday's Law of Induction. The size of this measurement voltage is proportional to the mean rate of flow and consequently also to the volume flow rate.

A flowmeter consists of a sensor that picks up the measuring signal generated from the induced voltage, and a transducer that converts this signal into a standardised output signal (4-20 mA or pulses). The measurement transducer can be affixed to the sensor or mounted separately. Pressure, temperature, density and viscosity do not affect the volume measurement. Solid fractions and gas bubbles should be avoided.

The microprocessor-controlled converter UMF2 guarantees the highest of accuracies and with its alpha-numeric backlit LCD terminal, six keys, plain text response, and plausibility check of entries, is easy to operate.

Empty-pipe detection, coil current monitoring, and plain text error messages guarantee full control over sensor and measuring point at any time. Pulse, status, and current outputs as well as HART communication are standard features, all of them electrically isolated.

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



One sensing range for all metals

Kplus sensors have the same sensing range for all types of metals. They are for example perfectly suited for the detection of aluminium, where conventional sensors show a considerably reduced sensing range. The high switching frequencies enable the monitoring of fast changing switching states.



The resistant stainless steel sleeve allows reliable use in oil and coolant applications. The wide temperature range as well as the high protection ratings enable universal use of the new Kplus sensors.

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

ELECTRICAL TRANSDUCERS:

Technologies:
Hall-Open/Closed loop,
Fluxgate, Rogowski
AC/DC current 1mA-400kA
AC/DC voltage up to 6.4kV



CONTACTORS & HIGH VOLTAGE RELAYS:

High Voltage Relays up to 70kV/25A*
DC contactors up to 1 000A/ 1 200V*
* Depending on model.



CURRENT PROBES/CLAMP CT'S:

Technologies: Hall, CT and Rogowski
AC/DC 1mA-15 000A



Universal Technic:
www.universal-technic.com



GMC-I PROSsys
Prosys: www.i-prosys.com

DENVER

CONTACT:
Denver Technical Products (PTY) Ltd
Tel: +27 11 626 2023
Email: denverttech@pixie.co.za
Website: www.denver-tech.co.za

Secure liquid level detection

Kobold, represented locally by **Instrotech**, has capacitive level indicators type NMC, specifically designed to measure liquid levels



in tanks. They consist of a measuring probe and a connecting head with a plug-in evaluation module. Depending on the operating conditions, different probes are available:

- NMC-N: Standard version with metal tanks inserted, their walls undertaking the task of a second electrode. It is applicable for fluid foods as well as for different waters
- NMC-S: The two probe sensor for non-metal tanks for operation in aggressive media
- NMC-T: Especially for operation in non-metal holding tanks and media of lower conductivity, the designed probe consists of an interior probe and a surrounding pipe of stainless steel serving as a reference electrode

- NMC-H: The electronics of one stick probe of stainless steel is thermally insulated by a special intermediate piece so that the sensor technology can easily handle up to 125°C.

The measuring system is based on the capacitive measuring method. The measuring probe and the tank wall, or the second electrode respectively, form the plates of a capacitor; the medium in the tank is the dielectric fluid. The capacity depends on the medium. The more the medium touches the measuring probe, the higher the capacity. This change is detected by the plug-in evaluation module and transformed in a percentage display or a 4-20 mA signal.

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

uprox3 sensors are IO-Link-capable

Turck, locally supplied by **RET Automation Controls** is offering its uprox3 sensor in an IO-Link-capable version. Turck's uprox3 sensor line offers the longest sensing distances of all factor 1 sensors on the market, and now coupled with IO-Link capabilities, allows for more flexibility and intelligence to be integrated into sensing applications.

With the use of the uprox IO-link sensors, you reduce costs in new and existing applications. Easy configuration allows you to flexibly adapt the sensors to your needs. You can not only set the output functions and the sensing distances, but special functions are included and can be used whenever needed. Additionally, each adjustable switching distance can be run sequentially in combination with an IO-Link master. Also, the sensors include all standard uprox3 benefits such as factor 1 with the longest sensing distances and an excellent magnetic field strength. The reduction of variants streamlines the ordering of the product, and also minimises the storage and administrative costs for customers.

In IO-Link mode, the sensor is operated on an IO-Link master. This enables access to all parameter and evaluation functions. The intelligent data retention with IO-Link 1.1 allows a sensor to be exchanged without having to reset parameters. The process data uprox3-IOL provides further analysis options such as application-specific switch points, temperature limits, etc. or an identification number. These can be used

to identify 256 different nodes. The sensing of targets and their simultaneous identification can then be implemented with a single sensor.

Turck is initially offering four variants of uprox3 IO-Link: an M12, M18, and M30 barrel style, all in a chrome brass housing, as well as PTFE-coated variants for welding applications. Additionally, a rectangular, CK40 style is also included in the series.

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



Process solution companies collaborate

Allpronix is the authorised stocking distributor for Eurotherm process control, measurement, precise temperature control and data recording solutions. Eurotherm has a global reputation as a provider of innovative process control solutions, and for over 50 years has saved companies processing costs and helped them meet regulatory requirements. As part of the Schneider Electric business, Eurotherm is a global supplier of Industrial Automation and process control, measure-

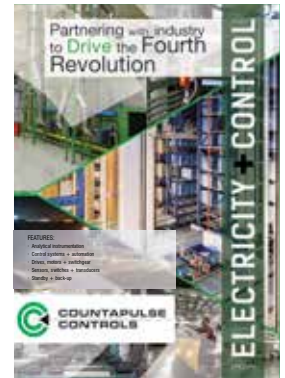
ment and data management solutions and services. Allpronix is a supplier of process control and industrial networking instrumentation. This unique instrumentation is supplied to a wide range of industry types within South Africa and the African continent.

Allpronix, with Eurotherm, provides process power controllers and process data recorders solutions in life science industries, heat treatment, plastics and glass manufacturing, as well as water and wastewater,

oil and gas, semiconductor, environmental monitoring, power, food and beverage industries.

Allpronix is pleased to collaborate with Eurotherm and highlight their innovative products and solutions which are designed to bring real benefits to customers by optimising processes, operations, and plant efficiency.

Enquiries: Tel. +27 (0) 11 795 9500 or email sales@allpronix.com



Hengstler Acuro X65

Encoder that fits where others won't

Encoders operating in potentially hazardous applications must be engineered to deal with the demands of these environments, such as petrochemical plants, mines and offshore platforms.

The Hengstler Acuro X65 is billed as the explosion proof absolute encoder that will fit where other encoders won't. The most compact encoder in its class, the device has a shallow depth of 70 mm and a body diameter of only 59 mm. This allows the encoder to be accommodated in extremely tight spaces with ease.

Certified explosion proof, this encoder is built with marine-grade stainless steel and has a shock rating of 200 Gs and a shaft load of 300 N. It is protected to Class IP 66 and IP 67.

It can be installed quickly and easily due to its flexible quick-connect terminal system.

The Acuro X65 offers the choice of SSI or CANopen interface, and it is also possible to integrate the CANopen encoder in a ring network configuration, increasing its flexibility of use.

Applications include winches, enamelling production lines, bottling machines, mixers, silo works, mills, cranes and drilling equipment.

Hengstler encoders are available from official southern African distributor, Countapulse Controls. The company operates a 24/7 technical helpline to assist potential and existing customers.

Enquiries: Gerry Bryant

+27 (0) 11 615 7556

@ bryant@countapulse.co.za

www.countapulse.co.za



ACURO®- AX65

Xproof

The Hengstler Acuro X65 is billed as the explosion proof absolute encoder that will fit where other encoders won't.



ACURO®- AX65



The Hengstler Acuro X65 is built with marine-grade stainless steel and has a shock rating of 200 Gs and a shaft load of 300 N. It is protected to Class IP 66 and IP 67.

The most compact encoder in its class, the Acuro has a shallow depth of 70 mm and a body diameter of only 59 mm.



ACURO®- AX65

Xproof



For the Cummins QSK95 generator range, both the diesel engine and the generator are designed from the ground up to suit the specific needs of power generation.



Case for Diesel and Gas Engines

Generators have two key uses: For standby power to mitigate against the risks of power outages from a connected supply; and for prime power with an unlimited run time for use in industrial applications where the grid is not readily accessible.

PM How crucial is it to have power in critical situations?

KG As well as during load shedding, standby power generators are often used in emergency or safety critical situations. Power is critical for safety in underground mines, for example, where lives depend on electrical power, from the basic siren/alarm system all the way to the ventilation, cooling plants and evacuation hoist. In hospitals, surgeons cannot continue to operate on a patient if there is no power and patients on life support systems such as dialysis machines won't survive long if these machines are left without power for any length of time.

Cummins offers a range of back-up power options, from 8,0 kVA to 3 750 kVA. For example, open sets for installation in plant rooms or containerised units that can be placed outside shopping malls; for applications along the coast, we can use stainless steel enclosures and, generally, we can engineer a standby power system and its enclosure to best suit the application, the environment and the operating conditions.

PM Why is standby power so necessary in a drought?

KG Standby power has become increasingly necessary in hydro-dependent countries north of our borders because of drought. Inadequate grid availability in South Africa affects exports to neighbouring countries and drought causes low water flow, so turbines have to be shut down. This is particularly problematic in the dry winter seasons in countries dependent on the Zambezi: Zambia, Zimbabwe, Mozambique, Malawi and Namibia.

PM How do engine-driven generators differ for standby and prime use?

KG Engine-driven generators for standby and prime use are different. A unit used for 600 continuous hours a month has a very different duty cycle than a back-up generator that is started several times a month for 200 hours or less of total generation. The specification of the engine and the generator, as well as the power management solution and the cost equations are all very different.

The SABMiller Polokwane Brewery in Limpopo was supplied with two fully containerised C1675 D5 gensets with a prime rating of 1 400 kVA each.





Crown Publications editor, Peter Middleton, talks to Kenny Gaynor, director of power generation for Cummins Southern Africa, about the role of diesel, gas and biogas engine-generator sets and some of the hybrid options that are fast becoming viable as grid replacement options.



Peter Middleton



Kenny Gaynor

For prime use, Cummins Power Generation offers solutions for people needing a 24/7 supply, typically a remote off-grid mine or a mine under development, for example, and while diesel power generation is always going to be more expensive than utility power, if access to the grid is unavailable, then there are fewer options other than prime units. There is nothing better for picking up a load than diesel engines. Diesel engines are amazing when it comes to absorbing changes in load, either up or down.

PM Costs?

KG With the price of diesel at around 1 US\$ per litre, diesel generated power costs are somewhere upwards of \$0,30 per kWh. About 73% of this cost can be attributed to the diesel fuel costs, with capex and maintenance accounting for the remaining 27% of the levelised cost of electricity (LCOE). The capex and maintenance costs are low but the big issue is running costs due to fuel. This makes prime diesel generators ideal for use in hybrid solutions. We see companies using solar during the day to reduce the fuel costs, with the diesel being used overnight. Solar technology is now quite sophisticated. Management systems can predict when the solar output is about to drop due to cloud cover, for example, and the diesels can be started in

time to prevent power dipping. The diesels ramp up in sync with the solar coming off and the load doesn't see any change in the supply.

These hybrid systems could see some 20% savings on diesel fuel costs, which has a huge impact on the levelised kWh cost. Almost all solar PV costs are capex – which can be recouped very quickly – and in term of running costs, even the maintenance of solar systems is minimal, limited to cleaning.

PM Is there a problem with cloud cover in Africa?

KG In Africa, particularly in North and West Africa, cloud cover can be a big problem, causing the diesels to come in more often than they would in sunnier places. The cost of solar has decreased significantly in recent times, though, making hybrid diesel-solar solutions very attractive for mining operations that are off-grid.

This also applies to cell phone towers in rural Africa, which use generators, battery storage and PV panels in similarly managed hybrid combinations. The generator charges the batteries at night while the solar PV charges them when the sun is shining, with the batteries supplying the direct load.

As is now common with modern control and power management technology, remote monitoring capabilities are readily available and

- Natural gas and biogas engines are increasingly viable alternatives to diesel gensets.
- By passing the exhaust gas through a heat exchanger, a second and free source of energy in the form of heat becomes available.
- The direct efficiency of a gas engine-driven generator is around 40 - 42% ... but a further 45% can be added to that by beneficiating the heat.

take note



Cummins' LNG-fuelled QSV 91 generator sets are ideal for CHP (combined heat and power) applications such as data centres, where cooling dominates the load profile: this because the exhaust gas stream runs significantly hotter – by about 200°C – than diesel-engine equivalents.

built into Cummins power solutions. When called to look at generators that aren't working, we often find that a security guard has borrowed the battery to start his car or the fuel tank has run empty. These are trivial issues and common and remote monitoring can easily be used to overcome them.

On a level above this is engine diagnostics. Sensors are installed in all modern engines and this information is ideal for preventative maintenance, to alert plant managers to engine problems before they cause serious damage.

PM *How does the company fare when it comes to footprint and sound?*

KG On the emissions side, Cummins is ahead of the curve. Internationally, we supply Tier IV diesel engines, but the issue in Africa is fuel quality, so we are still supplying Tier III systems. We design and manufacture our own emissions and filtration systems, which can easily be incorporated into static back-up or prime generation plants. These do require some routine maintenance, though, and in very remote areas, even changing a filter can be difficult.

In the past, a diesel engine designed for other applications would be used for a generator. But nowadays, with our QSK95: 3750, for example, both the engine and the generator are designed from the ground up to suit the specific needs of power generation.

The loads and acceleration ranges required for generation are very different to transport needs. A mine truck might go from being empty to carrying 200 t when loaded and the speed, rpm and torque ranges are wide. For generation applications, the operating rpm range can be narrowed and held relatively constant for better optimisation of fuel efficiency, reliability and longer maintenance intervals. The power density of generators is also high and they need to be able to ramp electricity generation up or down from full load to zero in less than 10 seconds.

Footprint is also important, as are sound levels. Our units produce 75 dB at 1,0 m and down to 62 to 65 dB at 7,0 m, but enclosures can be used to dampen this right down to below 55 dB, which is the standard specification for hospitals.

PM *Are gas engines viable alternatives to diesel gensets?*

KG Natural gas and biogas engines are an increasingly viable alternative to diesel gensets, particularly for combined heat and power applications. Gas engine exhausts run hotter than diesel equivalents, by about 200°C. So by passing the exhaust gas through a heat exchanger, a second and free source of energy in the form of heat becomes available. There is an ideal application in hospitals, for example, where substantial amounts of hot water are needed, as well as prime and uninterrupted electrical power.

Most hospitals are already using gas for their boilers. We like to redirect that gas into an engine to produce both heat and power. In so doing, we can often take the hospital off-grid without having to use

substantially more fuel. We have done numerous studies and the cost balance is there. It is a little marginal at the moment but with rising grid-based tariffs, this solution is becoming increasingly attractive.

Piped gas is ideal as it overcomes the need for onsite diesel tanks or regular deliveries but, where a gas infrastructure is not available, compressed natural gas from tanks can also be used, with the trucking cost being similar to diesel. From a fuel cost perspective, the \$0,30 per kWh LCOE for diesel can be brought down close to the \$0,20 mark, obviously driven by local gas costs. In Nigeria, where engine generators are routinely used for prime generation, we are seeing price reductions from 30 cents (US) to perhaps 18 cents, when switching from diesel to gas. In addition, the high quality CO₂ in the exhaust stream can offer a third bite of the cherry for bottling, food and beverage companies.

PM *What is the direct efficiency of a gas engine-driven generator?*

KG The direct efficiency of a gas engine-driven generator is around 40 to 42% but a further 45% can be added to that by beneficiating the heat. That allows these systems to achieve overall efficiencies of more than 80%, which is remarkable for an energy generation system driven by an internal combustion engine.

Another opportunity for CHP systems is for data centres, where cooling dominates the load profile. Using absorption chillers for the HVAC systems of data centres, the exhaust heat from the gas engines can be used instead of electricity to meet the cooling demand. The data centre can then be taken off-grid in a very cost effective and convenient way – and we are sure to see more and more data centres using this technology.

Cummins offers gas-based generation solutions from 25 kVA to 2 000 kVA, with the 16 cylinder, 91 litre QSV91 system being the upper-end flagship. We have the smaller solutions too, though, for small offices or remote clinics, which often only need 25 kW.

PM *Tell me a little about your gas engine systems that are fuelled by biogas?*

KG The method of using of gas engine systems fuelled by biogas generated from municipal waste: from landfill sites or sewage works was designed in 1970s and 80s, when increasing urbanisation created management problems for sewage plants. Biogas-fuelled CSP systems offer an excellent opportunity to exploit the waste creating the problem.

For sewage, there are two opportunities to extract biogas (methane) for a generator, first directly off the liquid and, second, by gasifying the solid sludge – the exhaust heat from the gas engine being an ideal heat source for drying the sludge.

Not only does this enable a sewage works to be taken off grid, making the plant self-sufficient, it can offer opportunities to sell power to nearby housing or industrial estates. On urban landfill sites where

“
The lowest cost option is
seldom going to be the
safest one.”



space is constrained, a methane plant can be installed to extract the methane from buried organic waste. This can be used by a gas engine to produce heat and power for sale into businesses and communities.

This is a perfect example of how thinking a little further about our problems can create new opportunities to benefit our resources. These need not be mega plants. Plants of 20 to 100 kW can be cost effective and the technology is available and relatively simple.

Long term, power generation from biogas also offers renewable energy opportunities: Cactus is an excellent feedstock for biofuel production, offering opportunities for mines to better engage with and support surrounding rural communities. By planting and harvesting cactus, agricultural jobs are secured with the harvest being sold to a biofuel producer. The fuel is then sold to a power plant, for credits or kWh, and the power used to create growth opportunities in the community: bakeries, Internet cafés, shops or small industries.

PM ... And in conclusion?

KG Generators are currently often seen as a necessary 'grudge purchase'. Companies know that they need them but often make the mistake of seeing them as a once-off purchase at the minimum cost possible. Back-up service and maintenance is very important. Are parts available, are the products being properly supported and serviced and is anyone available for callout should problems be experienced?

If the power goes off, can you rely on the purchased generator to supply the back-up power? The lowest cost option is seldom going to be the safest one.

Cummins supplied SABMiller Alrode Brewery with four C2500 D5A diesel generator sets for emergency standby power. The 6,6 kV generators boast a prime rating of 1 800 kVA, and are powered by a Cummins QSK60G8 engines.



RELAYS TO PROTECT YOUR ENTIRE SYSTEM

Secure critical equipment, substation transformers, motors, capacitor banks, distribution feeders, and transmission lines with advanced protection, power quality monitoring, metering, communication, event analysis.

Our comprehensive relay platform offers advanced level features and functions for multiple applications:

- Metering and monitoring
- Feeder protection
- Transformer protection
- Capacitor protection and control
- Advanced event analysis tools
- Generator protection
- Motor protection
- Line protection
- Busbar protection

REYROLLE

WoodBeam

P O Box 526 Modderfontein 1645
Tel: +27 (11) 457-1600 (0861 966 323)
Fax: +27 (11) 608-1016
email : info@woodbeam.co.za



How battery technology is redefining the future of energy supply

Ken Boyce, UL LLC

One of the greatest challenges in energy production and distribution today is something few people think about... storage.

This is particularly true when it comes to renewable energy, which is usually produced at decentralised facilities. In the case of solar energy, it can also only be produced during daylight hours, so safe and efficient storage is essential if we are to be able to take advantage of the tremendous potential of solar energy.

The facts speak for themselves. In just 88 minutes, 470 exajoules of solar energy hit the earth's surface, which is as much energy as all of humanity consumes in a year. In less than five days, we receive 36 zettajoules of solar energy, which is as much energy as is contained in all proven reserves of oil, coal and natural gas on the planet [1]. If we could capture just 1/1 000th of the solar energy that reaches the earth, we could have access to six times as much energy as we currently consume. The challenge, of course, is not only how to harness this energy, but also how to store it in a safe and cost-efficient manner.

One of the ways in which energy is stored is, of course, by using batteries. As we all know, batteries are everywhere – and are used to power everything from cell phones to airliners. In the renewable energy sector they are the building blocks of the future. Rapid and exponential developments in battery technology are, in fact, redefining the entire future of energy supply.

A number of important trends are shaping this trajectory, one of which is the development of lithium-ion technology and flow batteries.

To begin with, the prices of lithium-ion batteries for use in electronic devices have been declining for 20 years and are still dropping. In contrast, storage capacity has increased eleven-fold over this period, and scaled production is likely to make them viable for commercial use in electric cars by 2020. As for flow batteries, which are just coming onto the market, these offer up to ten times the storage capacity of lithium-ion batteries, vastly increasing potential uses.

Appropriate quality and safety testing is naturally vital as these new technologies develop. Two key issues are fire suppression and the safety of aged cells and batteries, both of which are an important focus for UL's battery research scientists. The results of advanced tests on fire suppressants for various lithium-ion batteries have, in fact, recently been presented at the Space Power 2016 Workshop, convened by the Aerospace Corporation in the US, as well as at the Battery Safety 2016 Conference, convened by the Knowledge Foundation. Additional fire tests are scheduled to take place this

year and are aimed at optimising the cost and effectiveness of fire suppression technologies. Parallel studies into the safety of aged cells and batteries have examined the safety characteristics of both fresh and recycled cells and cell modules, and have yielded insights into how cell components degrade. Research and testing in this area is essential for the development of new battery technologies for all users.

”

Rapid and exponential developments in battery technology are redefining the future of energy supply.

Conclusion

In South Africa, the design and production of lithium-ion and flow batteries is a new focus area in manufacturing. The industry's potential to contribute to economic growth and job creation is nevertheless recognised, and it could also contribute significantly to securing the country's leadership position in renewable energy production. With this in mind, UL is continuing to develop cutting-edge safety and quality testing protocols for local application. Ensuring that standards and conformity assessment methods continue to keep pace with innovation is essential, and this is a challenge UL has definitely taken up.

Bibliography

- [1] Diamandis P. September 2016. Three big trends shaking up the energy industry. Singularity Hub. <https://singularityhub.com/2016/09/05/3-big-trends-shaking-up-the-energy-industry/>
- [2] Boyce K, Jeevarajan J. 2017. Leading the way in battery safety.

- The price of lithium-ion batteries for use in electronic devices has declined dramatically.
- Flow batteries offer ten times the storage capacity of lithium-ion batteries.
- In South Africa, the 'design and production' of lithium-ion and flow batteries is a new focus in manufacturing.

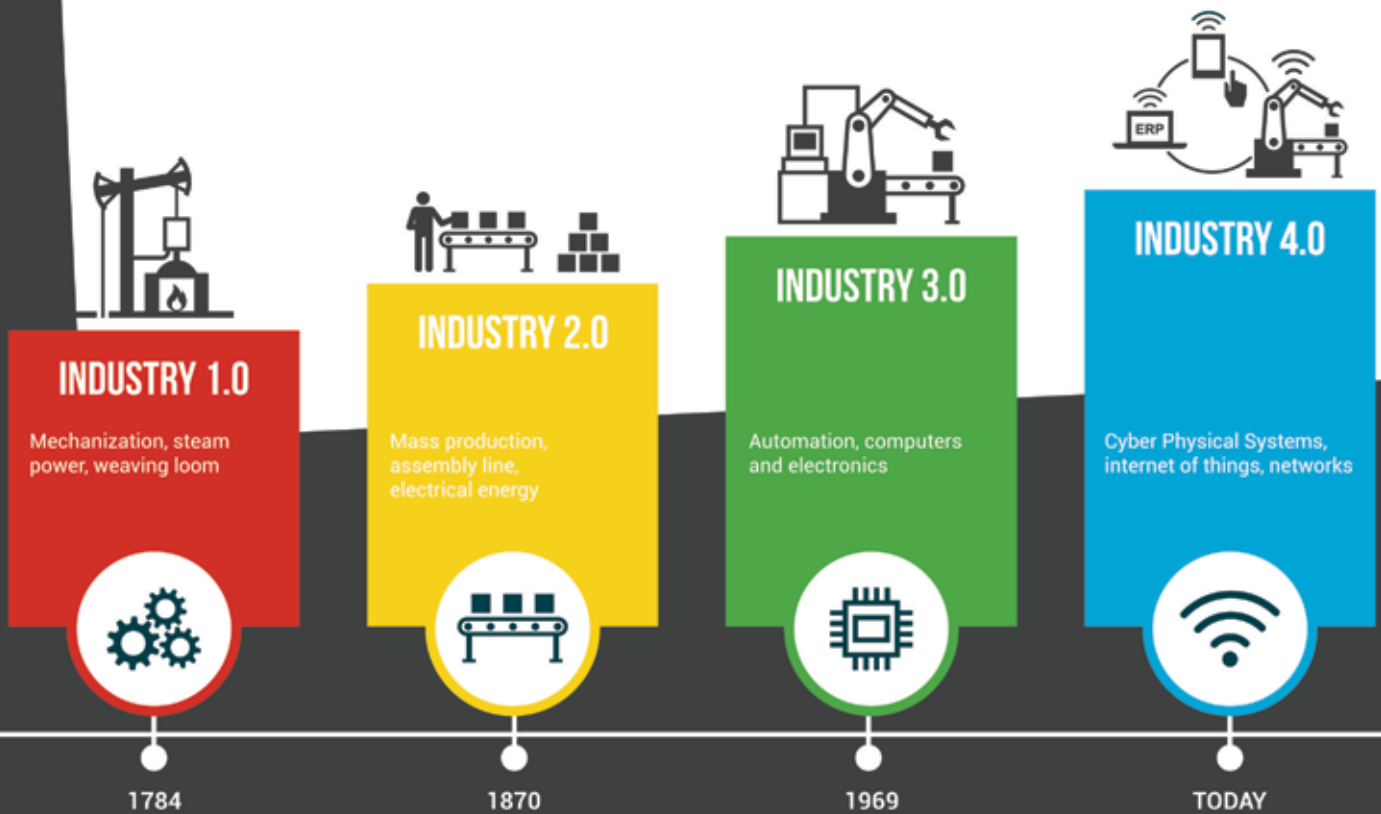


Ken Boyce is Principal Engineer Director, Energy and Power Technologies at UL LLC. Ken has decades of experience in safety engineering across many sectors. Most recently he has served as UL's technical leader for the energy and power sectors, overseeing global standards development and technical operations for renewable energy technologies, batteries and energy storage systems, advanced technology grid infrastructure, electric vehicle systems, power distribution, factory automation, and related equipment. Ken holds a Bachelor of Science degree in Electrical Engineering from the Illinois Institute of Technology. Enquiries: UL Southern Africa. Tel. +27 (0) 10 822 3950

Don't miss it!

Participate in
paving the way to the
Fourth Industrial Revolution
in Africa

Get behind
IOT/IIOT/Industrie 4.0



- 48 INTERNATIONAL AND LOCAL GUEST SPEAKERS
- 117 TECHNOLOGY UPDATE PRESENTATIONS
- 7 INTERACTIVE PANEL DISCUSSIONS
- 250 DELEGATES


FULL DELEGATE RATE R8500 ex VAT
(or R4500 ex VAT per day)

Delegate fee includes:
VIP Lunches, VIP Cocktail Networking Functions,
Refreshments & Conference Material

SEATS ARE LIMITED. REGISTER TODAY.

www.connectedindustries.co.za

Organised by:

 **Reed Exhibitions**

Showcased at:



AFRICA AUTOMATION FAIR
showcasing industrial control technologies **2017**

'In Africa ... for Africa'

Siemens has signed a local manufacturing agreement with Cape Town-based Electro Inductive Industries (Eii) – a Level 2 B-BBEE black industrialist company that manufactures distribution transformers and miniature substations. The signing event was held at Siemens headquarters in Midrand on 4 April 2017.

The manufacturing facility is currently being developed and upgraded in CapeTown, to cater for a new line of Siemens transformers as part of its growth and job creation strategy.



“Siemens experts will begin training Eii staff on the new technology, equipment and quality, thereby equipping them with a new set of internationally-recognised assembly skills and expertise,” said Ronnie Naidoo, Head of Transformers and High Voltage Products, Siemens Southern & Eastern Africa.

Downstream benefits of this localisation project will be felt across the entire supply chain through Siemens’ global procurement and enterprise development programme. It incorporates global good governance, compliance and ethical business mentoring.

“Siemens is in Africa for Africa. This new partnership is of immense importance in helping South Africa to achieve its market growth, with benefits to society as a whole, such as an increase in job creation. It also helps Siemens to expand its local portfolio,” said Naidoo.

**Enquiries: Keshin Govender. Tel. +27 (0) 11 652 2000;
E-mail: keshin.govender@siemens.com**

Andre Soergel (CEO, Siemens Medium Power Transformers), Sydney Mabalayo (Acting CEO, Electro Inductive Industries), Peter Kgame (Executive Director, Electro Inductive Industries), Jost Kerscher (Sales Head Africa Siemens Transformers), Giovanni Cattani (CEO Siemens Medium Power Transformers, Trento, Italy).

Virtual Reality at PEWA 2017

Cummins, a global power leader and corporation of complementary business units that design, manufacture, distribute and service diesel and natural gas engines and related technologies, demonstrated its recently launched Virtual Reality training and marketing device at Africa’s highly acclaimed Power & Electricity World Africa (PEWA) Exhibition. PEWA is the annual forum where industry professionals gather to acquire ideas on developing sustainable, clean and bankable world class energy solutions for projects on the continent.

The Cummins exhibit showcased two sets of high-tech equipment for media and customers to experience. By wearing goggles and a headset, one is swept up in a simulated 3-D tour of a plant or data centre, complete with sound to further drive the reader’s trip into the world of virtual reality. The viewer is introduced to various products in a data centre, including the recently launched QSK95 Series of high-horsepower generator sets. The QSK95 is specifically designed and engineered for critical applications that demand a robust, reli-

able source of power to ensure uninterrupted operations, for applications such as hospitals, sports stadiums, office buildings, data centres and the like. Commenting at the exhibition, Kenny Gaynor, Director of Power Generation for **Cummins Southern Africa**, said, “This incredible innovative device has been engineered for use in training and education, providing a very new and dynamic teaching experience. Innovation is about unlocking and unleashing new ways of thinking, doing and delivering against a background of continuous improvement.” The compact and portable headgear provides endless marketing opportunities for the broad range of products.

Cummins Southern Africa is headquartered in Johannesburg, with branches in Longmeadow, Bloemfontein, Cape Town, Durban and Port Elizabeth; as well as Zambia, Botswana, Mozambique and Zimbabwe. The company also enjoys a wide range of dealer networks in support of its widespread Southern Africa footprint. (See *Social Engineers*, page 43).

Enquiries: Sal Govender. Email sal.govender@cummins.com



Kenny Gaynor, Director of Power Generation for Cummins Southern Africa, wears goggles and a headset that transport engineers into a simulated 3-D ‘virtual’ tour of a plant or data centre.



The Cummins stand at Power & Electricity World Africa (PEWA).



Engineers speak out on SA's cabinet reshuffle!

Consulting Engineers South Africa (CESA), representing a member base of over 500 companies which employ over 23 000 people in various capacities, is dismayed by the current cabinet reshuffle. As an industry we pride ourselves on excellence in the delivery of infrastructure projects.

The current cabinet reshuffle, which we accept as being the prerogative of the President regrettably not only runs the risk of exacerbating the already troubled economic situation we find ourselves in, but also sends out a disturbing message on rewarding mediocrity and punishing excellence. The latter is counter-intuitive to the culture we seek to establish among young engineering professionals who will be responsible for ensuring the wellbeing of our infrastructure for generations to come.

CESA further would like to reiterate that the country cannot afford this questionable reshuffle based on the need for more 'effectiveness and efficiency' according to the President, when this flies in the face of dispensing of the very performance needed to achieve this objective. As engineers we believe that a better approach would have been to dispense of the non-performers and bring on board more performers.

The industry is already experiencing difficulty amidst corruption, appointment of consulting engineering firms that have little

or no track record of delivery and even mafia style criminal activity halting construction activity. The latter not only puts lives at risk but also affects job security in a sector where limited employment opportunities currently exist due to the already low levels of capital investment in infrastructure.

The junk status downgrade investment rating by Standard & Poor's, a leading global credit rating agency, which emanated mostly from the political uncertainty confirmed by this ill-timed reshuffle, limits investor confidence further and will not only hamper economic growth, but will further limit our ability to create more jobs. Skilled engineering practitioners from various technical disciplines are currently being retrenched at a time when this has been identified as at least six out of the ten most scarce skills in the country.

The jury of course is always out on whether new

appointees will be future star performers and whether some Ministers would have learnt from their past shortcomings. As an industry committed to the success and wellbeing of our country, in support of initiatives towards constructive and sustainable economic transformation, we offer our support to partner with those ministries entrusted with infrastructure delivery.

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



CESA Chief Executive Officer - Chris Campbell.

We, like all other citizens are committed to a South Africa that benefits all, in the present and for generations to come.

Alliance Partners at CONNECT

Schneider Electric celebrated the winners of the CONNECT Alliance Partner Conference at a glitzy awards ceremony held at the Riverside Sun Hotel in Vanderbijlpark, South Africa. The awards are a commemoration and a recognition of companies within Schneider Electric's network of Alliance Partners who continue to excel in being system integrators through implementing Schneider Electric's industry solutions.

"It is important that we celebrate and honour our dedicated partners who continue to innovate and grow their portfolio's to provide excellent services that help our industrial and infrastructure customers meet their technical and business goals," says Marc Ramsay Vice President - Industry Business Unit, Schneider Electric. He adds that this is a crucial part of celebrating local partners and this forms an integral aspect of Schneider Electric's Alliance Partner program. Local Excellence Awards for 2016 presented during the Connect conference, Gala Dinner:

- PlantStruxure Partner of the Year 2016 – Control Software Solutions
- Best Migration Project of the Year 2016 – EME-PCBs
- PlantStruxure PES Partner of the Year 2016 – Artiflex
- Business Development Award 2016 – Devcotech
- Most Certified PlantStruxure Engineers Award 2016 - Control Software Solutions

Schneider Electric's Alliance Partner Program enables partners the opportunity to collaborate, gain insight into what is new in terms of

Schneider Electric's innovative solutions and products. This allows the partners to leverage on Schneider's best in class industry solutions to grow their own portfolios and build their businesses to become leading industry system integrators.

Enquiries: Lebohlang Thokoane. Email lebohlang.thokoane@schneider-electric.com



Joe Von Aulock - SI Channel manager, Eric Leger-Country President of Schneider Electric. Holding the award for PlantStruxure Partner of the Year 2016 – Control Software Solutions (Pieter Venter). (Second from right) Marc Ramsay – VP Industry Business. Anthony Pickering, Zone VP Industry Africa & Caribbean Rest of the World Operations Schneider Electric.

Second French South African Schneider Electric Education Centre in the Vaal

Schneider Electric, the global specialist in energy management and automation, has partnered with the Sedibeng College to launch the second French South African Schneider Electric Education Centre (FSASEC) in the Vaal. The launch forms part of three more French South African Schneider Electric Education Centres (FSASECs) which Schneider Electric has established in conjunction with the Schneider Electric Foundation, the French Ministry of Education, Higher Education and Research. The primary objective for the establishment of these centres is to bridge the gap between industry and vocational training in the fields of energy. The French South African Schneider Electric Education Centres focus on training previously disadvantaged young South Africans to become artisans, electricians and technicians in the field of energy, using Schneider Electric's latest cutting-edge technology offerings and equipment. The launch of this centre forms part of Schneider Electric's partnership agreements that were signed in March 2016 with several other key institutions of Higher Education, for the establishment of more FSASECs throughout the country.

Enquiries: Lebohang Thokoane.
 Email lebohang.thokoane@schneider-electric.com



An initiative to change young people's lives makes them smile!

Left to right: Professor Ben Groenewald (CPUT), Hendrick Langa (F'SASEC at VUT) and Professor Sebastian (Director at F'SASEC).

VEGA Controls supports local crime fighting initiative

VEGA Controls SA has donated funds to the Honeydew Community Policing Forum (CPF) in recognition of its service to the community. A cheque of R50 000.00 was handed to Jon Rosenberg and Kevin Thomson representing the CPF Group Director John Groom said, "They are our unsung heroes. They deliver a service to the public and as a business, we support their cause".

The donation has been earmarked to assist in the operations of the Trauma Unit which has seen a decrease in funding but provides an essential free counselling service to victims of crime. Community Policing was created by the Police Act of 1995, and it is being used as a philosophy that guides police management styles and operational strategies, and emphasises the establishment of police-community partnerships, with a problem solving approach responsive to the needs of the community.

A major objective of community policing is to establish an active partnership between police and the community through which crime, service delivery, and police-community relations can jointly be analysed, and appropriate solutions designed and implemented. The CPF office runs purely on donations. Resident Associations, companies, and private individuals donate on a monthly basis to this essential initiative, which serves all communities.

Enquiries: Email chantal.groom@vega.com



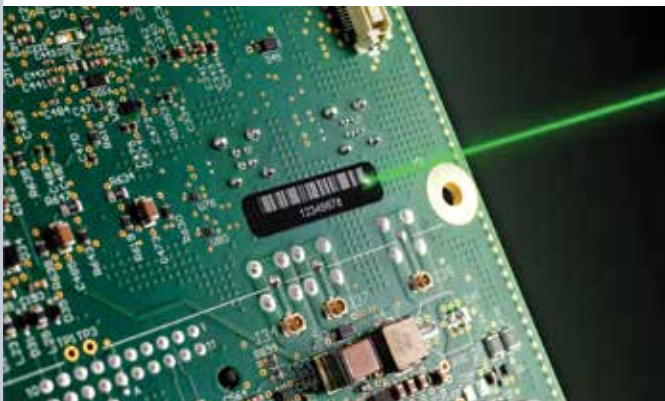
Caption: VEGA Controls Group Director, John Groom, and Kevin Thomson of the CPF.

Increase barcode legibility with laser engraveable labels

Brady's new B-730 polyimide laser engraveable label offers reliable barcode legibility, regardless of the subsurface that needs to be identified. The high quality durable label, with a black matt finish,

shows white markings after lasering which optimises barcode and serialisation contrast. It also makes the label very suitable for extremely small fonts and complex prints that can be generated by lasers. The B-730 polyimide label can reduce scrap in supply chains that need to comply with traceability requirements. Barcodes lasered on the B-730 label are easier to read for scanners compared to direct part marking, which leads to reduced waste. Because of its increased barcode legibility, the B-730 label can also improve data mining in smart factories that use lasers to mark products. The B-730 laser engraveable polyimide traceability label features an ultra-thin yet durable permanent adhesive that can resist high temperatures and aggressive chemicals, while avoiding adhesive bleed to reduce the risk of unplanned production stops. Specifically developed for auto-apply systems, the label is highly reliable and offers increased accuracy and pick up rate.

Enquiries: Email emea_request@bradycorp.com



Eskom Contractor Academy assists Cape Town entrepreneur

GlobesScope Security Solutions owner, Glynn Mashonga, has been awarded a certificate for successfully completing the Eskom Contractor Academy accredited course. She heard about the academy when her company competed and became a finalist in the Eskom Development Foundation Business Investment Competition (BIC) in 2015.

The Contractor Academy is the Eskom Development Foundation's programme to equip small business owners and entrepreneurs with the necessary skills required to build sustainable businesses. It is offered to contractors and suppliers wishing to improve their skills in project and financial management, entrepreneurship, legislation and technical acumen. The academy, which combines both theoretical and practical work, is covered over eight months and students attend a residential study school for a week every month. Eskom believes that by empowering small businesses and helping them to become profitable, the country can start addressing its socio-economic challenges and start seeing a difference.

Glynn Mashonga says: "The academy has provided me with all the tools and knowledge to enable me to implement these systems. I was recently awarded a maintenance contract which necessitated work being carried out at numerous sites and at different times. I was able to implement the knowledge I had gained from the project management course to accurately calculate the time needed to complete the work, as well as the profit margins."

Enquiries: Email mediadesk@eskom.co.za



Eskom Development Foundation's Acting Chief Executive Officer, Cecil Ramonotsi; GlobesScope Security Solutions owner, Glynn Mashonga; Eskom Western Cape Operating Unit General Manager, Alwie Lester.

Bizz Buzz

Yokogawa and Cosasco conclude Agreement for Sale of ISA100 wireless-based products

Yokogawa Electric Corporation has signed a mutual sales agreement with Rohrback Cosasco Systems, Inc., a US-based manufacturer of corrosion monitoring systems and equipment. Under this agreement, Yokogawa will distribute Cosasco's ISA Wireless-based MWT-3905 and CWT-9020 corrosion monitors and Cosasco will distribute Yokogawa ISA Wireless-based field wireless system devices. Yokogawa can now add corrosion sensors to its line-up of field wireless devices that help customers efficiently maintain facilities and ensure safety at their plants. For Cosasco, the ability to offer its corrosion monitors in combination with Yokogawa field wireless devices is expected to increase sales.

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

Agreement - Uretech and HMA Group

Uretech, a local manufacturer of polyurethane products such as wear liners for the mining industry, has entered into an agreement with the **HMA Group** of Australia to have its product range distributed internationally. In turn, the HMA Group's wide product range will now be made available in Africa for the first time. The agreement, concluded towards the end of 2016, will see the establishment of a new South African subsidiary of the HMA Group, known as HMA South Africa, with George Hoffmann as General Manager. In terms of the agreement, HMA has been appointed as Uretech's sole international distributor, including South Africa.

Enquiries: Email ghoffmann@hmagrp.com

ENEL signs 25 year PPA with ZESCO

Enel, acting through its Renewable Energies Division Enel Green Power (EGP), has signed a 25-year power purchase agreement with Zambia's state-owned utility **ZESCO** for the 34 MW Ngonye (The project was known as Mosi-oa-Tunya when Enel was awarded the 34 MW in June 2016). PV solar project won in June following the first round tender of the Scaling Solar programme, which was launched by state-owned investment holding company Industrial Development Corporation Limited (IDC). Ngonye is located in the Lusaka South Multi-Facility Economic Zone in southern Zambia, and the awarding of the capacity to Enel marked the Group's entry into Zambia's renewable energy market. Enel will be investing approximately \$40 M in the construction of the new PV plant, which is expected to generate around 70 GWh per year. Ngonye will be owned by a special purpose vehicle in which EGP will hold 80% and IDC will have a 20% minority stake.

Enquiries: Email ufficiostampa@enel.com

GCIP-SA entrepreneurs star in African innovation competition

Two alumni of the **Global Cleantech Innovation Programme** for SMEs in South Africa (GCIP-SA) were the only two South African finalists in the British Royal Academy of Engineering's Africa Prize for Engineering Innovation.

According to GCIP-SA national programme manager, Gerswynn McKuur, the success of graduates of the programme in other competitions is testimony to the quality of the programme. Alumni of the GCIP-SA regularly excel on national and international platforms after completing the programme.

The two Africa Prize finalists, André Nel with his GreenTower, a solar-energy micro-grid boiler, and James van der Walt with the Solar Turtle, a containerised mobile off-grid power station, were GCIP-SA finalists in 2015.

The British Royal Academy of Engineering established the Africa Prize for Engineering Innovation to stimulate and reward innovation in sub-Saharan Africa and to encourage engineers to develop scalable solutions to local challenges.

All Africa Prize finalists were invited to pitch their innovations during the Pitch@Palace Africa event at St James's Palace in London last month. Prince Andrew, the Duke of York, launched this event in 2015.

Nel says the opportunity to participate at the Pitch@Palace Africa event was incredible.

"Each of 16 finalists did a three-minute pitch to a select audience that forms part of the vast network surrounding the Duke of York. I was inspired by the standard of pitching that conveyed the singular message that engineering innovation is thriving in Africa.

"I met with a private utility and we are now in discussions to collaborate on a project to implement a GreenTower to provide renewable hot water and electricity to a community of 100 RDP homes in Gauteng."

He says he is very grateful to the GCIP-SA programme for how it has helped him to refine his technology, as well as his business model.

"During the GCIP-SA training programme we were exposed to the deBarys 20-element business model, which has been an invaluable tool in positioning and growing our business to become investor-ready," he says.

Nel's company, Eco-V, has commercialised the GreenTower, a hybrid off-grid water-heating system that has been proven to save around 90% in energy compared to electric boilers. It is affordably powered by solar energy. Sunlight heats up solar thermal collectors, adding to heat energy extracted from the air by solar heat pumps powered by solar PV.

Key commercial pilot projects executed during 2015 and 2016 have validated GreenTower technology and, along with winning a number of international and national

awards, have created significant traction for GreenTower.

James van der Walt says that although his Solar Turtle innovation did not win, a number of interested investors approached him after the event.

"The response was amazing. I'm feeling very positive at the moment," he says.

The SolarTurtle is a solar kiosk designed for security and portability. These container-based solar kiosks are assembled off-site and then deployed by simply offloading the container and unfolding the panels towards the sun.

Entries for the 2017 GCIP-SA competition and business accelerator are now open for start-ups and small- and medium-sized enterprises with innovative clean-technology solutions in energy efficiency, renewable energy, water efficiency, waste beneficiation, green building and green transportation.

The programme combines a competition and a business accelerator programme where participating entrepreneurs are continuously trained and mentored in the development of a more marketable and investor-attractive product and business. Participants also have the opportunity to connect with potential partners, clients and investors, participate in showcasing events and a chance to win a cash prize and a trip to San Francisco to compete with the best clean-technology innovators from eight other GCIP countries.

"We would like to invite entrepreneurs with new and ground-breaking technology innovations, or who are using existing technologies in unique applications, to contact us," says McKuur. He explains that innovations should be at proof-of-concept stage up to pre-commercialisation, demonstrate a feasible concept and product and have the potential to be commercialised."

Enquiries: Visit www.southafrica.cleantechopen.org



Africa Prize Finalist, André Nel.



Africa Prize Finalist, James van der Walt.



ABB's Longmeadow Regional Drives Workshop

ABB recently launched the Regional Drives Workshop at its facility in Longmeadow, Modderfontein, South Africa. As a regional workshop it provides a repair service to customers throughout sub-Saharan Africa. (See article on page 22).

Enquiries: Email nols.muller@za.abb.com



ABB Robotics and Motion Division, Drives and Controls: Nols Muller (Drives Service Manager), Mark Sheldon (Local Business Unit Manager), Harald Mossbacher (Local Division Sales Manager).



ABB Longmeadow, Fritz Grobler, Victor Leal and, from ABB Germany, Zafer Akyildiz.



Tomi Juutilainen (ABB, United Arab Emirates) and Kimmo Hirvonen (ABB Finland).



ABB Robotics and Motion Division, Drives and Controls: Clodette Prinsloo, Linda Joseph, Deon du Plessis and Lynette Viljoen.

Virtual Reality experience at PEWA

Cummins Southern Africa demonstrated its recently launched 'Virtual Reality Equipment' at Power & Electricity World Africa (PEWA) on Tuesday 28 March 2017. By wearing goggles and a headset, one is taken on a 'Virtual Reality' tour of an industrial plant and introduced to the company's products, capabilities and solutions. (See article on page 38).



Sporting the 'Virtual Reality Equipment' is Cummins Southern Africa Director, Power Generation Southern Africa, Kenny Gaynor, with Sales Engineer, Celeste Cadilhe.



Also at the Cummins stand were Siyandi Naiker and Nakul Virat.

EATON



Eaton, has appointed Malvin Naicker as Director of Sales for its Africa region.

SAIEE



Jacob Machinjike, General Manager Grids in Eskom Transmission, has been inaugurated President of the South African Institute of Electrical Engineers for 2017.

Africa Automation Fair 2017.....37	HB Systems.....14	Throughput Technologies.....Insert
Beckhoff.....IFC	ifm electronic.....OBC	Voltex.....3
CONCO.....13	Marthinussen & Coutts.....25	WIKA.....9
Countpulse Controls.....OFC	Schneider Electric.....7	WoodBeam.....35
Denver Technical Products.....29	SEW EURODRIVE.....IBC	ZEST WEG Group.....23

INDEX TO ADVERTISERS

Smart Buildings & Infrastructure

24 May (Africa Summit in Sandton, Johannesburg)
15 August (Western Cape Summit, Cape Town)
Enquiries: Visit www.smart-summit.com

4th Annual Manufacturing Indaba

27 – 28 June 2017
Emperors Palace, Ekurhuleni
A focus on the future of manufacturing in South Africa centered around the role of manufacturing, how to build a stronger manufacturing sector and the growth sectors for the future.
Enquiries: Email thembisa@siyenzevents.co.za

Securex 2017

30 May – 01 June 2017
Gallagher Convention Centre, Midrand, Johannesburg
Securex is Africa's leading security and fire exhibition. The exhibition enjoys the support of a number of industry associations, a fact that underlines the credibility of Securex as Africa's leading security and fire exhibition.

A-OSH EXPO 2017

30 May and 01 June 2017
Gallagher Convention Centre,

Midrand, Johannesburg

Africa's leading OSH exhibition.
Enquiries: Email leigh@specialised.com

Africa Automation Fair 2017

6 – 8 June 2017, Ticketpro Dome, North Riding, Johannesburg
South Africa's key automation and industrial control event will host a high-level conference on Connected Industries of the Future in line with the growing international focus on the 'The Fourth Industrial Revolution'. 'Pollution and Waste Technology Africa' with its own workshop area will also be showcased. Entry to the exhibition area is free to visitors who register before the end of May.
Enquiries: Tel. +27 (0) 11 869 9153 or email leigh@tradeprojects.co.za

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.
**Enquiries: Leigh Angelo.
Email leigh@tradeprojects.co.za**



Seeing the big picture.

We drive Industries

**SEW
EURODRIVE**



Quality. Innovation. Efficiency.

The new SEW DRN IEC motors – Small. Compact. Light.

Introducing the new energy efficient IE3 asynchronous AC motors from SEW-EURODRIVE. The weight and dimensions of the new IE3 motors of the DRN series have been changed only marginally compared with the IE2 DRE product line from SEW-EURODRIVE which is used successfully all over the world. It goes without saying that the IE3 motors of the DRN series can be combined with the same gear units as the IE2 product line.

Class H, IP 65, Aluminum up to DRN 180, Cast Iron from DRN 200 and above & Foot or Flange mounting

SEW-EURODRIVE – Driving the world



**SEW
EURODRIVE**

SEW-EURODRIVE (PTY) LTD
Eurodrive House
Cnr. Adcock Ingram & Aerodrome
Roads, Aeroton Ext 2
Johannesburg
P.O. Box 90004
Bertsham 2013
Tel: +27 11 248 7000
Fax: +27 11 248 7289

— www.sew-eurodrive.co.za

Cape Town Branch
Tel: +27 21 528 7600

Durban Branch
Tel: +27 31 902 3815

Nelspruit Branch
Tel: +27 13 752 8007

Port Elizabeth Branch
Tel: +27 41 372 2244/6



ifm electronic



SafeLine SmartPLC fail-safe automation system



View this product at the ifm stand at Africa Automation Fair 6 - 8 June 2017

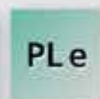
Quick and easy set-up

Flexible and future-proof thanks to connective hardware and CODESYS V3

High machine uptime due to sophisticated diagnostics

Safe up to SIL 3, PL e

Unbeatable price / performance ratio



*We will be exhibiting at the following
2017 Expos - visit our website for all the
important details*



National: 0861 IFM RSA (436 772) • International: +27 12 450 0400

Centurion, Durban, Rustenburg, Port Elizabeth, Vaal Triangle, Klerksdorp, Richards Bay, Lydenburg,
Cape Town, Northern Cape, Namibian Subsidiary