

JULY 2015

# CBI INTRODUCES NEW GLOBAL RANGE



## FEATURES:

- Control systems and automation
- Flow measurement and instrumentation
- Drives, motors and switchgear
- Valves and actuators
- Energy and enviroFiciency

**CBI** electric  
low voltage

ELECTRICITY + CONTROL

[WWW.CROWN.CO.ZA](http://WWW.CROWN.CO.ZA)

CROWN  
PUBLICATIONS

# TRULY SUSTAINABLE LIGHTING



Industrial environments



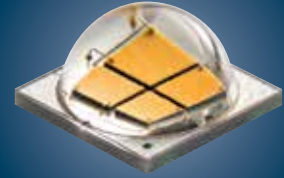
Logistic Centers



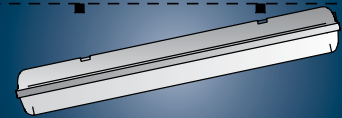
Shopping Centres



Tunnels



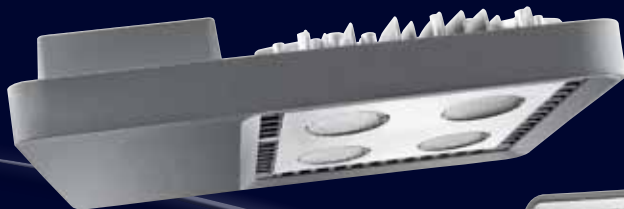
Innovative POWER LED system



Ease of installation and replacement



Comprehensive lighting solution



## Smart [4]

LED SYSTEMS FOR INDUSTRIAL  
LIGHTING AND PROJECTION



SMART[4] is the new Gewiss lighting range that can be used as a floodlight, high-bay or ceiling light, offering different photometric characteristics depending on your installation requirements. With the unmistakable Italian styling, you are ensured of an easy and effective installation with a vertical or horizontal installation option. SMART[4] delivers you energy efficiency, cost savings, superior light quality with fast and easy installation.

[www.gewiss.com](http://www.gewiss.com)

**ACDC**  
DYNAMICS  
[www.acdc.co.za](http://www.acdc.co.za)

JOHANNESBURG  
CAPE TOWN  
PINETOWN  
GERMISTON  
RIVERHORSE

Tel: 010 202 3300  
Tel: 021 510 0710  
Tel: 031 700 4215  
Tel: 011 418 9600  
Tel: 031 492 4800

Distributors and Franchises throughout Southern Africa

**GEWISS**

**Editor:**  
Wendy Izgorsek

**Design & Layout:**  
Adel JvR Bothma

**Advertising Managers:**  
Helen Couvaras and  
Heidi Jandrell

**Circulation:**  
Karen Smith

**Reader Enquiries:**  
Radha Naidoo

**Publisher:**  
Karen Grant

**Editorial Technical  
Director:**  
Ian Jandrell

Quarter 1 (Jan - Mar 2015)  
Total print circulation: 4737



Published monthly by:  
**Crown Publications cc**  
CnrTheunis and Sovereign Sts  
Bedford Gardens  
PO Box 140, Bedfordview 2008  
Tel: (011) 622-4770; Fax: (011) 615-6108  
e-mail: ec@crownc.co.za  
admin@crownc.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, SAAE, CESA, IESSA or the Copper Development Association Africa

We have always promoted Electricity+Control as a magazine that effectively focuses on the two commodities of modern industry – *Energy and Information*. Describing the magazine as ‘a collection of articles on the use of electrical energy to produce a product or deliver a service’ neatly encapsulates the content. This would include the flow and use of electrical energy at any site, and the way energy must be managed and controlled in a system designed to produce a product.

In the past, measurement focused largely on managing and monitoring variables in an automated or controlled environment. Increasingly, however, these measurements have been extended to include almost every aspect of the electricity supply system at the plant.

We have seen measurement moving rapidly – and rightly – into the energy component, ensuring that the information we are accessing to better manage our systems includes that which defines and quantifies our energy usage. This shift has come about because the cost of energy has become an issue of which manufacturers and businesses need to be cognisant.

I am convinced that the key to any successful industry is not only the use and management of *Energy and Information*, but how these integrate into a coherent system where each input is a monitored and measured part of the system, recognised as having a real impact on the final product or service.

The delineation between power, and instrumentation specialists is becoming blurred. While we have argued all along that such differentiation is fictitious; today competence needs to cut across these traditional divides.

We require people with a real systems’ attitude towards a plan, and an ability to see into all the existing silos with a view to breaking them down – at least partially.

At Electricity+Control, we continue to strive to ensure that the technical feature articles we publish, in this magazine and on-line, will be of interest to

you and will enable you to peer into the ‘silos’ that define our industry with an increasing breadth of vision and appreciation for how best to manage the system that is the modern plant.

In meetings, I often find myself adding to my traditional Venn diagram, depicting the two intersecting circles representing Energy and Information with an all-encompassing circle called Systems – emphasising the need to design, build and maintain coherent systems that encompass both commodities in their fullest sense.

I will do a Face Value around this theme in the near future – and I invite you to join the conversation on trends that are emerging in our industry. At a later date I will comment on how I see these impacting on research in the southern Africa context.



*Ian*

Ian Jandrell

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



# INTERNATIONAL CONFERENCE

TOWARDS SUSTAINABLE ENERGY SOLUTIONS FOR THE DEVELOPING WORLD

## INDUSTRIAL & COMMERCIAL USE OF ENERGY

17 - 19 August 2015

### Conference Venue:

Belmont Square Conference Centre  
Belmont Road, Rondebosch  
Cape Town, South Africa.

### Conference Topics:

- Demand-side Management
- Energy Management
- Energy use in Mines and Industry
- Heating Ventilation and Air-Conditioning
- Africampus: Energy used on Campus
- Climate change, Environmental Issues and Clean Development Mechanisms
- Lighting
- Transport
- Energy Audits and M&V
- Energy Strategies
- Power Generation, Transmission and Distribution
- Renewable Energy
- Tariffs, Metering and Cost of Electricity

### Conference Workshop:

Energy Efficiency in Heating Ventilation and Air-Conditioning

### Social Functions:

Monday 17 August: 10:00 Industrial Outing and a Meet and Greet Function at 18:00  
Tuesday 18 August: 18:00 Conference Dinner



### Registration and Information:

Tel: +27(0) 21 460 3660

Email: [icue@cput.ac.za](mailto:icue@cput.ac.za)

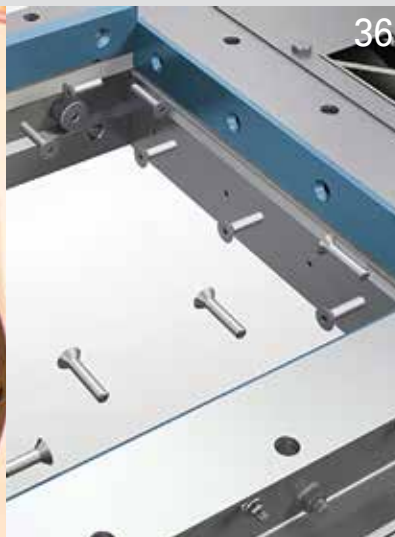
Web: <http://energyuse.org.za/icue>



4



26



36



42

**Control systems and automation**

- 4 IEC-61850 – Promise and pitfalls *by K Mahoney, Casco Systems LLC*
- 8 MAC meets market needs effectively *information provided by Omron*
- 10 Round UP

**Flow measurement and instrumentation**

- 18 Particle Time of Flight: Reflections on gas flow measurement in hazardous environments *by T Moorhouse (ex Photon Control), S Ante (contributor), S Braver, Martec Asset Solutions*
- 21 Round UP

**Drives, motors and switchgear**

- 26 Brushless Servo operating principles *by G Craig, Techlyn*
- 29 70 % Savings on power costs with modular energy saving system *by N Maleka, SEW EURODRIVE*
- 31 Round UP

**Valves and actuators**

- 36 How to select the right valve *by T Young, Vortex*
- 39 Round UP

**Energy and enviroFiciency**

- 42 Seeking cleaner and safer energy solutions *Information compiled by The South African Civil Society Information Services (SACSIS)*
- 46 Round UP

www.electricityandcontrolmagazine.co.za



Cover

The only manufacturer of circuit breakers and related devices in Africa, **Cbi-electric** is a truly South African success story. *Read more on page 17.*

Regulars

- 1 Comment
- 17 Cover article
- 48 Light+Current
- 49 Bizz Buzz
- 51 Social Engineers
- 52 Clipboard



Visit our innovative online technical resource for the engineering industry. [www.eandcspoton.co.za](http://www.eandcspoton.co.za)



345 kV Circuit Breakers at one of the bulk power substations for which Casco Systems designed a new IEC-61850 system.

# IEC-61850: Promise and pitfalls

By K Mahoney, Casco Systems, LLC

*Whereas control systems have long been a part of our industry, relying on complex measurement and information systems, only within the past few decades have robust standards been developed to transfer some features into the national grid. This takes automation of the network to a new, smart level. The IEC-61850 [1] standard promises a future of standard data models, automatic device configuration, lower costs and increased functionality. But the question remains, does it deliver?*

**A** communication protocol defines a common language used to exchange information. If you can envision trying to speak Spanish while visiting Japan, you can understand how critical selecting the right protocol for a given task is to your ultimate success. Pick the wrong protocol and you cannot communicate at all, select a protocol with limited functionality and you may be able to get some, but not all, of the information you want. Selecting the right protocol, with the right mix of features and functions, will enable the exchange of all desired data and ultimately decide the success of any substation automation project.

The electric utility industry has a long history of applying many different protocols, however; these protocols have historically been proprietary, limited in functionality and difficult to replicate across manufacturers. Using multiple protocols in one location or project adds cost and presents a number of problems that the IEC-61850 [1] standard seeks to address. As you can imagine that while two native Spanish speakers can hold a conversation quite easily they will struggle to communicate with a Japanese speaking colleague. The IEC-61850 [1] protocol holds forth the promise of being the universal lingua franca of the electric substation and perhaps across the entire

ACSI	– Abstract communication service interface
APCS	– Advanced Protection and Control System
BC	– Block Close
BFI	– Breaker Failure Initiate
BFT	– Breaker Failure Trip
BFTT	– Breaker Failure Transfer Trip
CT	– Current Transformer
GOOSE	– Generic Object Oriented Substation Events
HMI	– Human Machine Interface
IEC	– International Technical Commission
IED	– Intelligent Electronic Device
ISO	– International Standards Organisation
MMS	– Manufacturing Message Specification
PT	– Power Transformer
RI	– Reclose Initiate
RTU	– Remote Terminal Unit
SCADA	– Supervisory Control and Data Acquisition
SCSM	– Specific Communication Service Mapping
SMV	– Sampled Measured Values

## Abbreviations/Acronyms

power industry. However along with this potential comes risk, added costs and pitfalls that should be fully considered before committing to build an 'IEC-61850 [1] substation'.

**Promise**

As an international standard for substation automation, IEC-61850 [1] defines the exchange of information between disparate systems from multiple vendors. Having a common method of communication that allows interoperability between all devices, regardless of manufacturer, opens the potential for new protection, control, automation and integration functions. It also promises lower cost of implementation and ownership, greater flexibility, and the ability to adapt as new applications are defined. This standards-based approach enables integration of modern protection, control, metering and supervisory equipment into a total substation solution. This total solution will enable the next generation of utility Smart Grid functionality including dynamic equipment and line rating, automatic grid restoration, advanced predictive equipment maintenance, fault and SER logging, and many other features yet to be defined.

A common misconception is that the IEC-61850 [1] standard is a 'protocol'. In fact it is a standard for the design of an electrical substation that defines abstract data models which are mapped to a number of specific communication protocols. The approach defined by the standard takes advantage of an object-oriented data model and Ethernet networks, enabling a reduction of configuration and maintenance costs while enabling enhanced functionality.

*Selecting the right protocol, with the right mix of features and functions, will enable the exchange of all desired data and ultimately decide the success of any substation automation project.*

In addition to the data model the standard also defines a number of specific communication protocols, each with a specific niche focus designed to enable various facets of substation communication. These protocols include the Manufacturing Message Specification (MMS), Generic Object Oriented Substation Events (GOOSE), Sampled



345 kV Substation Yard showing 'A' frame transmission line structure, circuit breakers and reactor bank.

Measured Values (SMV) and Web Services. Each of these protocols provides different capabilities targeted to address applications within the substation environment. For example the IEC-61850 [1] MMS protocol is targeted at supervisory level communication while GOOSE is designed for high speed (< 4 ms) peer to peer communication.

The IEC-61850 [1] standard is divided into multiple sections that collectively define the overall solution:

- IEC 61850-1: Introduction and overview
- IEC 61850-2: Glossary
- IEC 61850-3: General requirements
- IEC 61850-4: System and project management
- IEC 61850-5: Communication requirements for functions and device models
- IEC 61850-6: Configuration description language for communication in electrical substations related to IEDs
- IEC 61850-7: Basic communication structure for substations
  - o IEC 61850-7-1: Principles and models
  - o IEC 61850-7-2: Abstract Communication Service Interface (ACSI)
  - o IEC 61850-7-3: Common data classes
  - o IEC 61850-7-4: Compatible logical node classes and data classes

- IEC 61850-8 Specific Communication Service Mapping (SCSM)
  - IEC 61850-8-1: Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
- IEC 61850-9: Specific Communication Service Mapping (SCSM)
  - IEC 61850-9-1: Sampled values over serial unidirectional multidrop point to point link
  - IEC 61850-9-2: Sampled values over ISO/IEC 8802-3
- IEC 61850-10: Conformance testing

So the IEC-61850 [1] standard promises a future of standard data models, automatic device configuration, lower costs and increased functionality. But the question remains, does it deliver?

## Pitfalls

The IEC-61850 [1] standard and its associated protocols provide for great flexibility to allow it to be adapted to almost any application.

However this flexibility comes at the cost of complexity and confusion. Written with the help of many integration and protection engineers from across the globe, the standard has been in various stages of development since 1995. Given the long history and wide scope of issues the standard intends to address, the standard itself can and has been interpreted differently by each hardware and software vendor. That is the first of several pitfalls to understand each vendor while being compliant with the IEC-61850 [1] standard may have its own unique flavour. This often leads to confusion for users accustomed to simple, address based protocols like DNP3 or Modbus. In fact on a recent large project with IEC-61850 [1], IEDs from seven major manufacturers, we found eight distinct implementations of how each device implemented the standard!

Another point to consider when moving to an IEC-61850 [1] solution is the merging of traditional 'protection' and 'integration' functions. In many past projects these two realms, while closely inter-related, were treated as separate domains and often designed by different engineering teams. With this new approach the configuration



Kevin Coyne, integration engineer Casco Systems and Kevin Mahoney, founder and President of Casco Systems, with the IEC-61850 Simulation System used for Research and Development. This lab configuration was used to prototype and validate all of the integration and protection settings for the project.

of protection and integration settings are often combined into a single setting file. By its very nature IEC-61850 [1] has forced the 'protection' engineers to work much closer with the 'integration' engineers. The result is that changes in one area may have unintended consequences in another. What was formerly a 'quick' change to add an integration feature (or fix a problem) must now be carefully considered in the context of the entire Protection and Control scheme.

Consideration must also be given to how this new system will be documented. Given that much of the wiring is being replaced with messaging, how will this critical information be documented for future troubleshooting, modifications and testing? With prints no longer reflecting the full detail of system interconnections a documentation method must be developed based on logic diagrams, tables, flow charts or some other method that will adequately reflect how the system works.

Other factors to take into account are the differing levels of internal support and expertise among vendors; overall maturity of the standard's offerings provide by different vendors, plan to work through bugs in firmware and software, and the critical need to perform detailed lab testing prior to field commissioning in order to work out all integration issues prior to becoming part of the project's critical path.

Last, and perhaps most importantly, careful planning must go into deciding how the new platform will be commissioned, maintained, modified and routinely tested in the future. How will relays using 'virtual wires' be isolated for relay maintenance or replacement? How will commissioning be performed and what equipment is necessary? What new training, tools and techniques are necessary to safely work on a platform of this nature. These are all questions that must be answered and solutions designed into the platform from the outset.

## Conclusion

Casco Systems took part in the development of an Advanced Protection and Control System (APCS) as part of a multi-year, \$1.4 billion United States transmission system upgrade. This project involved the construction of 440 miles (708,111 km) of transmission lines and multiple new 115 and 345 kV bulk power substations. Working with the owner and other project stakeholders the entire concept of substation protection, control, automation, integration and security was examined in light of the desired functionality, requirements and IEC-61850 [1] technology.

Included in the initial engineering effort was the development of new standards for the Substation Remote Terminal Unit (RTU), Human Machine Interface (HMI), Protective Relay Logic, Intelligent Electronic Devices (IED), Communication Networks, Data Collection and Cybersecurity. The APCS platform utilised the latest technology for application in the utility class substation environment including IEC-61850 [1] based communication protocols for all intra-substation device to device communications. While the DNP3 protocol was used for backwards compatibility and communication to the SCADA Master Station, the project goal was to use IEC-61850 [1] everywhere possible inside the substation.

This platform was designed with advanced features and limits the use of hardwired interconnects and devices, moving all but the most critical tripping and sensing 'onto the wire'. Breaker trip circuits,





Kevin Mahoney testing the IEC-61850 based Advanced Protection and Control System (APCS) during 345 kV substation commissioning.

as well as PT & CT sensing circuits remained hardwired, but all other interconnection wiring was moved 'onto the network'. All IED to IED communication including Breaker Failure Initiate (BFI), Breaker Failure Trip (BFT), Breaker Failure Transfer Trip (BFTT), Reclose Initiate (RI), Block Close (BC), and many other functions were implemented using 'virtual wires' over the Ethernet based IEC-61850 [1] network.

The end result is an advanced protection and control platform with a much simpler (and lower cost) hardware design. The project

included advanced features such as equipment monitoring and data logging, fault event record automatic retrieval and storage, breaker switch operation event logging, cyber security monitoring and control, and remote engineering access to all relays, meters, remote terminal units, human machine interfaces, and other intelligent electronic devices (IEDs). The platform is a sophisticated implementation that brings 'smart' to the 'grid' for a comprehensive substation protection, control and monitoring solution.

### Reference

[1] IEC-61850 (Standard). 1995. Design of Electrical Substation Automation. (Multiple sections listed within article).

- Control and automation technologies must be applied to bulk electricity supply networks.
- Standards exist to ensure that system design and management are optimal.
- Utilities continue to supply the primary source of energy to our industry and it is critical that they have smart grid functionality.



Kevin Mahoney is president of and an automation specialist at Casco Systems, LLC, in Cumberland, Maine, USA. The system integrator company specialises in the protection, control and automation of electric power installations including power generation plants and high voltage substations. Casco is a member of the Control System Integrators Association (CSIA). [www.controlsyst.org](http://www.controlsyst.org). Enquiries: visit the company profile on the Industrial Automation Exchange.

## Electrifying performance from your transformer.

Inhibited POWEROIL TO 1020 (60 UX) and Uninhibited POWEROIL TO 1020 (60U), the trusted insulating oils for peak performance and endurance in your transformers.

Contact the Engen Customer Service Centre (CSC): +27 21 403 5090 or visit [www.engenoil.com](http://www.engenoil.com). Extensively available in bulk (Engen only) and in packs (Engen and The Oil Centre). The Oil Centre is an approved distributor of Engen Lubricants.



# MAC meets market needs effectively

By EC Janse van Vuuren, Omron South Africa

*In a world where market forces establish need and value, and then science and engineering are applied to meet them, machine control hardware for automation is a clear example of this in practice.*

**D**uring the past 50 years there has been a powerful and dramatic development of controllers: Distributed Control Systems (DCSs), Programmable Logic Controllers (PLCs), Industrial PCs (IPCs), and Programmable Automation Controllers (PACs).

The explosion of industrial applications continues to challenge the functionality of those controllers, fostering further innovation. The need to combine the capabilities of traditional process/discrete industrial control has led to adaptations or extensions of existing technology. The efforts to evolve resulted in underperforming machine automation owing to limitations in architecture and a lack of cross-discipline expertise. Today we see the emergence of a new controller type: Machine Automation Controller (MAC) which emerged after painstaking development from the ground up – specifically for high-speed, multi-axis motion control, vision, and logic. Let us revisit how this point was reached. The industrial controls market split into two distinct segments:

- **Process** – where pressure, temperature, and flow were paramount
- **Discrete** – where sequencing, count, and timing were the key metrics

PLCs dominated the discrete market, while DCSs led the process market. Customers were well-served. As machinery advanced, technologies converged and the PAC was developed to address the overlapping of process and discrete markets. The PAC incorporated the fundamental capabilities of a small DCS and a PLC with the addition of low-axis-count motion control.

The PAC provided redundant processors, single database, function block language, high speed logic, component architecture, and online programming. While PACs cost less than traditional distributed control systems – and integrate motion and logic into a single controller – they encounter limitations when applied to high speed motion with multiple axes. Motion control continued to be implemented with a separate network, and performance issues were tackled by adding processors. This meant additional codes for controller

sequencing, which resulted in inefficiencies in system synchronisation. Inevitably, machine performance was compromised.

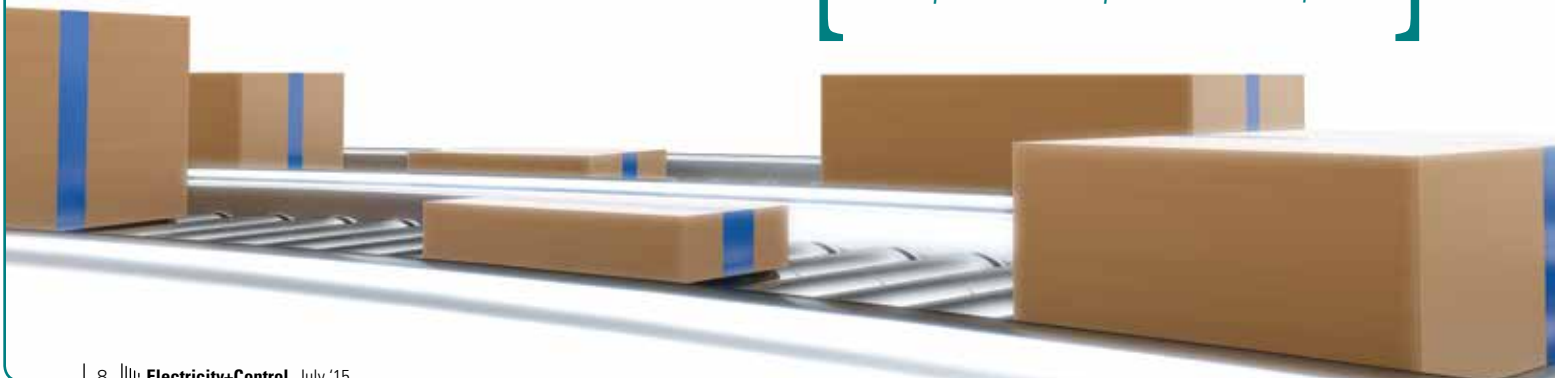
## Inevitable emergence of the MAC

Manufacturing demands performance in terms of throughput, yield and uptime: the Overall Equipment Efficiency (OEE) model. Moreover manufacturers are always pushing for greater accuracy and lower cost while maintaining quality and safety. These factors are the key drivers.

Increasingly, manufacturing also requires moving product automatically during set-up or production. This calls for a system that centres on motion and relies on it to be fast and accurate. If a controller has not been designed around motion, it may have inherent architecture barriers to performance when used to increase OEE. Consequently, machine manufacturers are forced to coordinate and synchronise the controller across technological boundaries such as motion, vision, logic, and safety. A new category was started - Machine Automation Controller (MAC) – where the most important attribute is motion performance. A true MAC can handle applications that require a high level of synchronisation and determinism as it integrates multiple technologies stretching across the boundaries of motion, vision, logic and I/O – all without sacrificing performance. The company represented by the author has developed the NJ-Series controller which is an example of the emerging MAC. A MAC features an advanced real-time scheduler to manage motion, network, and the user application updates at the same time to ensure perfect synchronisation.

Updating all three in the same scan is unique to this company's series MAC. System synchronisation occurs when the user application program coordinates with the motion scheduler, the network servo

*By design, a MAC allows different technologies, different systems, from different companies, to converge – making it possible for protocol development to be completed in a matter of hours.*



CPU	– Central Processing Unit
DCS	– Distributed Control System
IPC	– Industrial PC
OEE	– Overall Equipment Efficiency
MAC	– Machine Automation Controller
PAC	– Programmable Automation Controller
PLC	– Programmable Logic Controller

## Abbreviations/Acronyms

drives, and ultimately controls the motor shafts. With each motor shaft synchronised with each other, what is true for two axes is true for nine, 17, or even 64 axes.

There are many 8-axis and 16-axis controllers on the market. If there is a need to expand the coordination of motion beyond that number of axes, another motion module is typically added. However, this is where many other controllers fall short, because the application requires synchronisation across expansion and scalability of motion, through to the network, and back to the application program into the motion scheduler. MACs have this capability. To best approximate the intended motion profile, the controller must be deterministic to accurately coordinate all axes in the system. All this points back to the main driver in order to increase throughput, the system requires the axes to remain synchronised with great repeatability to guarantee higher performance of throughput, yield, and uptime. Lower yields will result and the system may require shutdown to make adjustments. Uptime is not necessarily just a factor of the equipment itself. It's also a factor of the production process. If motion is not accurately controlled to match the process, when speeds are increased, the result is bad parts as the machine goes slightly out of control. This clearly impacts uptime because up stream and downstream processes need to be readjusted as well. For the next generation of platforms, machine builders need to be assured their architecture will allow them to expand throughput and yield without the platform becoming a bottleneck.

## Convergence

The revolutionary step was to purposely design the MAC to integrate multiple, specialised controllers with exacting system synchronisation to deliver high performance throughput on a single controller.

There are two parts: the set-up and actual production. The coordinate system of the camera must match with the coordinate system of the Cartesian robot. To get the camera data to the controller in a coherent form, a lot of time is spent developing the protocol. Previously, this might have taken the combined efforts of an articulated-arm robot manufacturer, a third-party vision system engineer, and a PLC vendor. There could be three different systems, from three different companies, using three different technologies. At this point there would be three engineers in a room, taking weeks to figure out how the systems can communicate with each other for commissioning. By design, a MAC allows these technologies to converge together so protocol development can be completed in a matter of hours.

On the performance side, the use of a real-time network enables the passing of vision data to the motion system without losing a scan. This is only possible if vision and motion are on the same network.

As another challenge, machine builders want to adjust servo parameters on the fly. This added functionality can create performance loss as the whole system gets overloaded with a high number of axes moving a high speed with full synchronization. What makes MAC especially good for motion control is that it has all the elements to do

it without degrading performance. With many machine controllers, there is a loss of speed if synchronised motion control is combined with a large number of axes, and there is a need for adjusting servo tuning at the same time. Non-MAC systems require additional CPUs to accomplish this.

## New performance benchmark

Today's benchmark to qualify for the MAC category is processing 32 axes and updating in one millisecond. There were many earlier attempts to create a multidisciplinary controller. PACs were the most prominent. There were attempts to apply them to process control, to cell control, and to machine control; but, we all knew that the PAC had to have an extensive operating system.

Also, for really high-speed motion control, that controller and configuration required many CPUs. The performance of motion control will drop as the number of axes increases. This is typical of many controller manufacturers. In the wake of this scenario, the development of a highly targeted solution such as a MAC now seems inevitable.

## Conclusion

Controller inefficiencies that were exposed by machine innovation caused the new thinking that led to the development of machine automation controllers. Now that MACs have emerged as a revolutionary solution, further machine development incorporating their advances will continue evolving, with motion at the core, and with the creation of value as its ultimate work. Today, with MAC, the potential for value is being realised to a higher degree than ever before.

- During the past 50 years controllers have developed dramatically.
- The industrial controls market was split into two segments – process and discrete - PLCs dominated the discrete market; DCSs led the process market.
- The MAC was designed to integrate multiple, specialised controllers with exacting system synchronisation.



Evert Christiaan Janse van Vuuren is the Sysmac, motion field application engineer for Omron South Africa. Evert has a wide knowledge of technical support and instrumentation. With emphasis at Omron on technical support, product management and establishing training programs, Janse van Vuuren plans to develop study material for consumers and staff focusing on Sysmac Studio with training modules for consumers and staff up and running next year. He was previously employed by IMP Calibration Services. He holds a National Diploma in Process Instrumentation from the University of South Africa (UNISA) and has completed an Omron Electronics PLC course.

Enquiries: Michelle le Roux. Tel. 011 579 2625

## Ultra compact IR camera for metals

**OPTRIS**, specialists in non-contact temperature measurement, has launched the new Optris PI 1M Infrared (IR) camera, especially suited to measuring the temperature of metals, as these exhibit a distinctly higher emissivity at the short measurement wavelength of 1 µm than at measurements in the previously conventional wavelength range of 8 – 14 µm.

The advantage of temperature measurements with the new infrared camera lies in the large amount of information in an IR picture/IR video and the short reaction time of 1 ms for the output of temperature information of freely selectable individual pixels. The use of these new image sensors allows a large dynamic range for temperature measurement so that the previously necessary use of relatively many and narrowly defined sub-ranges is no longer required. Intelligent measuring

with a pyrometer is now possible thanks to the two-dimensional temperature recording of the Optris PI 1M. With the large measurement temperature range of 450 – 1 800 °C, that Optris PI 1M IR camera offers, it satisfies practically all demands in the fields of metal production and processing. Pertinent features of the Optris PI 1M IR camera:

- Highly flexible CMOS detector with an optical resolution of up to 764 x 480 pixels
- Very large temperature measurement range (without sub-ranges) of 450 °C to 1800 °C
- Frame rates of up to 1 kHz for fast processes
- Real-time output of middle pixel at a set-up time of 1 m
- Includes licence-free analysis software and full SDK

*Enquiries: Instrotech. Tel. 010 595 1831 or email sales@instrotech.co.za*



## Wireless, remote data logger using GSM network to send data via SMS

**Schneider Electric**, the global specialist in energy management, has introduced the launch of SCADAPack 50 data logger, the latest innovation for monitoring applications when power and network access are either unavailable or prohibitively challenging. Compact and self-powered (offering up to five years autonomy), the SCADAPack 50 device monitors and logs analogue, discrete, and Modbus process inputs. It reports logged data and alarms via SMS over existing GSM infrastruc-



ture to any SCADA host application. The enclosure is IP68-rated for applications where environmental protection is required. In a typical installation, process data is monitored and stored locally in the device and transmitted to a host according to configurable sampling and transmission rates. Logged data is sent over the GSM network as binary data files using the SMS PDU format. Additionally, discrete inputs can be used to trigger alarm transmission to both the host and/or SMS-enabled mobile devices. The SCADAPack 50 unit can be used in a variety of markets and applications, such as water infrastructure, bulk storage level, and more. On the reception end, any GSM

modem compatible with Hayes commands can be used. Both 2G and 3G options exist for network connectivity as well as internal and external antenna options. From a host perspective, SCADAPack 50 networks are natively compatible with Schneider Electric StruxureWare SCADA Expert ClearSCADA software. The SCADAPack 50 unit also has an OPC enabled gateway that can interface with any third-party SCADA host.

Once the user has activated the internal SIM card and configured the SCADAPack 50 data logger, no intervention is typically required during its entire battery life.

*Enquiries: Ntombi Mhangwani. Email ntombi.mhangwani@schneider-electric.com*

## Looking for that easy 'X' factor

In automation, all of the potential measures for saving must be consistently utilised – from planning to implementation, commissioning and operation. Ingeniously automated systems are required to deal with the increasing needs of a fully developed infrastructure or industrial factory; these can be monitored and controlled effectively and efficiently through the use of flexible, reliable, and user-friendly equipment. A great example of this innovative technology is the highly renowned **Easy XLogic**, diversity in both switching and control.

The Easy XLogic is ideally suited for implementing simple automation tasks in industry and building management systems. The intelligent logic module leaves little to be desired in terms of functionality, with a large memory capacity, user friendly programming abilities, efficient use of control and many expansions options, the Easy XLogic can control even the most complex of plants without any problems. In combination with the Easy XLogic's software, the handling of our logic controller is child's play: Creating programs,

project simulation, the drag and drop functionality as well as diagrammed documentation are all reasons why the Easy XLogic has proven itself and been widely acclaimed for the effective use in multiple applications worldwide.

To ensure diverse applications can be accomplished, the Easy range has been expanded to GSM units (XMessenger) as well as WIFI units, and various expansions modules for extra IOs and functionality, not forgetting to mention the dynamic LCD display and voice activations modules. These micro Programmable Logic Controllers (PLCs) are truly diverse, reliable and flexible, and can provide solutions to a wide amount of applications where automation is involved.

*Enquiries: Daryn Chalmers, Gator Products. Tel. 021 982 7561 or email daryn@gator.co.za*



SIEMENS



## “Mr. Automation – that’s me”

Stephan Libera, member of Volunteer Fire Dept. in Hanover/Germany, and LOGO! fan



Logo! 8. Simply ingenious. Simply more.

Stephan Libera backs LOGO! 8 for light control for creating realistic situations in the training facility of the Hanover Fire Department.

New design, new hardware, new software: the perfect intelligent logic module for switching and control tasks in small automation projects is entering the next generation! With LOGO! 8, automation solutions for simple machines or plants, in building automation, and also for applications in the domestic area can be implemented even faster, more simply, and more conveniently. The new LOGO! generation with innovated display, integrated Ethernet communication, integrated Web server, remote communication via mobile wireless, and a host of other new functions, fulfills just about all customer wishes with the simplest possible handling.

[siemens.com/logo](http://siemens.com/logo)

## Long-term investment protection for companies

Siemens continues to develop its controller portfolio to handle sophisticated tasks in the process industry. Users of the flexibly configurable controllers, which offer a high level of security and availability, will therefore benefit from long-term investment protection. The first step was to give the Simatic S7-410 the standard coating

for operation in toxic atmospheres and to further increase the fault tolerance of the redundant system. Siemens has also extended the ambient temperature range up to 70 °C, which allows users to deploy the powerful Simatic PCS 7 controller in harsh environments, such as in oil and gas applications. The next steps will be, for example, to further expand the Profinet functionality in order to increase fault tolerance and availability.

The Simatic S7-410 controller is an integral part of the Siemens Simatic PCS 7 process control system and currently the most powerful controller in the process industry. This is particularly obvious in the integrated scaling feature: it is now possible to apply a uniform hardware and software environment for very small systems of 100 I/Os up to large-scale plants of more than 100 000 inputs/outputs. The Simatic S7-410 controller is available in a standard version as well as in fault tolerant and fail-safe versions. The device therefore meets all the requirements of the process industry, including the chemical, glass, metal, food and beverage,

*Enquiries: Keshin Govender.  
Email [Keshin.govender@siemens.com](mailto:Keshin.govender@siemens.com)*



THE 10TH ANNUAL

2015

**SAEEEC**

SOUTHERN AFRICAN  
ENERGY EFFICIENCY  
CONVENTION

PRESENTED BY



11-12 NOVEMBER 2015 • EMPERORS PALACE • GAUTENG

The 2015SAEEEC features a convention agenda with seminars and an exhibition on a variety of current topics and a comprehensive overview of "Energy Efficiency @ Work". The 2015SAEEEC together with the exhibition target the complete spectrum of technologies and services of great importance to over 500 delegates. Learn from more than 80 knowledgeable speakers in the energy efficiency force and become part of the answer!



### 2015SAEEEC DELEGATES

Delegate Full Registration	R 6 636.00
SAEE Member	R 5 530.00

### 2016SAEEEC EXHIBITORS

1 x Exhibitor stand (3m <sup>2</sup> )	R 18 870.00
2 x Exhibitor stands (3m <sup>2</sup> )	R 34 090.00
1 x SAEE Corporate Member stand (3m <sup>2</sup> )	R 16 590.00
2 x SAEE Corporate Member stands (3m <sup>2</sup> )	R 30 780.00

### 2015SAEEEC SPONSORS

Enhance your company's prominence and visibility at this niche event by taking up one of the range of sponsorship opportunities offered.

### FOR MORE INFORMATION, PLEASE CONTACT US

Tel: +27 (0)18 290 5130 • Cell: +27 (0)82 428 7386  
Email: [convention@saee.org.za](mailto:convention@saee.org.za)  
[www.saee.org.za/about.aspx](http://www.saee.org.za/about.aspx)



### Reduces communication costs and ensures reliable monitoring and control

**Yokogawa** has introduced an enhanced version of the STARDOM network-based control system which reduces communication costs and ensures highly reliable monitoring and control. These enhancements meet a variety of needs in upstream oil and gas development and production, which Yokogawa is targeting based on its Transformation 2017 mid-term business plan.

STARDOM network-based control systems consist of FCN/FCJ autonomous controllers and either a VDS or FAST/TOOLSSCADA server. FCN/FCJ controllers are ideal for the monitoring of oil and gas field installations, pipelines, and other widely distributed facilities that rely on satellites and other types of communications platforms for the transmission of data. In addition to eliminating communications delays and achieving high quality communications, the companies that operate such facilities are seeking to reduce communications costs by limiting the volume of data that needs to be transmitted. Product features:

- Unsolicited response support
- Expanded support of standards for gas well applications
- Strengthened security measures

*Enquiries: Tel. 011 831 6300 or email Christie.cronje@za.yokogawa.com*

### Miniature photoelectric sensors – high performance

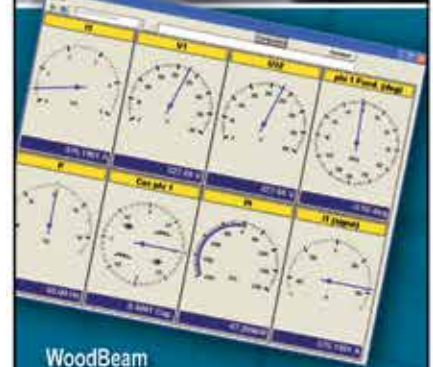
**ifm electronic's** new diffuse reflection sensors provide reliable background suppression, even in the case of highly reflective backgrounds such as moving machine parts. The clearly defined consistent light spot ensures precise object detection. There is no scattered light which could interfere with other photoelectric sensors in close vicinity. For connection the user can choose between a potted cable, M12 pigtail or a M8 metal connector on the housing.



The O6 range features a potentiometer for intuitive setting, and the light-on or dark-on mode is selected via a rotary switch. The diffuse reflection, through-beam and retro-reflective sensors are distinguished by a good price/performance ratio. An extensive range of accessories is available making the sensors ideal for universal applications.

*Enquiries: Tel. 012 450 0370 or email info.za@ifm.com*

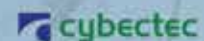
### SUBSTATION AUTOMATION, METERING AND SCADA



**WoodBeam** substation communication solutions simplify substation integration and automation, providing the utility with :

- NERC CIP compliant security
- System wide device automation and integration
- Automatic event file retrieval
- Remote control and engineering management passthru
- Protocol translation
- Data concentration and distribution
- Industrial Ethernet LAN
- Substation SCADA
- Metering and energy management

The solution allows you to build a comprehensive communications infrastructure that is fully integrated, delivers maximum reliability and improves service quality.



### 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

## Biometric control system for underground miners



**Booyco Electronics'** biometric control system has attracted widespread interest in the local mining industry after being introduced to market a little more than a year ago. The unique system was developed specifically for the local operating environment and uses fingerprints to authenticate licenced machine operators. Use is made of personalised smart cards on which an individual operator's fingerprints and other relevant data such as licensed capabilities and expiry dates are stored. This provides the ideal solution allowing controlled access to moveable items such as earthmoving and mining equipment, blasting boxes and carts, as well as con-

veyor starter panels. An operator gains access to and can operate a given machine or piece of equipment by validating his fingerprint on the scanning device on the machine. This same level of control can be applied underground in other control environments, such as explosive magazines and facilitating access control to underground substations. Communications to and from the biometric device takes place via an approved control module, and the system makes provision for an IS unit, powered by an IS power supply housed in a flameproof enclosure, to enable use in coal mines.

**Enquiries: Anton Lourens. Booyco Electronics.  
Email [anton@booyco-electronics.co.za](mailto:anton@booyco-electronics.co.za)**

## Laser scanner – two safety functions in one device

Available from Countapulse Controls, the Leuze RSL 400 scanner's most important feature is that it has two independently adjustable configurations and two safety-related switching output pairs (OSSDs). Together with an operating range of 8,25 m and a scanning angle of 270°, this feature allows two different protection tasks to be performed simultaneously with just the one device.

Gerry Bryant, managing director of **Countapulse Controls**, the distributor in southern Africa for Leuze sensors, says that this capability means that, in most cases, customers do not need to acquire a second laser scanner, thus reducing their capital investment.

Not only are the scanners easy to set up and configure, but they are extremely easy to operate. Functionality and user friendli-

ness are key attributes of the devices and upgrades can be performed quickly and without electronic and mechanical realignment, readjustment or configuration. "The RSL 400 range of laser scanners represents a drive towards high quality, combined with simplicity. The goal is to encourage customers to embrace these scanners and the advantages they offer in the safety arena. A separate connection unit, with integrated cable management, ensures uncomplicated mounting and the large, plain-text display with electronic spirit level makes alignment simple," Bryant points out.

The Leuze RSL 400 scanners feature integrated network connectivity. In the first connectivity option, the Ethernet TCP/IP interface makes it possible to achieve simple and convenient configuration and diagnostics. In addition, the devices can be

controlled and configured wirelessly, via Bluetooth, at distances of up to 10 m.

**Enquiries: Gerry Bryant. Tel. 011 615 7556 or  
email [bryant@countapulse.co.za](mailto:bryant@countapulse.co.za)**



## 'Many-core control' with 256 processor cores

**Beckhoff's** 'Many-core controllers' will play a central role in the future of machine control and in the realisation of Industry 4.0 concepts. To meet the rising requirements of Smart Factories, with their increasingly intelligent machines and production systems, high-performance controllers such as the Beckhoff C6670 industrial server are becoming indispensable. To make effective use of this immense computing performance, however, powerful software support, such as that provided by the TwinCAT 3.1 automation platform, is a necessity. Many-core computers differ from conventional Industrial PCs in their architecture. They feature

several processors, also referred to as 'packages', and each is equipped with multiple cores. Their memory architectures also provide a notable difference. One technique, known as NUMA or non-uniform memory access, provides each processor with its own dedicated memory. Beckhoff has implemented this design with its C6670 industrial server featuring two Intel Xeon packages, each offering 6, 12, or 18 cores and from 64 to 2 048 GB of RAM. This immense computing power can only be utilised effectively, however, if the performance of each core is fully leveraged by TwinCAT 3.1 software. The flagship control software from Beckhoff

is capable of mapping the various machine and process workflows – highly suitable for parallelisation and distribution of different tasks as function modules.

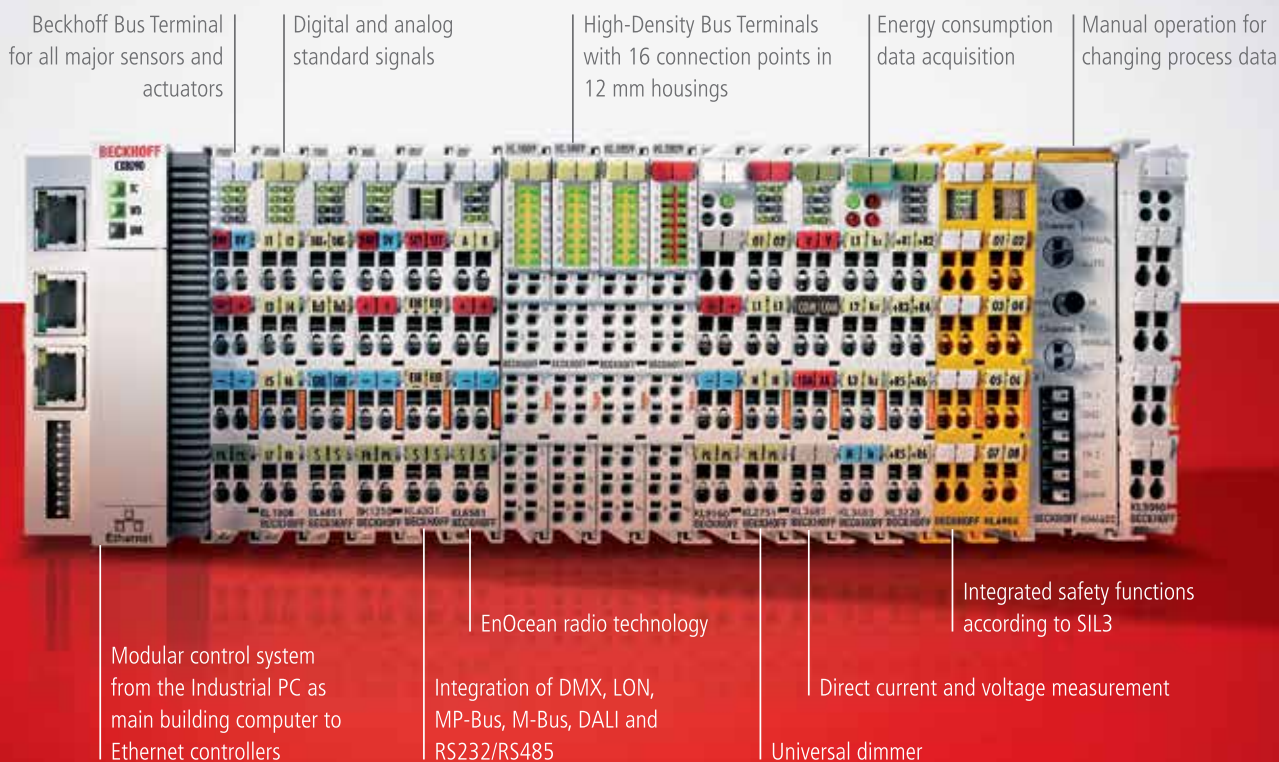
**Enquiries: Email [EMCPherson@beckhoff.com](mailto:EMCPherson@beckhoff.com)**





# Modular automation components for all building functions.

Building Automation from Beckhoff.



[www.beckhoff.co.za/building](http://www.beckhoff.co.za/building)

PC- and Ethernet-based control technology from Beckhoff offers software-based solutions for all building functions. The universal automation concept with hardware and software components for all building services offers maximum flexibility with low engineering costs. The TwinCAT automation software platform includes all key building functions and offers standardised system integration via Ethernet, BACnet/IP, OPC UA or Modbus TCP. The Beckhoff Building Automation components meet the requirements for building automation according to energy efficiency class A.



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



IPC

I/O

Automation

New Automation Technology

**BECKHOFF**

## Multi-channel device circuit breaker boards

The new multi-channel device circuit breaker boards from **Phoenix Contact** are available with 4, 8, and 12 channels. The



boards are very versatile as they can be fitted individually with thermomagnetic or electronic circuit breakers. They are particularly suitable for machine building and control and process technology.

Owing to the central potential distribution, up to four loads can be protected per channel. This reduces installation time to a minimum, while simultaneously saving space compared to conventional installations. In addition to individual load protec-

tion, the boards give you the option to loop in safety-related relay contacts. As such, the affected circuits are integrated into the safety concept with minimal wiring. In doing so, the switch contacts of the enabling current paths are protected according to regulations. A supply of up to 60 A can be achieved thanks to the high current carrying capacity.

**Enquiries: Tony Rayner. Email [tonyr@phoenixcontact.co.za](mailto:tonyr@phoenixcontact.co.za)**

## Distribution network efficiency in Ghana

The Electricity Company of Ghana (ECG) is responsible for the distribution of electricity in the southern part of Ghana, namely the Ashanti, Central, Eastern, Greater Accra, Volta and Western Regions. ECG is owned by the government of Ghana and provides electricity to 2,5 million customers.

With increasing demands on the network from its growing customer base, ECG felt compelled to improve resilience and customer service throughout its operations. Pressing issues for the ECG ranged from frequent customer outages to operational and maintenance costs, which ultimately resulted in common electricity revenue losses as well as being a significant burden on the impacted community and businesses, affecting the economy and potentially disrupting critical infrastructure.

ECG approached **Lucy Electric** and the company created a tailored automation programme in which it would be able to deliver on ECG's objectives, including the design work, manufacture and delivery of the equipment to Ghana from the UK, within six months. Lucy Electric also developed a bespoke training course to ensure that local engineers would be able to manage the

equipment as part of Lucy's after service care offering. The existing power distribution network of ECG consisted of 48 439 km of 33 kV, 11 kV and low voltage overhead distribution lines. The initial phase of the project involved automating the network, which focused on the 33 kV radial overhead feeders across the regions of Bogoso and Tokuse, in addition to parts of the 11 kV underground network in the capital city of Accra. The automated field devices, such as the remotely controlled gas-enclosed load break switch (Rapier GX), were complete with fault passage indicators and retrofit with RMU actuators and interfacing Gemini RTUs/ communication modems.

To give ECG full visual control and data accessibility to the network, Lucy Electric installed a standalone Gemini SCADA package. A key benefit being that the system architecture can be upgraded to manage network expansion in the future.

In addition to this, a Gemini DC (Data Concentrator) was installed, which would prevent server overloads and minimise communication traffic. To do this, secondary RTUs were integrated into the existing DMS/ SCADA systems to provide a centralised and



distributed data process. The installation of radio repeaters at strategic locations along the network provided an ideal solution ensuring that communication functioned correctly over tough terrain such as rocky and jungle areas. The high power radio communication links incorporated 'store and forward' techniques to enhance the distances covered. This system was helped by successful design, manufacture and delivery of power and distribution equipment to ECG.

**Enquiries: Visit [www.lucyelectric.com](http://www.lucyelectric.com)**

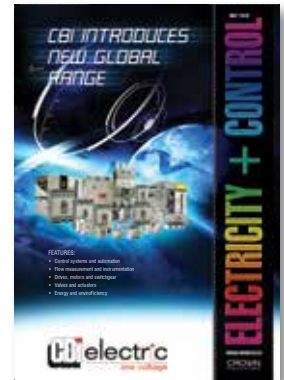
## Compact modules for limited space

The AS-i M8 modules from **ifm electronic** are suitable for applications where space is limited. The units have been equipped with ecolink connection technology and the full potting ensures high shock and vibration resistance. The compact modules require little space due to their slim design. They are suitable for robotics, handling technology and assembly technology. The modules have a protection rating of IP67/IP68 and are quickly and easily installed via two fixing holes from the front or from the side. The ecolink technology mounts easily. An integrated mechanical end stop protects the O-ring from damage and rapid and secure installation is possible without a torque wrench.

**Enquiries: Tel. 012 450 0370 or email [info.za@ifm.com](mailto:info.za@ifm.com)**



# Local manufacturing success story exports products worldwide



The time has come for manufacturers and suppliers in the electrical industry to step up to the next level. They need to exceed customer support expectations and ensure the continued protection of lives through both compliant installations and certified electrical protection devices. That time is now!

CBI-electric is a truly South African success story. As the only manufacturer of circuit breakers and related devices on the African continent this locally grown organisation, established in 1949, exports the majority of its products to countries across the world. The organisation has established subsidiaries and distribution channels in North America, Australia, Asia and Europe. To be able to be successful in international markets it is imperative to maintain a leadership position within your home market, notwithstanding strong international competition. CBI-electric maintains its leadership position by investing extensively in skills development, machinery, systems, facilities and equipment. This is supported by leading edge in-house research complemented by their design, development, manufacturing and testing capabilities.

## National Development Plan

In a recent speech President Jacob Zuma stated that the manufacturing sector continued to contribute significantly to the country's economy and there is a strong focus on growing this sector aimed at achieving the goals of the National Development Plan (NDP). The NDP aims to eliminate poverty and reduce inequality by 2030. According to the plan, South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society.



## Relationships

In addition to the locally manufactured products that CBI-electric exports the organisation has long term partnerships with highly reputable international organisations such as Mitsubishi Electric and Eaton. CBI-electric and Mitsubishi has extended their 14-year relationship with the re-signing of the agreement during April this year.

## Only local manufacturing facility

CBI-electric is also the only manufacturer in the Southern Hemisphere with its own 65 kA, 44 000 V SANAS accredited test station with certifications witnessed by SABS, UL, VDE and CQC. The organisation holds numerous international certifications including American, Canadian, Australian, Russian, European, Chinese, Japanese, Ukraine, South African and others.

## New product launch – The Time has Come...

CBI-electric is in the process of launching a new state of the art web-based design tool. To complement the system, they are also launching new product ranges with specific focus on their Australian and American subsidiaries, but also applicable to the South African market.

## Comprehensive product range

Products supplied by CBI-electric are for the Residential, Commercial, Industrial, Mining, Utilities sectors and Original Equipment Manufacturers (OEMs). These products include Protection devices; Distribution devices; Control devices; Metering devices; Automation and Control systems; Industrial and consumer energy storage devices; HVAC systems and devices; Systems/ solutions integration as well as Specialised application devices.

The company holds a strong position internationally as an equipment supplier to the telecommunications, rail and solar industries, partnerships that will benefit the South African electrical industry.

**CBI-electric – Outperforming the Test of Time!**

**CBI-electric – Protecting Lives and Property!**

Enquiries: Aletta Olivier,  
Marketing Manager,  
CBI-electric: low voltage.  
Email [aletta.olivier@cbi-electric.com](mailto:aletta.olivier@cbi-electric.com)  
or visit [www.cbi-lowvoltage.co.za](http://www.cbi-lowvoltage.co.za)

# Particle Time of Flight

## Reflections on gas flow measurement in hazardous environments

By T Moorhouse and contributor - Steve Ante, Photon Control R&D, S Braver, Martec Asset Solutions

*The goal of this project was to create precise optical flow meters for the oil and gas industry optimised for measuring flare gas flow in explosive atmospheres. The flow meters had to incorporate enclosed electronics yet allow easy installation, accessibility and servicing.*

Optical techniques for measuring gas flow use the principles of optical velocimetry, which measures gas flow velocity. From this, we can obtain the volumetric flow rate. Within this model, there is both Laser Doppler Velocimeters (LDV) and optical transit time velocimeters. Within the latter, there is a further subdivision into laser-two-focus (L2F) and scintillation-based and absorption based transit time velocimeters. This article addresses L2F.

### Theory of operation

The operating principle of the optical gas flow meter (OFM) based on L2F velocimetry is explained in *Figure 1*. Small particles found in any natural or industrial gases pass through two laser beams focused in a pipe by illuminating optics. Laser light becomes scattered when a particle crosses the first beam. The detecting optics collect scattered light on a photodetector (P1), which then generates a pulse signal. When the same particle crosses a second beam, the detecting optics collect scattered light on a second photodetector (P2), which converts the incoming light into a second electrical pulse. By measuring the time interval between these pulses,  $T$ , the gas velocity is calculated as:

$V = S/T$  where  $S$  is the distance between the laser beams.

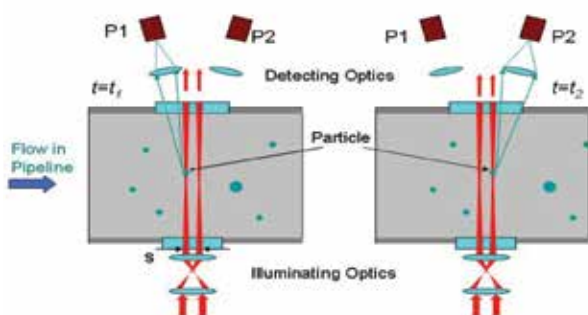


Figure 1: L2F basics.

With this L2F method, we can measure the linear gas velocity with high accuracy independent of pressure, temperature and gas com-

position. Photo detectors register individual photons, which allow them to use relatively low power lasers. The collecting optics collect the scattered light within as large a solid angle as possible while blocking all direct light. Light scattering efficiency is determined by the size of the particles and the laser wavelength. L2F velocimeters operating at near-IR (850 nm) can measure the velocity of air with a minimum particle diameter of approximately 0,3  $\mu$ m. Shortening the laser wavelength reduces this minimum detectable particle size to less than 0,1  $\mu$ m. During the early development of the OFM, particles found in a typical gas pipeline were shown to range from 1 to 10  $\mu$ m. The turn-down ratio is probably the most important parameter of any flare gas meter. The minimum velocity for Photon Control's OFM is defined by the presence of particles – the dirtier the gas, the lower the possible minimum velocity. It has been shown that flow through the OFM can be measured down to  $V_{min} = 0,1$  m/s. High  $V_{max}$  has been tested up to  $V_{max} = 150$  m/s, which is used to define the OFM turn-down ratio as 1500:1.

### System Configuration

The OFM consists of an optical head and a signal processing unit, which are connected by a fiber optic cable (see *Figure 2*). The basic OFM probe (see *Figure 3*) developed by Photon Control is designed to

fit into a standard ANSI flange.

The signal processing unit (or opto-electronic converter) is designed on one electronic board, which fits into a normal NEMA or an explosion proof enclosure.



Figure 2: Optical flow meter system.

AGA	– American Gas Association
CEESI	– Colorado Experiment Engineering Station Inc
DSP	– Digital Signal Processing
L2F	– Laser Two Focus
LDV	– Laser Doppler Velocimeters
OFM	– Optical Gas Flow Meter
PVC	– Polyvinyl Chloride

## Abbreviations/Acronyms

The board incorporates a Digital Signal Processing (DSP) chip with internal analogue-to-digital conversion at sample rates up to 12 MHz. It has inputs for pressure and temperature transmitters, so that various flow calculations can be performed. The unit provides typical flow meter outputs: 4-20 mA, frequency and pulse, and RS-232 or RS-485 digital. The board is powered from 24 Vdc; the average power consumption is 3 watts. Signal pulses are collected over a fixed sampling interval, which is determined from the flow rate and number of particles in the gas. The raw flow velocity is calculated using a fast correlation technique (correlogram). The raw velocity data is then input to a post-processing calculation. The post processing filters average the output and remove spurious readings based on previously calculated data (see *Figure 4*). The flow profile correction is used to calculate the average flow velocity (bulk velocity) from the point velocity reading using a programmable look-up table specific to the piping and meter configuration.

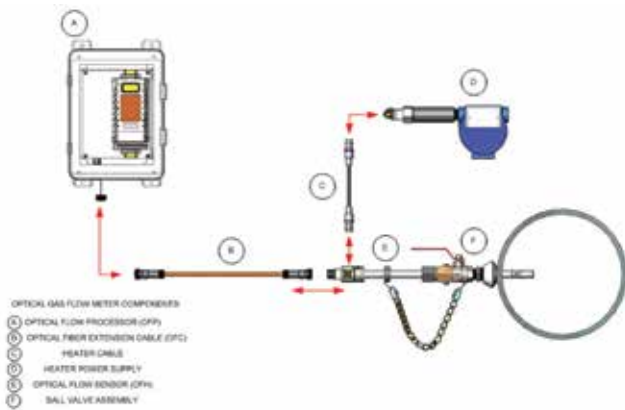


Figure 3: Optical flow meter probe.

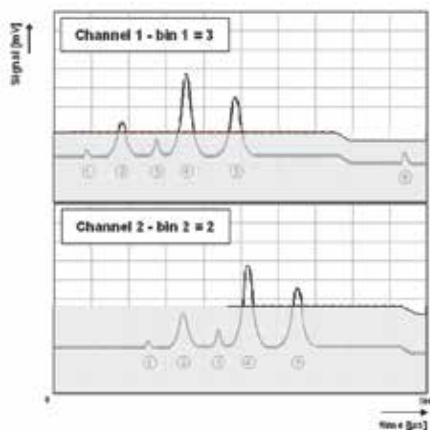


Figure 4: Photodetector light scatter signals (after threshold filter).

The fibre optic cable accommodates a group of single-mode and multi-mode fibres protected by a flexible metal conduit and a water-

*American Gas Association (AGA) Report No 1, issued in 1930, described the measurement of natural gas through an orifice meter. By 1980, AGA Report No 7 described the measurement of natural gas through a turbine meter.*

proof indoor/outdoor PVC jacket. The standard length of the cable is 20 metres, but the power budget of the system allows extension of the cable length far beyond 100 metres.

## Applications

As with any technology, there are numerous practical issues that a user may encounter in real world installations. Contamination of optical components is an inevitable concern when contemplating a flow measurement system using optics in a flare gas environment. This is especially so with flare gas, which generally has a variable composition and liquid content. We addressed this issue at the beginning of our OFM probe development by implementing a shroud design. This solution dramatically improved the resistance of the device to concurrent liquid hydrocarbons, which are known to cause problems for other types of flare meters. Another improvement aimed at the problem of liquids dropping out of the gas was the application of heated windows. In early commercial installations, it was discovered that many flare and biogas facilities deal with wet gas. Keeping the windows warmer than the ambient gas prevents laser light from scattering owing to foggy or wet window surfaces. This has now become a standard feature for all OFMs produced by Photon Control.

Hundreds of laser-two-focus OFMs have been supplied and installed in the field since commercialisation began. Applications include flare gas and associated gas flow measurement in pipe sizes from 4 inches to 30 inches, fuel gas measurement in natural gas pipelines, and biogas flow metering.

## Installation planning

Feedback from the OFM installers revealed that the four most important elements are:

- Robust electronics
- Protective shroud
- Way of retrieving the probe without shutdown (retractable device)
- Calibration curve to move to within an acceptable accuracy of +/- 5 %

The OFM can be used in a pipe with a diameter between 4 and 30 inches. A key requirement is to only install the OFM after

20 diameters of straight upstream length and before 5 diameters of straight downstream length. This allows for the flow profile to be fully developed at the point of measurement. The advantages of accurate flare metering include:

- Meeting regulatory and environmental requirements,
- Better understanding of the facility process
- Making decisions based on good data.

In many facilities, a large quantity of background gas goes up the stack unnoticed. Flare reduction is not just an environmental responsibility; it affects the facility's bottom line. Wasted gas is lost profit and, more important, an unnecessary environmental load.

## Installation examples

One of the most important factors when determining the ideal installation location is to follow the 20/5 rule: probe placement at least 20 diameters downstream and 5 diameters upstream. Without following that rule, there will be an unpredictable flow profile.

## Calculating Insertion Depth

Before installing an OFM, it is necessary to calculate and mark the correct insertion depth on the probe. The actual sensing point for the probe is 1,65" (42 mm) from the end of the probe. For 6" and larger pipe diameters, the sensing point should be positioned at the quarter radius point of the pipe for accurate readings. For a 4" diameter pipe, this measuring point should be positioned at the centre point of the pipe for accurate readings.

## Pressure and temperature compensation

Pressure and temperature compensation is mandatory for gas volumetric flow rate correction since pressure and temperature differences will cause volume to vary as stated by ideal gas law. The American Gas Association (AGA) publishes various reports describing how to measure the flow of natural gas, starting with AGA Report No 1 issued in 1930, which described the measurement of natural gas through an orifice meter.

By 1980, AGA Report No. 7 – Measurement of Fuel Gas by Turbine Meters – was published, detailing the measurement of natural gas through a turbine meter. By applying the American Gas Association's AGA-7 guidelines, we can recalculate actual conditions to base conditions.

## Calibration checks

Calibration is typically performed by comparing velocity measurement against a multi-path ultrasonic meter or sonic nozzles. Linearisation coefficients based on a bulk to raw velocity ratio are collected then plotted against the reference meter's Reynolds number.

Full-range calibration can only be performed by a limited number of facilities, such as the Colorado Experiment Engineering Station Inc (CEESI) owing to the Optical Flow Meter's wide velocity range (0,1 to 150 m/s).

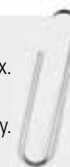
## Conclusion

While the stated goal of the project was to create precise optical flow meters for the oil and gas industry optimised for measuring flare gas flow in explosive atmospheres, the flow meter that was developed is now being used by a myriad of customers outside of the oil and gas industry. We exceeded our expectations with respect to ease of installation, accessibility and servicing. Furthermore, our measurement range, from 0,1 m/s to 150 m/s, surpassed our initial plans, giving us the desired turn-down ratio of 1500:1. Ultimately, we were able to cost-effectively measure high CO<sub>2</sub> gas flows as well as low pressure, high dynamic range conditions with measurements not affected by gas composition.

## Acknowledgement

This topic was presented at an IDC Technologies Flow Measurement and Control Forum (Session 4) by Selwyn Braver, Managing Director of Martec Asset Solutions Pty Ltd.

- Flow measurement in explosive atmospheres can be complex.
- Optical flow meters use the principle of optical velocimetry.
- Volumetric flow rates can be determined from gas flow velocity.



take note

Ted Moorhouse was vice president of Business Development, Photon Control R&D Ltd. Contributor to the article is Steve Ante of Photon Control R&D.



Selwyn Braver is the managing director of Martec Asset Solutions Pty Ltd and is a specialist in the areas of condition assessment, condition monitoring and diagnostics for predictive maintenance for generation, transmission and distribution assets. Prior to establishing Martec, Selwyn was general manager of Dynamic Ratings (a subsidiary of Wilson Transformers). Originally from South Africa, Selwyn was the divisional marketing manager with Alstom T&D and prior to this the director and general manager of Alstom Measurements for 15 years. Selwyn has a BSc (Electrical Engineering) and an MBA from the University of the Witwatersrand. Enquiries: Email [selwyn.braver@martecassetsolutions.com.au](mailto:selwyn.braver@martecassetsolutions.com.au)

## User-friendly mass flow controller

EL-FLOW Prestige is the next generation of Bronkhorst mass flow meters/ controllers for gases. Nearly all core components have been redesigned and many improvements and innovations have been incorporated. With this new series Bronkhorst introduced the 'Differential Temperature Balancing' technology, ensuring high accuracy and a superb sensor stability. New, power efficient micro-processors with innovative multistage control loops have been applied to achieve enhanced dynamic behaviour. The new metal housing is of robust yet compact design. EL-FLOW Prestige represents a truly ground-breaking shift in versatility and user-friendliness, featuring an on-board gas conversion model, various fieldbus options and customizable I/O functions. The control performance of EL-FLOW Prestige mass flow controllers is factory adjusted to swiftly respond to setpoint changes, without overshoot. Moreover, the controllers are

highly resistant to mechanical shocks and pressure fluctuations, which may be caused by other devices consuming gas from the same source. As an option the mass flow controllers can be tuned for extra fast flow response (down to 500 milliseconds) or extra smooth control, depending on the requirements of the user's process. The dynamic behaviour can also be tuned on site easily, by adjusting the controller speed settings via FlowTune, or by using our software tool FlowPlot. This free tool can also be used for device diagnostics or alarm and counter settings.

**Mecosa** is the sole agent for Bronkhorst Cori-Tech in South Africa.

**Enquiries: Tel 011 257 6100 or email [measure@mecosa.co.za](mailto:measure@mecosa.co.za)**



## Low volume variable area flowmeters

KOBOLD Instrumentation, represented in South Africa by Instrotech – a **Comtest Group** company – has launched the KFR line of acrylic body flowmeters offering the perfect balance between low-cost, accuracy and range availability. Bridging the microflow and large flow ranges, this flowmeter can provide an effective solution to industrial applications, such as gas analysis and water applications.

The KFR operates on proven suspended float system, i.e. the installation position is vertical and the flow is from bottom to top. It has a one-



piece acrylic body with PVC or metal fittings for durability. Large lettering and extra hash marks make the scale clearly visible and take the guesswork out of reading flow. Further enhancing readability, the low flow meters offer an inherently stable float design, while the larger flowmeters feature a float stabilisation mechanism. In the larger flow ranges, the stabilisation mechanism allows a smaller installation footprint at a correspondingly lower price. Most units are offered both with, or without, needle valves. Accuracy, value, low cost are three non-mutually exclusive attributes which are made possible by KOBOLD KFR flowmeters.

**Enquiries: Tel. 010 595 1831 or email [sales@instrotech.co.za](mailto:sales@instrotech.co.za)**

## MAKING TECHNOLOGY WORK FOR YOU



## SENSING SOLUTION SPECIALIST



**COUNTAPULSE  
CONTROLS (PTY) LTD.**

Tel: 011 615 7556 | Fax: 011 615 7513 | e-mail: [clive@countapulse.co.za](mailto:clive@countapulse.co.za)

## Water flow measurement solution

Integration and intelligent data management are becoming increasingly important on account of the growing degree of automation in water and wastewater treatment plants.

However, what is crucial is the precise measurement of water flows. To do this, plant operators require robust, high-quality flowmeters. The Promag 400 meets the basic requirements without any ifs or buts and provides new, cutting edge technology. This device series represents industry-optimised design and impresses with its simplicity and reliable operation. Where accurate measurement of water quantities is essential, the Promag 400 is the key to optimal quantity balancing, process regulation and billing for measuring points.

The device configuration and checking is ingeniously simple - and the latest web server technology enables time-saving operation without additional software. Upload and download of parameters can be easily performed for data storage and fast commissioning of multiple identical measuring points. Data storage (HistoROM) with trend analysis and process monitoring is carried out automatically. This ensures rapid recovery of device data in the event of servicing and enables simple replacement of electronics without readjustment.

Extensive self-diagnosis functions increase the plant reliability and provide maximum transparency. The verifiability of the measurement results is based on traceable verification concepts, permanent fault monitoring and clear fault categorization for specific maintenance measures. Compatible Analogue output signals, HART, PROFIBUS DP, MODBUS RS485, through to Ethernet IP enable seamless integration into existing process control systems, including documentation. Since the firmware/ device drivers are available

throughout the entire life cycle, compatibility between the field device and the process control system is guaranteed at all times.

The tried-and-tested W@M information system provides efficient lifecycle management for design, maintenance and service. The power supply is also new: the same device can be used for alternating voltages of between 18 and 260 V and for dc voltages of between 18 and 30 V.

Enquiries: *Hennie Pretorius. Tel 011) 262 8000 info@za.endress.com*



  
**Bronkhorst®**  
HIGH-TECH



**The New Digital In-Flow Mass Flow Controller from Bronkhorst HIGH-TECH**

## The Ultimate Choice for Gas Mass Flow Metering and Controlling

### WHY?

**Multi Range:** Full scale flow rate can be re-ranged anywhere between 40% and 150% of nominal value

**Multi Gas:** Up to 8 different gas calibration curves can be stored in and selected from the instrument

**High accuracy:**  $\pm 0,8\%$  of reading plus  $\pm 0,2\%$  of fsd  
**Fast response time**

**Instruments also available for ATEX CAT 3 for use in Zone 2**

If it is Gas it is



Exclusively available from

**MECOSA** (PTY) LTD



Tel: (011) 257-6100 Fax: +27 86 531-9682 PO Box 90, Fontainebleau, 2032

E-mail: [measure@mecosa.co.za](mailto:measure@mecosa.co.za) Web: [www.mecosa.co.za](http://www.mecosa.co.za)



# Reliable Flow Measurement.



## Proline Promag Electromagnetic flow meter

Electromagnetic flow measurement has been used very successfully in measuring and control technology for over 50 years. As a process instrumentation specialist, Endress+Hauser has secured a leading position worldwide in all industry sectors since 1977 and has sold over 1million measuring instruments.

This million stands for:

- Global trust in Endress+Hauser as a business partner
- High dependability and robustness of our instruments in day-to-day operation
- Innovative products and solutions for our customers
- Extensive expertise in a wide range of industries and applications
- Worldwide sales network with highly skilled technicians and sales engineers

Endress+Hauser (Pty) Ltd  
Phone +27 11 262 8000  
Fax +27 11 262 8062  
info@za.endress.com  
www.za.endress.com

Endress+Hauser 

People for Process Automation

# Learning versus Training

*Power of know how – Process engineering is anything but simple. How can we impart information that is hard to digest in an easily accessible manner?*

For the process automation sector it is not only hard to get new fully qualified staff, but the ones who are available are probably not the most experienced having just completed their studies at the universities or technology centres. Even in other parts of the world where it is much easier to find new staff, the requested qualification combined with required process experience remains an issue.

But what happens to the existing staff? The life cycle of technology is getting shorter and shorter. How does a technical person stay up to date? As for the process plants and factories, how can they be sure that they exploit the options of the technology and field instruments you are using today? In today's cost cutting efficiency requirements; plant availability, product quality and safety are becoming key – with the instrumentation technician or engineer needing to understand the complete life cycle of a plant in ensuring that these changes in technology are introduced to maximise the sustainability of a process plant. This change is no longer merely just a question of maintenance.

Apart from hiring of new staff and on-boarding these members, another aspect that needs attention is the ensuring further education for the staff. This becomes questions of the financial implications of further training. How much does a company invest in further education and do they have any idea if the money is well invested? It is no longer a matter of 'just attending' training, but to learn and comprehend while being able to utilise these skills the very next week in plant conditions.

In the past the focus was on: The delivery of training that means we made a check mark after a person attended a course and we assumed that he now has the knowledge and skills to perform better in his job.

We at **Endress+Hauser** stand for a shift in paradigm. Our focus is not on delivering a training course, our focus is on the learner, that he really acquires new knowledge and skills he can apply in his job. To ensure the success of such a programme we use an instructional system design model, which has been developed by the American Society for Training and Development, which recently renamed to ATD which stands for Association for Talent Development. The model is called 'The Training Cycle' and consists of five steps:

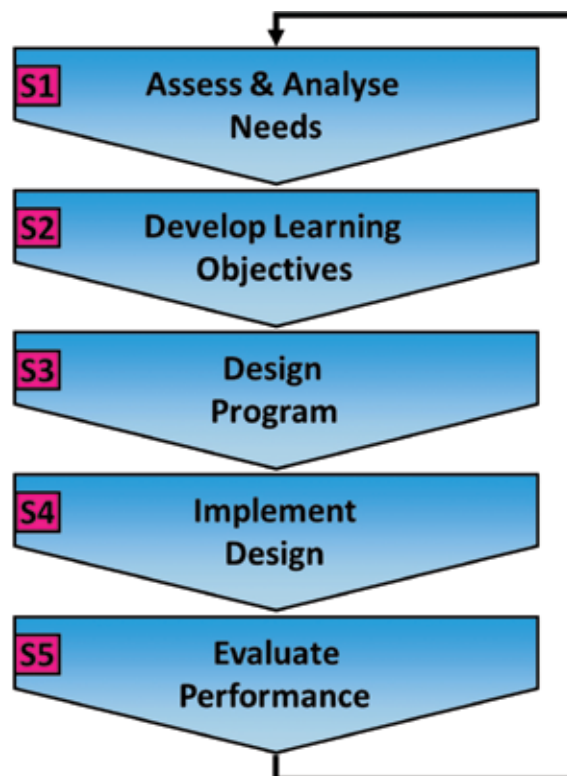
**First:** Analyse the training needs: here we will do a Gap-Analysis, and clarify questions about target group, necessary and existing preconditions, and other frame conditions.

**Second:** develop learning objectives: a learning objective is a specific performance statement about knowledge or skills which should be gained during the programme. They are essential because based on the learning objectives the content will be developed and also the success of the programme will be assessed.

**Third:** Design the programme: Again in the past most training courses were content-centred, with an 'expert' standing in-front

of the audience telling everything he knows. Using 90 slides in a 60 minutes something, I am actually reluctant to call something like this training, is not unusual. But the question, if the audience wants to hear about it, or if they do need to know about it, was never asked. Based on a needs-analysis we develop only the necessary content which will be transmitted in an interactive style, which takes into consideration the latest findings about adult-learning.

**Finally steps four and five** are implemented to address the implementation and complete the final evaluation.



Endress+Hauser South Africa has addressed these needs and launched the Universal Training Rig (UTR) at the Africa Automation Fair in May 2015. Purpose built for Endress+Hauser South Africa at the company's Application Training Centre (ATC) in Reinach, Switzerland, the UTR utilises 20 devices from the company's extensive range of flow, level, pressure and pH measuring instruments in a variety of flow and control loop configurations.

The integrated oil, water, acid and alkaline reservoir tanks combined with mixing and separation chambers allow a huge range of flow, level and pH conditions to be created through the utilisation of different control loop strategies based on pressure, temperature, level, density and pump speed primary values.



Whilst not emulating a production process of any specific industry, the UTR presents the application frame conditions in a way to offer a variety of training possibilities. An agitator (level disturbance) , heater element (temperature changes) and injected compressed air (entrained gas) allow the process conditions to be interrupted in a controlled manner giving the trainee a practical perspective of the sensitivities of each instrumentation type operating under varying field conditions

All operational parameters including instrument selection are controlled via the integrated Programmable Logic Controller and touch screen display.

Endress+Hauser is offering two new intensive five day training courses targeted at technical plant personnel from technician and engineer grades right through to maintenance, engineering and project management. The two courses cover all of the major process measurements classes including level, flow, pressure, temperature and analytical starting from the principles of operation through to application topics such as meter selection, installation and application issues, and basic trouble shooting. The trainee is introduced at a practical level to the standard Endress+Hauser instrument selection and sizing software tool "Applicator" plus hands on instrument configuration and troubleshooting using the device keyboard and display as well as the service software tool 'FieldCare'.

As well as 'real life' instrument and control operation, the UTR also allows different field communication strategies to be presented via its use of Wireless HART, Profibus as well as standard 4-20 mA connections. Supplementary topics such as reading and understanding P&ID diagrams and Plant Asset Management are also included. The courses are interactive with all theory accompanied by extensive practical assignments on the UTR itself followed by written assessments thus maximising the learning experience.

On request, a training brochure is available outlining the UTR and training course modules in more detail including pricing and schedules. An open day is being planned for later in the year where you will be able to have an in-depth look at the UTR and the training programme and discuss what it has to offer your company.

**Enquiries: Chris Gimson. Tel. 011 262 8000 or email [info@za.endress.com](mailto:info@za.endress.com)**

► **Flexibility is the main principle**



**KROHNE**

► *achieve more*

► **Are you looking for a modular level meter? OPTIWAVE 5200 is the answer.**

Over 90 years of research and development evolution have made innovation a tradition at KROHNE. The brand new OPTIWAVE 5200 is a perfect fit for a broad range of applications and mounting positions. This 2-wire 10 GHz FMCW radar level meter for liquids features a modular housing and antenna design which makes it a marvel of adaptability.

The quick-coupling system permits removal of the converter under process conditions and full 360° rotation. For additional ease of use, the display keypad is accessible without having to open the converter. Besides, KROHNE is the only manufacturer to offer full display and configuration capability over a distance of up to 100 m / 328 ft, using the optional remote converter.

Designed for use in safety-related systems acc. to IEC 61508 (SIL2), the OPTIWAVE 5200 offers antennas for standard and corrosive products making it ideal for the chemical, oil & gas and wastewater industry.

The unique flexibility of the OPTIWAVE 5200 allows it to seamlessly blend into a wide range of processes – it fits in where other meters would only be in the way.

KROHNE – Process engineering is our world.

KROHNE South Africa  
 8 Bushbuck Close  
 Corporate Park South  
 Randtjiespark, Midrand  
 Tel.: +27 113141391  
 Fax: +27 113141681  
 Cell: +27 825563934  
 John Alexander  
[j.alexander@krohne.com](mailto:j.alexander@krohne.com)  
[www.za.krohne.com](http://www.za.krohne.com)



# Brushless Servo operating principles

By G Craig, Techlyn

A servo motor is a highly specialised device. Like an ordinary electric motor, it requires detailed design and a thorough understanding of the operating principles. This article reviews the design of a brushless servo motor and drive system in the context of its use in industry.

Brushless servomotors have largely replaced brush motors, offering simple construction, absence of electrical rubbing parts (brush/commutator) and high speed capability. In addition, the heat developed by the windings is developed in the outside (stator) of the motor where it is dissipated by convection and conduction via the motor mountings.

Figure 1 shows a typical brushless motor's rotor. Clearly visible are the bearings, permanent magnet rotor and, on the right, a small ring magnet which is used to create the commutation signals via the Hall effect sensors (see Figure 2).

The stator (see Figure 3) has (in this case) three pairs of pole pieces, two per phase. Another possible description would be to call this a three phase synchronous induction motor. The windings can be connected in star or delta.

These motors are sometimes wrongly called dc (direct current) brushless motors. It is true that the drive electronics is dc powered, but the motor is unquestionably driven by alternating current (ac).

Link 1 [1] in the 'References' (see bottom of this article) will take you to an animated description of drive operation. This shows the sequential operating principle of the three phase inverter section. More detail is provided in the next section.

## Inverter section

This is the heart of the drive, where the dc supply is turned into ac to operate the motor.

Figure 4 shows the basics. Three 'half bridges' can connect the motor phases either to the positive or negative supply rails from a dc supply.

The transistors are provided with diodes which are needed to deal with the inductive energy stored in the motor windings when current has been flowing and a transistor is turned off.

The sequence of switching can impart either a clockwise or counterclockwise torque in the motor. The Hall sensors (small solid-state magnetic sensors) signal the drive when to switch stator polarity.

The result is the production of a rotating field in the stator which drags the permanent magnet rotor with it in synchronous fashion. Various sequences of transistor switching are possible, including the presently popular flux vector method (description of these modes is beyond the scope of this article).

Note that Figure 4 shows bipolar transistors. For lower powers, power Field Effect Transistors (FETs) are used. They have the added advantage of not requiring discrete diodes as the intrinsic body diode provides this function.

Referring to Figure 4, let us assume that a positive current is required to flow to the motor red phase, and that the returning negative current will arrive from the blue phase. To do this T1 is turned on and T5 completes the path. (T3 and T2, clearly, are off). As the current rises T5 is turned off when the required current is reached. Various sensors such as shunts or Hall linear sensors provide current feedback. When the required current set-point is reached, normally the high side switch (T1) is kept on and T5 is switched off. At this point the blue phase abruptly changes polarity and the remaining 'flywheel' current flows through D2 and then via T1, back to the red phase. The current now falls at a rate proportional to the winding inductance, whereupon the cycle repeats. To reverse the current flow T1 and T5 turn off and are replaced by T2 and T3. This on and off switching is known as Pulse Width Modulation (PWM).

## Position feedback

Position feedback is commonly provided by an incremental encoder. To save space you are requested to use Link 2 in the Resource list to get the detail. The incremental encoder has no way of knowing the rotor position on switch-on, so it can only measure relative rotor position.

An absolute encoder or a resolver will supply the absolute rotor position and can, in addition, be used to signal the commutation (polarity change) to the drive. This will mean that the Hall sensors are not required.

In the case of the incremental encoder, two signals, 90 degrees out of phase, enable the drive to determine whether rotation is clockwise or counter clockwise. These signals are referred to as quadrature signals.

Be aware that electrical noise which mimics quadrature will be falsely interpreted by the drive, with a consequent loss of true position. Great care has to be taken to separate power and sensor signals and use appropriate screening. In addition, if possible, move to a datum switch once per machine cycle. These and other topics

Ac	– Alternating Current
Dc	– Direct Current
EMI	– Electromagnetic Interference
FET	– Field Effect Transistors
PC	– Personal Computer
PWM	– Pulse Width Modulation

## Abbreviations/Acronyms

will be dealt with in a third article in this series which will deal with system design and integration. Typical encoder resolutions are 500 to 10 000 pulses per revolution.

### External signals

Position commands are, in general, implemented in three ways:

**See Figure 5:** The external controller supplies step and direction signals in the same way as would happen with a step motor system. Each time a step pulse is received, the direction input is checked, and the motor rotates in the appropriate direction. When configuring the drive settings via the serial port, the permissible following error can be set. When this error is exceeded, the motor is stopped and the alarm output is set so the controller is aware that position has been lost. This feature is not available with an open loop step motor system. Note that this control method allows a mixture of servos and steppers to share the system.

**See Figure 5:** It is possible to implement a control language strategy via the serial port. Although flexible and comprehensive, this scheme requires the system integrator to learn an arcane supplier-specific control language. Mixing and matching of drives is not possible.

**See Figure 6:** A third possibility is to use a host controller (often a PC) fitted with a motion controller. In this case the complexity is moved to the host controller which receives the motor encoder signals and controls the drive by means of a -10 V to +10 V torque demand signal. In this case the speed control loop and position control loop reside in the host controller. This approach has much to recommend it on large systems as the host controller is aware of the motor torque (current) and is able to detect the onset of overload and take appropriate action such as slowing down.

### Control filter

This is the heart of the system and resides either in the drive micro-processor or in the host controller. In both cases the processing is done digitally. *Figure 7* shows the operating principle.

- \* The position register receives a destination set-point from the system controller
- \* The quadrature up down counter holds the actual rotor angular position. Depending on the direction of rotation the count increases or decreases
- \* The subtractor subtracts the position from the set-point and calculates the error signal
- \* The proportional term scales the error signal (bigger or smaller) and it becomes the output signal which, after passing through the summer, causes the motor to rotate in a direction which minimises the error
- \* The integral term integrates the error with respect to time which, after passing through the summer, adds to the output signal and

- Brush motors have been largely replaced by brushless servo motors.
- Servo motors must be precisely controlled and be powerful and robust enough to serve their purpose.
- Great care must be exercised as regards minimising the influence of EMI in the accurate operation of a servo motor.



Figure 1: Motor rotor.

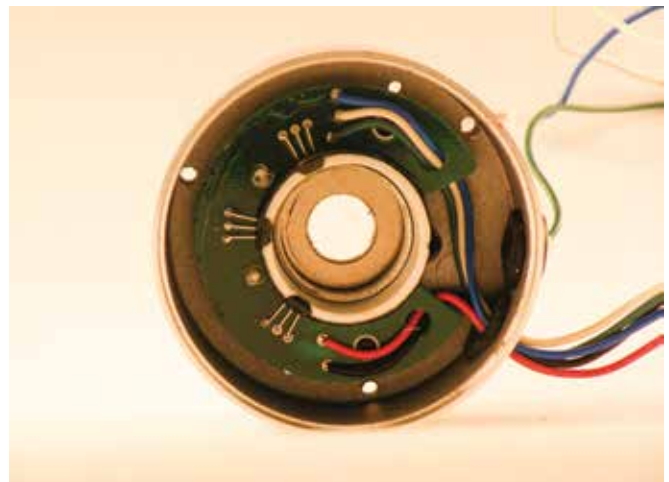


Figure 2: Hall Effect sensor.

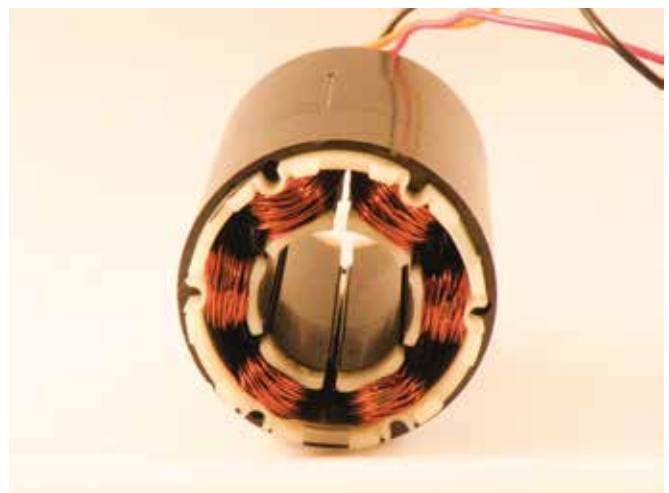


Figure 3: Motor stator.

the restoring force on the motor is increased. In this way the error can theoretically be reduced to zero

- \* The derivative signal measures the rate of change of the error signal. This is subtracted from the output signal which slows the rate of error reduction, and avoids overshoot
  - o The PID coefficients are set when the system is tuned during commissioning
  - o Unlike the process industry, motion systems do not suffer from system lags, as changes in rotor position register instantly in the controller. This section is of necessity brief due to space constraints
    - Attention to mechanical issues will help minimise system problems. These include:
      - o Avoid inertia mismatch caused by excessive load inertia compared to the motor rotor inertia
      - o Avoid lost motion (backlash) in the drive train
      - o Construct the machine in a way which minimises mechanical resources

These, and other issues, will be dealt with in the third article in this series which deals with system integration.

*The first article in this series (A bench top motor dynamometer for drive testing) was published in Electricity+Control, May 2015. A third article will include a case study of an actual installation.*

## Conclusion

The most important aspects of brushless drive technology have hopefully been covered in this article. Questions can be addressed to glyn@techlyn.co.za. (Please place 'EC article' in the subject line to avoid my spam filters).

## References

- [1] <http://www.funnycat.tv/video/brushless-dc-motor-animation/PKILDnr0aZ4>
- [2] [http://en.wikipedia.org/wiki/Rotary\\_encoder#Incremental\\_rotary\\_encoder](http://en.wikipedia.org/wiki/Rotary_encoder#Incremental_rotary_encoder)

### Mechatronics Training

Mechatronics specialist, Techlyn, is now offering training for technicians and engineers (both mechanical and electrical).

Taking a multi-disciplinary practical approach, topics covered will include :

- Mechanical considerations such as inertia matching, torque and power.
- Electrical basics such as Pulse Width Modulation (PWM) and encoder operation
- System setup, including tuning of Proportional, Integral, Derivative (PID) filters
- Program design and flow
- Operator interfaces
- Mechanical and electrical safety
- System wiring layout to ensure reliable operation
- Fail-safe operations
- Actuator design
- Hands-on training



Techlyn has represented California-based Galil Motion Control ([www.galilmc.com](http://www.galilmc.com)) since 1994. Galil manufactures a comprehensive range of motion controllers and Programmable Logic Controllers (PLCs). They are programmed using Galil's easily learnt programming language and free Windows design tools. The photo shows a 4 axis motion controller offering high end features such as dual encoders on each axis and comprehensive analog and digital inputs and outputs (IO).

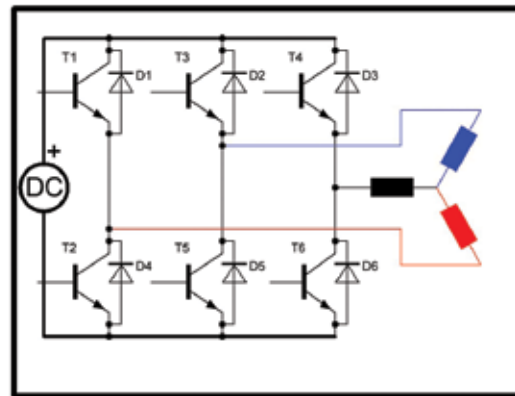


Figure 4: Inverter section.

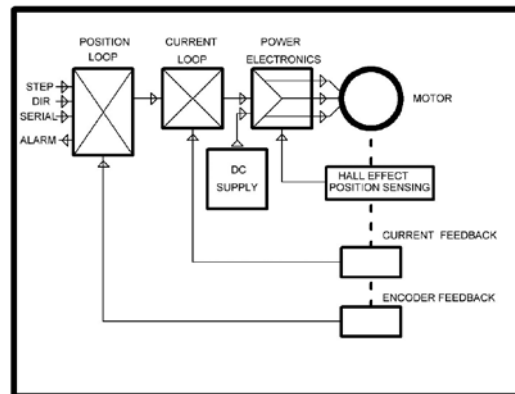


Figure 5: Step and direction or serial control.

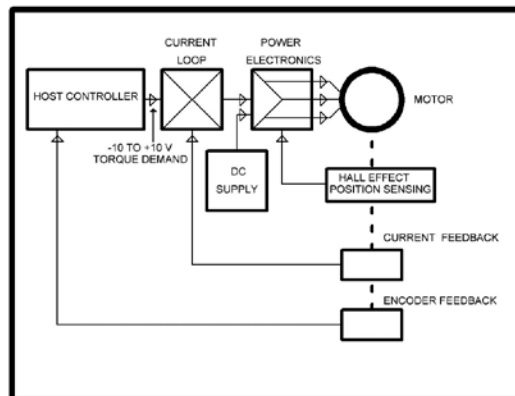


Figure 6: Torque control via host controller.

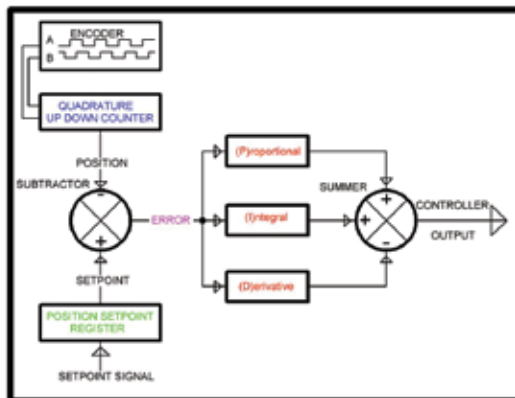


Figure 7: PID positioning filter.



Glyn Craig is a director of Techlyn. He has been involved in the mechatronics field for many years. Enquiries: Email [glyn@techlyn.co.za](mailto:glyn@techlyn.co.za)

# 70 % savings on power costs with modular energy-saving system

By N Maleka, SEW-EURODRIVE

*Energy costs can constitute up to 90 % of the lifecycle costs of systems that have not been optimised*

**M**odular energy-saving system Energy-efficient drive systems are becoming more important than ever in South Africa, given the volatile power supply from the national grid as a result of continued load shedding, as well as surging electricity costs and increasingly-stringent environmental legislation. This issue is being proactively addressed by SEW-EURODRIVE through its newly-launched effiDRIVE energy-saving solutions, which are based on the company's proven modular concept.

Even a single efficiency-optimised drive component can positively impact a system's overall energy balance. The modular energy-saving system only includes components with optimised energy efficiency. Combining these optimised components from the modular energy-saving system can result in up to 70 % energy savings.

The effiDRIVE solution is ideally suited for numerous industries, including; food and beverage, airport logistics, building ventilation systems, and intralogistics, such as storage and retrieval systems. Another major benefit of the effiDRIVE solution is that it can be retrofitted onto existing machines and systems.

## Practical examples

The effiDRIVE concept is new to South Africa and, as a result, successful case studies are currently based on European projects. Of course, the below results cannot be translated directly into local units, due Europe's varying energy tariffs and exchange rate fluctuations. It does, however, still provide a good indication of what savings can be achieved – regardless of any regions.

### Bottle conveyor

The first example is of a bottle conveyor in the beverage industry, where the production cycle is characterised by a wide range of varied tasks – such as palletising, cask or bottle conveying – in dry, wet or hygienic areas. The drive technology for these tasks is also exposed to special ambient conditions that may include heat, moisture and cleaning agents.

In this example, the standard variant of 105 helical worm gear motors with standard motors and standard frequency inverters in the control cabinet were replaced by the MOVIGEAR mechatronic

system with 105 drive units. MOVIGEAR is the ideal solution specifically designed for conveyor applications. Its design combines the permanent-field synchronous motor, gear unit and electronics into a single housing, meaning that the drive unit can be easily integrated into any conveyor system.

Although the initial purchase cost of MOVIGEAR is 6 % higher than the standard variant, it consumes 28 % less energy, thereby reducing annual power costs from to €34 500 (R6 124 833), while saving €35 700 (R495 257) over five years. The basis for this calculation is: 3 500 hours of operation per year x 10 c per kWh x plant power. Based on this calculation, the amortisation time for this effiDRIVE solution is just 1,3 years.

### Airport conveyor belt

The second example involves an airport conveyor belt. In conventional baggage handling, conveyor belts, collections conveyors, vertical translators, lifts, circular storage units and sorting lines are required to ensure that baggage items are transported quickly and efficiently. The drive technology must therefore be compact, intelligent and flexible.

To increase gear unit efficiency, helical worm gear units are replaced with efficiency-optimised DRE and DRP helical-bevel gear units, which can result in an increased efficiency of up to 30 %, depending on gear unit size and reduction ratio, with energy savings potential of 10 %.

Despite the 23 % higher initial purchase cost, the solution's amortisation time is just 2,2 years, due to the fact that it consumes 10 less energy to reduce annual costs from €71 750 to €65 560, thereby saving a total of €17 300 after five years of operation. Again, the basis for this calculation is: 3 500 hours of operation per year x 10c per kWh x plant power.

### Energy consulting

The effiDRIVE solution is about more than just equipment – energy consulting is the primary service in the energy-saving concept. Customer-specific consulting allows us to identify the optimal energy-saving solution for individual systems, whether they are existing or still being developed. Here, focus is on the complete system.



With the existing process sequences in mind, the goal is to reduce power loss, optimise power requirements and to recycle the released energy. SEW-EURODRIVE draws upon an extensive wealth of experience with tried-and-tested package solutions. The company's energy specialists are familiar with the applications of many industries, which ensures success of all the energy-efficient drive components.

**Energy-efficient solutions**

In South Africa, there is a strong drive for clients to increase their energy efficiency. This drive will only grow stronger in the future. The need for local manufacturers and clients to move to energy efficient solutions is two-fold, namely; to minimise operating costs while maintaining existing infrastructure and capacity; and to lower plant power requirements to improve stability.

**Conclusion**

The introduction of energy consulting to the current SEW-EURODRIVE South Africa business unit service is a natural extension of the mechatronic product portfolio, and is aimed at assisting current and future clients with energy-efficient solutions. Energy consulting serves as a demonstration that allows clients to witness the real savings in their actual plant environment, rather than just the theoretical savings. The most energy-efficient solution is not only dependent

on the components used, but also on the supporting analysis and consulting services.

As a result, the company's energy-efficiency specialists perform regular and thorough tests on the application. All energy-saving factors are identified and implemented consistently. During highly-volatile power supply periods currently being experienced in South Africa, the benefit to the end-user is measurable success by reducing energy consumption and costs, while simultaneously lowering CO<sub>2</sub> emissions too.

- In South Africa there is a strong drive to increase energy efficiency.
- Using energy efficient solutions minimises operating costs while maintaining existing infrastructure and capacity.
- Energy efficient solutions lower plant power requirements and improve stability.



Norman Maleka has been with SEW-EURODRIVE for more than 10 years. He is a Mechatronics Engineer. Enquiries: Email [nmaleka@sew.co.za](mailto:nmaleka@sew.co.za)



## Gas-insulated switchgear – more than just a cost consideration

According to **Schneider Electric**, the initial cost of a primary switchgear offering, be it a gas-insulated (fixed pattern switchgear) or air-insulated (withdrawable pattern metal-clad solution), should not be the only consideration.

Other factors to take into account are reliability of the switchgear, operation costs, the safety of workers, the risk of an outage and decommissioning costs.

“Only by looking at the complete business picture and mainly the total cost of ownership (TCO) can a company decide which electrical medium-voltage (MV) switchgear best suits its need,” says Brighton Mwarehwa, technical manager for MV primary switchgear at Schneider Electric South Africa.

The company maintains that from a management perspective, considerations include the purchase price, the life expectancy of the switchgear, the size of the equipment, the amount of time to install and commission the switchgear, worker safety, outage risk, maintenance, and reliability.

From an operational standpoint, training time, accessibility of the equipment, operating costs, decommissioning costs, and support must all be factored.

“Schneider Electric South Africa is often asked about the cost of a primary gas-insulated switchgear (GIS) solution in comparison to other MV solutions. When considering costs though, it is important that the customer look at expenses over the lifespan of the equipment rather than upfront costs,” says Mwarehwa.

The company’s GIS offering suits a wide range of requirements and applications in public and industrial distribution networks,

renewable energy projects infrastructure projects, mining, metallurgy, petrochemical, oil and gas industries, railways’ traction power supply, container stations and ship-building.

“As an efficient, smart and safe product line, our GIS solutions receive special interest as they are made from almost 100 % recyclable material and some of the high performance panel designs take up to 25 % less space than the average GIS product. Its ergonomically designed control panel also draws much attention for its simplicity and ease of use, something that is invaluable in an emergency situation. Cost alone should not remain an ultimate decision-making factor,” he says.

**Enquiries: NtombiMhangwani. Tel. 011 254 6400 or email ntombi.mhangwani@schneider-electric.com**



ABB SACE legacy switchgear; can operational life be extended?

Certainly.



Many SACE air circuit-breakers have been installed in South Africa since their introduction in the early 1980's. Durable construction and superior design keeps them functioning, however service is required to keep them functioning optimally. For additional information: [www.abb.co.za/lowvoltage/service](http://www.abb.co.za/lowvoltage/service)

**ABB South Africa (Pty) Ltd.**  
**Low Voltage Products and Systems**  
 Tel. +27 10 202 5880  
 E-mail: LP@za.abb.com

Power and productivity  
 for a better world™



## Strategic alliance agreement

**BMG** and **Danfoss Drives** have consolidated a long standing partnership, with the official signing of a strategic alliance agreement that augers well for both companies, stakeholders and customers.

"This new development formalises and strengthens the original distribution agreement for Danfoss variable speed drives and the soft starter range, which has been in place since 2007," says David Dyce, division manager, BMG Electronics – Bearing Man Group. "Through this firm alliance, BMG is set to increase awareness of the Danfoss brand; create a stabilised pricing structure and ensure efficient enquiry turnaround times and a reliable support service of Danfoss systems.

"The Danfoss range of technically advanced variable speed drives and soft starter systems, available from BMG's national branch network of over 140 outlets, enhances energy savings, food preservation, care for the environment and optimum productivity.

"BMG and Danfoss, with a complementary product and customer base and a perfect business ethics fit, are committed to working closely with industry to achieve a more efficient and sustainable environment and a highly productive and globally competitive region."

**Enquiries: Dave Dyce. Tel. 011 620 1530 or email Daviddy@bmgworld.net**



At the signing event at the beginning of June are: Mick Baugh, sales manager, BMG Electronics, David Dyce, division manager, BMG Electronics, Marco Airola, senior sales director, Southern Europe, Danfoss, Leif Flojgaard, president middle East & Africa, Danfoss, Gavin Pelsler, managing director, BMG Engineering; Roland Sargent, sales manager, South Africa, Danfoss.

## Repairs boost Kelvin's generating capacity

Over the past 18 months **Marthinusen & Coutts** and **ACTOM Turbo Machines** have performed a comprehensive range of repairs and refurbishments for Kelvin Power Station in Kempton Park. Marthinusen & Coutts recently completed a complex repair of one of the station's 60 MW synchronous alternators, while ACTOM Turbo Machines performed general overhauls (GO's) on five 60 MW turbine generator sets. This work by the two business units – ACTOM Turbo Machines (formerly Cetus Turbo Machinery which was acquired by ACTOM recently to become part of the Marthinusen & Coutts division – has contributed towards boosting the aging station's generating capacity from 120 MW to 300 MW.

The stator of the 60 MW synchronous alternator was damaged when the unit suffered a breakdown in March last year. Tests conducted on site by Marthinusen & Coutts established that three stator bars had been damaged, whereupon it was decided to replace a total of six stator bars.

"Due to the fact that the winding is of a special single-layer type in which the strands in each stator bar are individually brazed onto the associated strands of the bar next to it, the replacement of the stator bars was a prolonged process lasting several months," said Rob Melaia, Marthinusen & Coutts' engineering and technical executive.

In December last year Kelvin Power awarded a

30-month contract to ACTOM Turbo Machines to provide an ongoing maintenance service for the station's turbine generator sets. Kelvin Power is a privately-owned coal fired power station that supplies power to Johannesburg's City Power.

**Enquiries: Richard Botton. Tel. 011 607 1700 or email richardb@mandc.co.za**

Marthinusen & Coutts divisional chief executive officer, Richard Botton, and senior artisan, Shepherd Chigwa.



## Joint venture in large fans

ACTOM has joined international fans company TLT-Turbo GmbH of Germany in forming a joint venture (JV) company to cater to both the sub-Saharan and local market for all types of large fans.

The market comprises mainly the industrial, mining, process, metallurgical, cement and power generation industries. The formation of the JV company, TLT ACTOM (Pty) Ltd, and the technology and licence agreements signed by the two partners took effect from May 1, 2015.

ACTOM and TLT-Turbo negotiated the new international partnership after ACTOM's technology agreement with international ventilation fan producer Solyvent Fläkt Woods AG was dissolved

as a result of the acquisition of that company's international fan division by an opposition fan manufacturer.

TLT ACTOM retains the existing technology agreements with Fläkt Woods for categories of fans used in industry and for heating, ventilation and cooling (HVAC) systems used mainly in large commercial applications.

The large fan systems covered by TLT ACTOM's new technology partnership incorporate axial flow and centrifugal fan units with power ratings of up to 15 MW.

TLT-Turbo GmbH is wholly owned by Power Construction Corporation of China, a Chinese state-owned industrial conglomerate which is one of the world's 500 largest companies.

Craig Johnston, managing director of TLT ACTOM – which formerly traded as ACTOM Mechanical Equipment – said: "The new partnership arrangement places us in a much stronger position than before in two major respects. Firstly, in partnering TLT-Turbo in a 50-50 JV company we have a closer and firmer association with our international partner than applied previously.

"Secondly, we are entering the local power generation market with much stronger credentials than before.

"There is an established installed base of TLT-Turbo large axial flow fans at Eskom's Majuba power station and their fan systems are being installed and commissioned at both of Eskom's new power stations, Medupi and Kusile."

*Enquiries: Craig Johnston. Tel 011 878 3029 or email [craig.johnston@actom.co.za](mailto:craig.johnston@actom.co.za)*



<p><b>UNIBOX</b> Medium Voltage High Efficiency</p>  <ul style="list-style-type: none"> <li>• Medium Voltage Fabricated Frame Electric Motors to IEC 60004</li> <li>• Ratings from 200kW to 1.8MW at 2.3kV, 3.3kV, 6.6kV, 11kV and 13.8kV</li> <li>• Heavy duty motor frames in sizes from 302mm to 1000mm</li> <li>• Application designed for maximum duty efficiency</li> </ul>	<p><b>MS4</b> Medium Voltage High Efficiency</p>  <ul style="list-style-type: none"> <li>• Medium Voltage TFC frame Electric Motors to IEC 60034</li> <li>• Ratings from 150kW to 1.8MW at 2.3kV, 3.3kV, 6.6kV and 11kV</li> <li>• Cast Iron enclosures from IP23 to IP54 (IEC)</li> <li>• Application designed for maximum duty efficiency</li> </ul>	<p><b>LS5</b> High Efficiency</p>  <ul style="list-style-type: none"> <li>• Low Voltage TFC frame Electric Motors to IEC 60034</li> <li>• Ratings from 0.37kW to 400kW at 400V, 525V and 1100V</li> <li>• High Efficiency to IEC 60034-30 (IEC)</li> <li>• IP55 / IP56 &amp; Class H Insulation</li> </ul>	<p><b>NV1</b> Std Motors</p>  <ul style="list-style-type: none"> <li>• Low Voltage TFC frame Electric Motors to IEC 60034</li> <li>• Ratings from 0.37kW up to 200kW at 400V and 525V</li> <li>• Standard Efficiency to IEC 60034-30 (IEC)</li> <li>• IP55 enclosures &amp; Class F Insulation</li> </ul>	<p><b>QL3</b> Aluminium</p>  <ul style="list-style-type: none"> <li>• Low Voltage TFC aluminium frame Industrial Motors to IEC 60034</li> <li>• Ratings from 0.37kW up to 200kW at 400V</li> <li>• Standard Efficiency to IEC 60034-30 (IEC)</li> <li>• IP54 enclosures &amp; Class F Insulation</li> </ul>	<p><b>ML1</b> Single Phase</p>  <ul style="list-style-type: none"> <li>• Low Voltage TFC aluminium frame single phase Motors</li> <li>• Ratings from 0.25kW up to 2.2kW at 230V</li> <li>• Capacitor start and capacitor run product</li> <li>• IP55 enclosures &amp; Class F Insulation</li> </ul>	<p><b>NMRV</b> Geared Motors</p>  <ul style="list-style-type: none"> <li>• HRC Helix worm drive geared motors up to 15kW</li> <li>• OIP seal IP23 Intermediate 1/3 reduction boxes</li> <li>• Variable speed in this reducer 0.7 to 0.1 Min of motor speed</li> <li>• Inline helical helical &amp; co-axial geared motors up to 100kW</li> </ul>
--	---	---	--	---	--	---

PERFORMANCE PRODUCTS – all the brands – all the solutions – all the time!

ELECTRICAL MACHINES  
A division of ACTOM (Pty) Ltd

ACTOM

## MV motor control

With medium voltage motors typically some of the largest consumers of power in heavy industries, implementing precise, smart motor control is an effective way of significantly reducing power consumption and energy costs, along with significantly better process control. Since they were first manufactured in 1983, **Rockwell Automation** Allen-Bradley medium voltage drives have earned a reputation for reliable, efficient motor control across the industry's most demanding applications. The company recently extended this medium voltage motor control range with the addition of the PowerFlex 6000, providing a cost-effective and fit-for-purpose drive.

The PowerFlex 6000 supplements the existing PowerFlex 7000 range in providing a cost-effective motor control solution that is ideal for new and retrofit centrifugal fan and pump applications rated up to 10 kV.

Utilising the industry-accepted and robust Cascaded 'H' Bridge (CHB) Voltage Source Inverter (VSI) topology, the PowerFlex 6000 drive provides low-input harmonics and near-unity power factor, ultimately reducing power system issues and maximising motor efficiency while providing simple use and maintenance requirements.

PowerFlex 6000 is an air-cooled drive designed exclusively for induction motors. Designed for smaller field applications, the PowerFlex 6000 supports motor cable lengths of up to 300 m (the PowerFlex 7000 supports motors from lengths of up to 15 km). It has a seven-inch WinCE Colour Touch Screen and supports Modbus-RTU RS485, Modbus-TCP, Modbus-PLUS RS485, Profibus RS485 and EtherNet/IP communications protocols.

The PowerFlex 7000 remains the flagship PowerFlex product, offering multiple configurations and high-performance, customisable options for the diverse control needs of heavy industrial requirements. Utilising Active Front End (AFE) technology and a patented switching technique, the PowerFlex 7000 product line, rated from 2,4 kV to 6,6 kV, guarantees industrial applications the highest overall system efficiency whilst complying to stringent international standards. The drive achieves lower line harmonics and improved power quality through the AFE rectifier, which features a single rectifier bridge to maintain the lowest component count and system complexity.

**Enquiries: Henry Craukamp. Tel. 011 654 9700 or email [hscraukamp@ra.rockwell.com](mailto:hscraukamp@ra.rockwell.com)**

## SEW-EURODRIVE appoints new MD

After 12 years of service, **SEW-EURODRIVE South Africa** MD Ute Schoeman has stepped down to open up her own business as a business and marketing consultant in the industrial sector.

Schoeman, who made a name for herself as one of the youngest and first female managing directors in the power transmission game, has led the company to double its turnover during her reign. SEW-EURODRIVE would like to thank Schoeman for her years of service to the company, and we wish her the best of luck in her future endeavours. She will be replaced by general manager operations, Raymond Obermeyer, who boasts more than 25 years of operational experience at SEW-EURODRIVE.

Obermeyer, who takes up his post from 1 July 2015, was instrumental in the upgrading of SEW-EURODRIVE's facilities countrywide.

He was also involved in the streamlining of process flow in the factories, which has led to optimum productivity and reduced delivery times. Obermeyer hails from Nelspruit, where he was initially the branch manager before his promotion to operations and logistics general manager three years ago.

"I have every confidence in Raymond's ability to lead the company to new heights. SEW-EURODRIVE has grown by leaps and bounds

in the last ten years and Raymond has the necessary operational experience and passion for the business to ensure that this trend continues" concludes Schoeman.

**Enquiries: Go to [www.facebook.com/SEWEurodriveSA](http://www.facebook.com/SEWEurodriveSA)**



*Raymond Obermeyer, new Managing Director for SEW-EURODRIVE South Africa.*



*SEW-EURODRIVE South Africa MD Ute Schoeman has stepped down after 12 years.*

## Insulation and protection

Starting an electrical drive on a machine that has been standing for a long period of



time should be avoided until the insulation level of the motor has been found acceptable. Insulation degradation can occur as a result of moisture ingress in motors which stand for long periods - a situation typically found on plants that work seasonally or in applications where there is a high degree of water contamination.

Insulation is subject to many elements that can cause it to perform at a less than acceptable level. Excessive heat or cold, moisture, vibration, dirt, oil, and corrosive

vapours can all contribute to deterioration. For this reason, routine insulation testing is necessary.

**NewElec's** EC/ED relay solves this problem by monitoring the insulation integrity of the motor windings and feeder cables to earth while the motor is standing.

The main contactor is prevented from closing into a circuit in which the insulation level to earth has deteriorated to an unacceptable level.

**Enquiries: Email [sales@newelec.co.za](mailto:sales@newelec.co.za)**

## Protection and control for three phase LV motors

The modular MA electronic motor protection relay from **NewElec**, controls, monitors and protects the performance of 3-phase LV motors. The relay measures electrical motor variables such as current, phase unbalances, phase loss, earth leakage, earth fault, short circuit and voltage conditions. It can be used as either a standalone electronic motor protection relay or as part of an automated process communicating to a PLC. Designed for advanced motor protection, the MA comes complete with integrated current transformers and earth leakage core in the range from 0,5 to 250 A. The current range can be extended using interposing CTs. Individual fault status indication is provided by LEDs for easy diagnostics. It also stores the last four faults with time and date stamping. The relay has five digital inputs and four output contacts (two are programmable). The inputs will accommodate voltages from 24 to 220 Vac or dc, and for this reason, it is an ideal choice for rapidly automating older plants utilising the customer's existing switchgear and optimising the electrician's circuit knowledge.



*Enquiries: Email [sales@newelec.co.za](mailto:sales@newelec.co.za)*

## Soft starter for electric motors

**TELE** has introduced a new 3PH soft starter with true 3 ph control and integrated current control for a nominal motor power 2,2 kW up to 22 kW. The unit is thyristor based and integrates current measurement and current limiting without external components and wiring. This function controls and limits exactly the maximum motor current that is used to start the whole system without overloading the motor and drive mechanics. Additional power peaks and flickers in the mains are reduced to a minimum, so the stability of the supply is much higher compared to star/delta or direct motor starters. The overall size of the new MS3 is very compact and saves space in the cabinet. The fan-less design improves time between maintenance.

Asynchronous motors are the most common drive type in machinery, automation, HVAC, pumps and transport business. Direct starting these types of motors causes a high inrush current, mechanical stress and destabilisation of the mains. Using soft starters to start the motor, eliminates or at least minimises those disadvantages and guarantees a long lasting and low maintenance operation system.

*Enquiries: Tel. 011 454 8053 or email [edwin@vepac.co.za](mailto:edwin@vepac.co.za)*



**Powertech** 

MAKING POWER PERFORM

**Power brings dreams to life and turns opportunity into reality. Wherever there is electricity, there's a human being who's empowered in some way, and that's what we at Powertech strive for.**

A subsidiary of the Altron Group, we are one of Southern Africa's leading manufacturers of electrical and electronic equipment. Our wide range of products and systems integration skills provide a total design, manufacture, supply, and installation solution.

For more info contact us on (011) 706 7184 or e-mail: [info@powertech.co.za](mailto:info@powertech.co.za)

[www.powertech.co.za](http://www.powertech.co.za)



# How to select the right valve

By T Young, Vortex

*Selecting a slide gate or diverter for handling dry material is not as simple as one would imagine.*

It is typically assumed that the only information required when selecting a valve is:

- Size of the opening
- Shape of the opening
- Available stack-up height
- Matching connections or hole patterns

In reality, however, valve suppliers need more information to accurately select the right valve for the application. Costly mistakes can be avoided the more information about the application parameters a supplier has; like purchasing an expensive valve for a simple application, or buying an inexpensive valve that cannot handle a difficult application. Valve suppliers should have the experience and knowledge to know what valves and valve modifications to apply for certain applications parameters. Make sure your supplier is asking the right questions. So let us begin with the premise that each application for a slide gate or diverter valve has its own unique requirements. What are the factors that determine what type of valve is selected and what modifications are necessary?

## Valve selection

Installation criteria determine which valve line is appropriate. The most critical question is 'what is the valve intended to do?' Is a slide gate, diverter valve, iris valve or a butterfly valve needed to best fulfill the application? After this question is answered, you can follow up with these questions.

- What is the opening or orifice size?
- Is the opening square or round?
- Will the valve be used in differential pressure or gravity application?
- Will the valve be installed indoors or outside?
- What is the temperature of the air and material conveyed?
- Does the system use dilute, phase, dense phase, vacuum, or gravity to convey material? If pressure or vacuum, how much?
- What is the size of the conveying line?
- Are the lines tube or pipe? If the lines are pipe, is it schedule 10 or 40?
- Does the valve material contact need to be carbon steel, stainless steel, or aluminum?
- Will the valve be subject to wash-downs? If so, will it be washed with hot water or a caustic liquid?

*The most critical question when selecting a valve is: What is the valve intended to do?*

- Will there be flow aides such as aeration or vibration if the valve is mounted below a bin/silo?
- What is the sequence of operations for the system?
- When are the flow aides activated in relation to the cycle of the gate valve?
- If the slide gate is designed for gravity and is mounted below a bin/silo, then how is the material conveyed into the bin/silo?

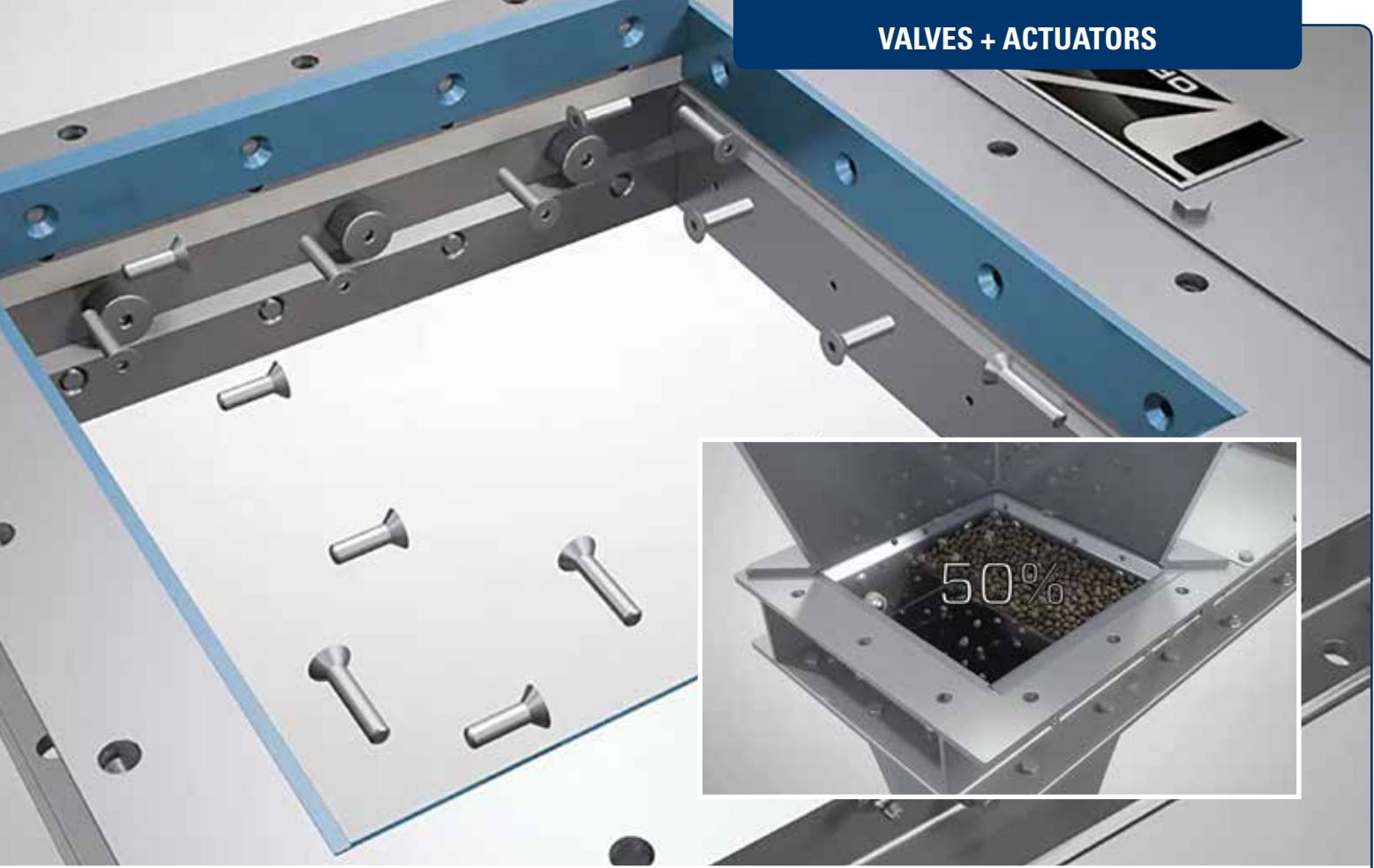
Then you need to consider the material characteristics.

- What is the material to be conveyed?
- Is the material in powder, granular, or pellet form?
- What is the particle size of the material?
- What is the weight of the material per cubic foot?
- Is the material sticky, abrasive, or corrosive?
- Is there spoilage or sanitary issues with the material?
- Will different types of material be conveyed through the same line? If so, are there cross contamination concerns?

## Actuator selection

There are many types of actuators to operate the valve to open and close. Depending on system requirements and power availability,





actuators can be automated or manual. Automatic actuators are available such as air cylinder, air cylinder with magnetic piston, electric actuator, explosion-proof electric actuator, and hydraulic actuator. Manual actuators available are hand wheel, hand crank, and chain wheel actuators. To define which one you'll need, you'll need to answer the following questions:

- What is the cycle frequency?
- Will the valve close on material? If so, will the material be standing or moving column?
- Is compressed air available?
- Does actuation speed matter?
- What are the cost variables for replacement and repair?
- Can I use manual actuation when the valve is only for maintenance purposes?
- Will the valve be outside in cold temperatures?
- Does it need to meet electrical classifications like Voltage, NEMA or ATEX?

**Standard modifications**

Determine if the company that is manufacturing your valve offers standard modifications to suit application/material specific requirements. Some application specific factors that would need to be considered for valve modifications are:

- Duty cycle
- Abrasive duty
- Corrosion
- Chemical compatibility
- Particle size
- Friability
- Temperature
- Serviceability
- Food specific
- Indoor/ outdoor service

Some valve modifications that can serve these challenges in the bulk powder industry:

Stainless steel material contact	Fabric sleeve
Water wash down	Sealed body
High temperature service	Stainless steel rollers
Cold temperature service	Seal access/removable seals
Flexible hose	Clean in place
Schedule pipe size	Round and square transitions
Clear bonnet covers	30 Degree offset and internal diverter linings
Straight leg	

**Valve location and orientation**

Designate where the valve is to be installed and the orientation of the valve. The position of a slide gate or diverter valve in a system helps determine which accessories may be required for your application. For example, if a slide gate is to be mounted below a surge hopper, positioning controls may be required to meter material into the weigh hopper.

**Features selection**

There are a number of different features available when selecting a slide gate or diverter valve. Each manufacturer will have its own standard products:

- **Abrasion resistant liners:** Abrasion resistant liners positioned at the inlet of the gate address potential wear issues that may exist from either the volume or the abrasiveness of the material being handled. The liners are replaceable when needed
- **Abrasion resistant blade:** The gate's blade can also be manufactured from abrasion resistant steel. The combination of the abrasion resistant blade and liners are important in providing a gate that offers longevity and an exceptional life-cycle cost

- **Adjustable rollers:** Externally greased hardened steel adjustable rollers are used to keep the blade dust tight
- **Available sizes:** Valve standard sizes will be dependent on the valve and the manufacturer. Contact your manufacturer for available sizes
- **Bonnet purge:** The optional bonnet purge is utilized to keep material out of the body of the valve and in the material stream
- **Displacement end pocket:** A displacement pocket displaces the material at the leading edge of the blade as the blade closes. Rather than the blade jamming and packing this material into an end seal, the blade stops part way into the pocket. Material falls away from the blade and re-enters the material flow stream area. This feature can increase the valve's service-life and reduce downtime costs related to maintaining and replacing end seals
- **Optional configurations:** Available in straight leg and wye line configurations
- **Replaceable seals:** Seals reduce interior valve dusting and can be replaced while the valve is inline
- **Return pan:** A return pan can be added to seal fine material internally or to atmosphere. With this feature, material that enters the bonnet of the valve is returned to the material flow stream, thus reducing material leakage to atmosphere
- **Wear compensating seals:** Pressure loaded, polymer bonnet seals offer a dual purpose. They act as a wiper for material that may be on the blade as the blade retracts. They also seal material from entering the bonnet area of the gate. The 'live load' on the back of the seal strip continues to apply pressure to the seal even as it wears. At a certain wear point, seals may be accessed and replaced from the outside of the gate, while the gate remains inline
- **Wear reducing material deflectors:** Material deflectors are placed around the inlet of the valve and protect it from the material flow stream. By deflecting material away from the hardened steel rollers and blade seals, this feature significantly reduces wear and downtime keeping the valve in service longer
- **Wear resistant bucket design:** A wear resistant bucket constructed from durable abrasion resistant steel and an optional ceramic liner can be added to reduce potential wear to the bucket. For even more durability, the additional of an optional honeycomb liner allows material to abrade on itself instead of the bucket

## Accessory selection



There are four distinct areas to address when specifying accessories for valves.

**Motion controls:** Intermediate positioning is available via a variety of methods depending on specific installation criteria:

- VPO/VPC: Relay control with manual adjustability
- AVP: PLC control with manual adjustability
- IVP - Infinitely Variable Position Control via a 4-20 mA signal

**Feedback:** For added valve control, manufacturers can provide customers with push-button control panels to suit your valve control needs. Manufacturers can also utilize state-of-the-art valve/sensor manifold technology with a variety of PLC interfaces on multi-port diverter assemblies.

**Safety devices:** A vented ball valve should always be installed in front of the air control valve in order to bring the slide gate or diverter valve to zero mechanical state before servicing. This style of ball valve bleeds off any residual downstream pressure contained in the air lines supplying the air cylinder. The ball valve should always be installed within easy arm's reach of the air control.

**Fabricated accessories:** Fabricated transitions provide flexibility for customers with existing equipment. Transitions can address custom flange-to-flange dimensions. They may also be fabricated to contain flanges that match special bolt patterns, tube stubs, sock beads, or blind flanges that allow in-the-field hole placement and installation.

## Conclusion

Many questions come in to play to select the right valve for your application. But, if you are prepared with the information for your manufacturer, you can be confident that you have purchased the solution to your needs. If your manufacturer does not ask specific detailed questions, you might end up paying too much for a simple valve that does not meet your requirements, and you will end up wasting factory time and money to modify the valve for your application.

- Costly mistakes can be avoided by accurately selecting the right valve for the application.
- Selecting the right actuator is as important.
- Make sure that your valve and actuator supplier is asking appropriate questions.



Travis Young has 20 years' experience in the dry bulk solids industry and is the vice president of global business development at Vortex, an engineering and manufacturing company that specialises in process valves and loading solutions specifically for solids handling. Travis has worked on solution-driven installations across six continents and has a strong knowledge of market-specific regulations and requirements within the industry. He is based in York, United Kingdom.

Enquiries: Email [travis@vortexglobal.com](mailto:travis@vortexglobal.com)



## Actuators qualify for 3D racing simulator

Linear actuators from **Warner Linear**, part of Altra Industrial Motion, have been specified for use on a new racing simulator which has been designed to give the driver the most realistic high speed experience possible. The actuators are used to create movement in the seat which simulates pitch and roll with braking, acceleration and cornering G-forces. The Warner Linear K2x models were specified due to their exceptional response time and load carrying capacity.

Using a combination of 3D screens, surround sound and advanced gaming software, the racing simulator allows drivers to experience the exhilaration of motor sport first hand. However, the final touch that really adds to the authenticity is the motion controlled chair that allows the driver to feel all of the forces that would be exerted upon them if they were in a real car. The movement is controlled by motion outputs as part of the racing software and delivered through the two Warner linear actuators attached to the underside of the racing seat.

The high quality K2x linear actuators are from Warner's B-track range. They have been designed for use in tough, high-load applica-

tions where they will be in frequent use. With a load of 270 kg (max load 1 270 kg) the actuators are able to travel at 25mm/second with a 200 mm stroke (50 mm - 600 mm available) and respond instantly thanks to their high performance electric motor. It was this precision performance that made them ideal for the application – perfectly translating every movement the car makes from the screen to the driver's seat.

Enquiries: Email [david@dmaeuropea.com](mailto:david@dmaeuropea.com)



## Cost effective valve retrofit

**Mitech** offers a valve retrofit service that fits new internals and top works to an original valve, substantially saving costs and assurance that plant performance remains high and that safety standards are adhered to. It is important to note that retrofitting valves that are smaller than 150 mm or have a

pressure rating below 60 bars is generally not justifiable. However, with larger sizes and high pressure rating valves, it becomes progressively more worthwhile. The valve retrofit service is usually undertaken on site at Mitech's factory.

The valve system must first be removed from service and dismantled, and if necessary, be machined on site. In many cases, when an existing valve needs to be replaced at a plant, the valve body is still in good condition, but the trim is no longer suitable, while the actuator and positioner may also need upgrading.

Enquiries: Tel. 011 927 4850 or email [enquiries@mitech.co.za](mailto:enquiries@mitech.co.za)



## COMPLETE CONTROL VALVE SOLUTIONS



Globe Control Valves



Pneumatic Linear Actuators



Desuperheaters



Positioners



Pneumatic Rotary Actuators

✓ **PROVEN IN GLOBAL PROCESS CONTROL INDUSTRY**

✓ **ENGINEERED & MANUFACTURED IN SOUTH AFRICA**

**MITECH**

Local Expertise - World Class Solutions

[www.mitech.co.za](http://www.mitech.co.za)



3-8 Atlas Road  
Denel North Entrance (D4)  
Kempton Park  
t: 0861 MITECH (648324)  
[enquiries@mitech.co.za](mailto:enquiries@mitech.co.za)  
[www.mitech.co.za](http://www.mitech.co.za)

## Oil control cartridge valves available throughout Africa

As part of the new joint venture into Africa, the Hytec Group has increased its distribution and support of the full range of **Bosch Rexroth** Oil Control cartridge valves throughout sub-Saharan Africa. This expanded support will enhance the Group's logistical, sales and support capabilities of the products, and includes a more competitive pricing structure for this series.

The valve range simplifies conventional compact hydraulic systems, and enhances hydraulic circuits where space and weight present fundamental application constraints. Bosch Rexroth cartridge valves are characterised by a very long service life: at an operating pressure of 350 bar,

the cartridge solenoid valves are rated for a product life of 10 million cycles.

The unique design of the cartridge valves reduces the amount of interconnecting pipework required within the hydraulic circuit through a customised manifold. This reduces the overall weight, and space requirements, of the machine, resulting in decreased power requirements – contributing to better all-round energy efficiency. Because the interconnections of piping within a conventional hydraulic system are a common source of fluid leakage, the compact design and reduced piping requirements of the cartridge valves also reduces inspection and maintenance re-

quirements, facilitating a more efficient hydraulic operation.

**Enquiries: Louis Roode. 11 573 5400 or email [louis.roode@hysa.co.za](mailto:louis.roode@hysa.co.za)**



## General purpose globe control valves



**Mitech's** general purpose Globe Control valves offer superior performance while permitting easy, fast and inexpensive maintenance. The standard Mitech Globe control valve can be used for many applications and offers high positioning accuracy and tight shut-off together with compact size and robust construction. Due to the modular design it can be easily adapted to satisfy many special requirements such as high or low temperature, corrosive duties, three-way configuration and high pressure drop applications.

The valves are available from the standard type up to the specially designed severe ser-

vice valve in 1/2" to 24" NB and up to ANSI 4500. The valves may feature tight shut-off, low noise, cavitation control and energy dissipating trims. The entire Mitech range of control valves utilise the clamp in place, free floating seat design. All trim components are designed to clamp in place so the valve can be quickly configured to the user's specific process needs. The free float of the seat and plug during assembly means that stem, plug and seat alignment is easily achieved. When compared to alternative designs, the free float design provides the user with longer stem seal life and better valve shut-off performance. The simplicity of build also means that maintenance is quick and easy, with no special tools required to achieve the design performance of the valve.

**Enquiries: Pieter Badenhorst. Tel. 011 927-4850 or email [enquiries@mitech.co.za](mailto:enquiries@mitech.co.za)**

## Pressure testing of Koeberg's containment building

Recognised as **Eskom's** most consistent and reliable power station, Koeberg is the only nuclear power station in Africa. Koeberg has a pressurised water reactor design. Featuring the largest turbine generators in the Southern Hemisphere, Koeberg is also the most southerly-situated nuclear power station in the world. With International Law stipulating that all containment buildings of all nuclear plants have to be pressure tested every ten years, Eskom contracted Rand-Air to facilitate the assignment.

The purpose of the pressure testing of the containment building at Koeberg was to ensure that there was no leakage which could be harmful to the surrounding environment and public.

Using ten PTS916 Rand-Air units running through desiccant dryers, dry oil-free air

was pumped into the containment building. Both the inner and the outer sector of the building were surveyed before, during and after the test. Water particles have a big influence on pressure testing and the end result. We were required to match 18 °C in temperature of the air going into containment. Heat exchangers and chillers reduce the pressure testing time by a few hours allowing for control of the air pressure distribution. The requirement for the pressure testing was minus 20 °dew point - minus 40 was achieved.

The pressure test took between seven to eight hours. It took two and a half hours to reach a pressure of one bar. The procedure stops for eight hours when it reaches one bar, this is key in ensuring that everything is stable enough to continue to four bar. The process requires the go ahead from

two parties namely Électricité de France (EDF) and Eskom. It is critical to monitor the progression thoroughly as damage to the equipment inside the building could be detrimental. The pressure test at Koeberg was a success.

**Enquiries: Visit [www.eskom.co.za](http://www.eskom.co.za)**



## Locally designed dosing control valves

Mitech's Dosing control valves are used in applications where a high repeatability is necessary in the process. Locally designed and manufactured, the valves ensure continuous monitoring of the dosing state and that the medium is constantly circulated. The valves reduce clogging, spillage and crystallisation while monitoring the process, reducing reagent costs and eliminating human error. Specifically designed for the application, the system provides a continuous monitoring of the dosing state with feedback given every 15 minutes.

The Dosing control valves are erosion resistant and fit in the main ring making them ideally suited for pH

control. They have an anti-clogging design and are trim sized to suit process data. The valves are rated for 600 kPa and their outlet port is designed to match the trim size. With an option of 'on/off' or modulating control, the valves have a nylon coated cylinder with a double-acting or spring-return mechanism.

Various options are available including pneumatic or electro-pneumatic positioners, solenoid valves, limit switches, position indication, hand-wheel override and stellite, ceramic or carbide trims.

**Enquiries: Pieter Badenhorst. Tel. 011 927 4850 or email: enquiries@mitech.co.za**



## Distribution valve with modular body concept



Modern and compact valve solutions are much in demand in plant engineering, for use in a wide range of applications. In addition to demanding requirements in terms of pressure and temperature, modular-style and expandable valve solutions are becoming increasingly popular. Through their adaptability to individual situations, a high level of flexibility can be achieved for a range of different applications with the modular GEMÜ 553 distribution valve.

The GEMÜ 553 series consists of high-quality, stainless steel investment cast bodies that can be very easily connected together in series using a tried-and-tested seal system. In terms of actuator unit, pneumatically operated actuators made of stainless steel or plastic are available from the GEMÜ modular system.

These can, depending on requirements, be used in combination with a widely varied range of accessories, such as electrical position indicators, combi switchboxes and/or pilot valves.

Thanks to the diversity of combination options, as well as the technical properties it possesses, the valve can be deployed for a variety of different processes. In this regard, it can be used in applications where an extremely wide variety of different media are distributed, mixed or collected.

In particular, the GEMÜ 553 is ideally suitable for the distribution of cooling and lubricating fluids on machine tools. In the mixing function, media with different properties can be mixed together, such as hot and cold water.

**Enquiries: Email [eva.zink@gemue.de](mailto:eva.zink@gemue.de)**

## Rotating disc valves – long service life

Mitech's Rotating Disc valves are quick in opening to handle boiler blowdown, scale, chemicals, high pressures, temperatures, and flashing condensate. The valves are installed in processes that are abrasive, corrosive or fouling and in those that have high pressure, temperature, or cycling.

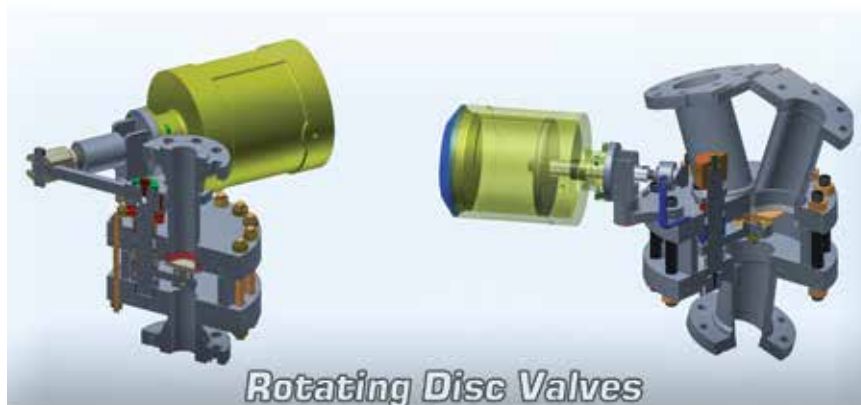
Locally designed and manufactured, the valves feature a unique rotating/shearing disc which provides a self-lapping rotation and enhanced seat cleaning action which cuts through solids giving a long-lasting tight shut-off.

The metal-to-metal seating makes the valves abrasion resistant over a wide temperature range, and their high pressure capability, which is better than industry standards, allows the force to be distributed over a larger area resulting in reduced trim wear.

The valves are manufactured from either cast/ ductile iron, carbon steel, stainless steel or weldable alloys. They are available in sizes from 12 mm to 600 mm with a choice of screwed, flanged, socket or butt weld end connections. The innovative rotating disks continually lap themselves

to the bonnets during operation, and the downstream seat is energised by the process fluid ensuring a good seal even under very arduous conditions.

**Enquiries: Pieter Badenhorst. Tel. 011 927 4850 or email [enquiries@mitech.co.za](mailto:enquiries@mitech.co.za)**



Rotating Disc Valves



# Seeking cleaner and safer energy solutions

*Information from a media briefing by The South African Civil Society Information Service (SACSIS) on Monday 25 May (notes put together by SACSIS).*

*In the face of extremely compelling evidence against coal and nuclear energy, our government's response to South Africa's electricity crisis is to continue building coal-fired power stations and a very expensive nuclear power plant.*

**G**iven what we know about the dangers of climate change, our current energy crisis presents the perfect opportunity to ask how we can do things differently; so how can South Africa produce the additional energy that we need in a more responsible and sustainable manner? Instead, the question, which is foremost in South African minds right now is: When are the two new coal fired power stations, Kusile and Medupi, going to come on line so that we stop experiencing power outages? It's an extremely selfish position for an entire nation to be taking.

## **South Africa's energy solutions buck international trends**

The international trend toward renewable energy is promising. Quoting Bloomberg, the race for renewable energy has passed its tipping point globally. The price of wind and solar is dropping, making both these sources of energy more competitive. The other exciting international trend linked to citizens' action is a growing global move toward divestment from fossil fuels linked to climate activism. Increasing numbers of formal financial institutions have signalled that they will not invest in coal. The world is experiencing key moments in the re-

newable energy sector and these are linked to a growing momentum on the issue. Barack Obama is suddenly traipsing around the world talking to emerging economies; talking about climate action and bilaterals on climate action and putting renewables front and centre of that climate action. Why are we not seeing that positive trend towards renewable energy globally reflecting itself back home?

South Africa has a long history of the control of the Minerals-Energy-Complex (MEC), which predates our democracy. Since the advent of our democracy in 1994, we have not seen an end to the entrenched vested interests in the MEC. Neither have we engaged with how to restructure our economy to move away from dependence on minerals and an energy intensive economy.

A crisis is one of the best ways to catalyse short-termism as we search for 'quick fixes'. Unfortunately, the quick fix on our government's mind is gas. While government has invested some money in its Independent Power Producers' (IPP) programme for renewable energy, this is not at scale and does not compare with what will be spent on fracking or on the nuclear power plant.

While the National Development Plan (NDP) talks about a transition to a low carbon economy in one part of the plan to ensure that

South Africa meets its Copenhagen commitments, the plan is in actual fact contradictory because it promotes investment in coal infrastructure in another part of the plan. The biggest threat that South Africa faces at the moment is that climate change is seen as an environmental issue and not an economic or social issue.

### We cannot continue mining

South Africa is living with class divisions of struggle. The push for renewable energy came out of the climate change struggle, but for a long time it was about 'climate change at a scientific level' far from the lives of ordinary people on the ground even though grassroots communities experience the most direct impacts of climate change.

To stop catastrophic global warming, we have to keep 80 % of our fossil fuels in the ground. We cannot keep mining - yet South Africa plans 24 new coal mines in the Waterburg region alone, which also happens to be a UNESCO protected biosphere reserve. The standard information that we get from the fossil fuel industry and from our government is that fossil fuels are cheap and that we need them for development. This narrative has been the hegemonic belief of the South African and global society because it has been backed by the politically and financially powerful industries who have an interest in fossil fuels. It remains an important blockage to the renewable energy industry.

The second blockage the renewable energy sector faces is that government is very close to people in the mining industry and this affects national policy. Even though South Africa talks up its renewable energy targets, by the year 2030, only 8 % of our energy will be sourced from renewables. South Africa will still be dominated by coal and nuclear. South Africa simply cannot afford to build the proposed new nuclear power plant. If a foreign country comes to you and says, we will build it, as the Russians are doing via the Build/Operate/Own (BOO) model, we need to ask why would a foreign country want to build something so expensive and so dangerous?

Part of the reason that we are stuck with coal mining is because mining is a heavily subsidised industry globally. Quoting the IMF, globally the subsidies for fossil fuel companies amount to US \$5.3 trillion per annum. That's equivalent to US \$10 M per minute, every day. In South Africa we have additional subsidies. For example, cheap water for the industry. One of the biggest problems facing South Africa is that there is a great deal of climate denialism linked to fossil fuel industry propaganda. This propaganda argues that renewable energy cannot meet our base load demand and that renewable energy is too expensive. These things are constantly being disproven - however, the one argument that our government is holding onto is that 'development and job creation' are dependent on fossil fuel extraction. This argument is invalid because Bangladesh, a developing nation, has created 114 000 jobs via its renewable energy programme in a very short space of time. So why is the South African public not out on the streets demanding change?

The problem is that it is easier for people to buy diesel generators than it is for them to buy solar geysers. As long as government places

negative controls on the renewable energy industry, for example, not offering subsidies like it does to the coal mining industry, it block access to renewable energy for ordinary people.

### South Africa's electricity crisis is a managerial crisis

South Africa's electricity crisis is a managerial crisis. Demand for electricity has ever really exceeded installed capacity – the amount theoretically available if all sources are functioning properly. Therefore the crisis arises from how our electricity resources have been managed. Managerial failures have also been manifested around a decent timetable for maintenance. They have not been able to stop demand eating into the safety margins.

*The biggest threat that South Africa faces at the moment is that climate change is seen as an environmental issue and not an economic or social issue.*

Our solution is to bring new electricity sources onto the grid as fast as possible. This points to the fact that we should be more reliant on renewables because unquestionably, renewables are the fastest way to install new capacity. Why do South Africans embrace more coal, more nuclear and shale gas?

Part of the answer is what the late Jamaican sociologist, Stewart Hall, termed a moral panic. This is a kind of panic engendered by a particular interest group usually wanting to push forward an unscientific or irrational position. Our moral panic is around how we can combat what is euphemistically called 'load shedding' to return us to 24-hour electricity provision. Eskom, government and the media do not interrogate the means for delivering more energy. Whichever source will deliver they argue, bring it on. People are so panicked that they mostly go along with this. The most rapid form of developing new energy is the multiplication of renewable energy solutions. So why is the public not pushing for this?

Depending on our definition of 'Who is the public?', we need to say that those sections of the public concerned with energy and ecological justice have certainly been advocating for renewable solutions very strongly -- for example, the active advocacy by Numsa, the metalworkers' union, for renewable energy. Numsa questions the state's model of introducing renewables by giving contracts to the most experienced global players rather than keeping production local and socially owned. Sadly, most of civil society is not yet on the same page as Numsa.

The nuclear industry is in denial about its carbon emissions. Measured from cradle to grave, the industry's carbon emissions are considerable and there is also the grave threat presented by radioactive waste when nuclear power plants are decommissioned. Whilst there is growing uptake of renewables in South Africa, the attitude of

Eskom and government can be likened to a 'reluctant embrace'. Why this reluctance? Because renewables raise the possibility of decentralised energy, of spreading power, in both senses, out of centralised control, of using the technology to empower many more people on the ground and of offsetting higher bills by consumers returning unused power to the grid. This is in conflict with a utility like Eskom and with municipalities that want to sell more electricity, not less.

### Lesson from abroad

Germany represents a unique example of surprisingly quick change from a very conservative liberal energy policy towards a progressive, sustainable, alternative political approach, ultimately brought about by a conservative liberal government. Behind the unexpected political shift by a conservative German government in June 2011, is an enduring social, political and technical process. The Fukushima nuclear disaster in Japan merely triggered this shift, which was actually prepared by a longstanding fight from the bottom led by a coalition of social movements, including trade unions, supported by a network of academics and think tanks as well as the Greens, the Social Democratic Party and the Left Party, which came on board later.

After the Fukushima nuclear meltdown brought about by an earthquake and tsunami in Japan, Germany experienced an earthquake of a political nature, which marked a turning point in the conservative government's energy policy. Only three days after the March 2011 disaster in Japan, German Chancellor Angela Merkel announced far-reaching changes to the country's energy policy at a press conference. She said: 'The events in Japan teach us that the risks which we regarded as totally unlikely were not completely so. And if a highly developed country like Japan with high safety standards and norms cannot prevent such consequences for nuclear power, then it also has consequences for the whole world. It also has consequences for Europe and it has consequences for us in Germany.'

Immediately a three-month moratorium was announced during which the seven oldest German nuclear power plants would be taken off the grid. Shortly afterwards an ethics commission on safe energy supply was established. It was tasked with submitting a proposal for a rigorous turnaround in energy policy.

This turnaround is remarkable especially because just six months earlier, the very same government had reversed the already existing nuclear phase-out strategy of the former SPD-Green coalition government developed in the year 2000. The so-called Renewable Energy Act of 2000 not only called for the phasing out of nuclear energy, but also provided for a far-reaching overall plan on renewable energy.

The coalition government of 2000 was able to negotiate an exit strategy with the nuclear companies due to broad public support. But in 2009, a conservative liberal coalition government came into power and in September 2010, it reversed the country's progressive renewable energy policy.

The dismantling of the country's progressive energy policy was a decision that was strongly opposed by the German public, which had seen that renewable energy was safe, reliable and climate friendly due to the fact that 16 % of the country's energy was already gener-

ated from renewable sources at the time. Today 26 % of Germany's energy is sourced from renewables.

Ramping up the campaign for nuclear in 2010, the country's four biggest energy utility companies went on the offensive with a massive advertising campaign promoting nuclear energy as clean (not unlike the way nuclear energy is presented to the South African public today).

The utility companies' aim was to get the German government to reinstate nuclear -- and they did achieve momentary success. But the German public reacted vehemently. Tens of thousands of people took to the streets in an anti-nuclear movement, which swept up people from all social ranks, not just the left.

Thus, the political decision taken in the aftermath of Fukushima in which major elements of the conservative policy from 2010 were finally reversed in one fell swoop can only be understood against the background of a general and obvious change in the social climate of German society. This change started with the rise of the anti-nuclear and environmental movements of the 60s and 70s and was consolidated by later successes of the Green party in government, which influenced the adoption of environmentally friendly policies overall.

*This article summarises a panel discussion that was co-hosted by SACSIS and the Friedrich Ebert Stiftung South Africa Office (FES) that interrogated the question: "Why is public opinion indifferent to renewable energy as a solution to South Africa's electricity crisis?"*

*Speakers on the panel included Tasneem Essop, low carbon advocate at the World Wildlife FUND (WWF-SA) and a commissioner on South Africa's National Planning Commission (NPC); Ferrial Adam, Africa and Arab region team leader at the environmental NGO, 350.org; Dr David Fig, an environmental sociologist who has written a book about nuclear energy in South Africa; and Renate Tenbusch, a political scientist who heads up FES' South Africa office.*

- The race for renewable energy has passed its tipping point globally.
- To stop catastrophic global warming, we have to keep 80 % of our fossil fuels in the ground.
- Germany is an example of how a country can experience a rigorous turnaround in energy policy.

take note

SACSIS is the brainchild of Fazila Farouk. She qualified with a MSc. in development planning from the University of Natal in 1996 and has worked in civil society ever since. Fazila has also completed a PhD-level course in social theory at Wits University's School of Public and Development Management, which she passed with distinction. Fazila's experience includes research, policy advocacy and new media. She has written extensively about civil society and development in South Africa.

Enquiries: Visit <http://www.sacsis.org.za>



## Welcome to the SMC fold, South Africa... we are at your automation and pneumatics service

SMC Corporation Japan, the world leaders in pneumatics and industrial automation component technology, announced a significant expansion of its global operations with the opening of a new subsidiary in Johannesburg, South Africa.

### Did you know?

As the global leaders in pneumatics and industrial automation with a 30% market share, SMC Pneumatics offers a range of over 12 000 basic components available in over 700 000 variant forms.

We were voted one of the top 100 most innovative companies in the world by leading business magazine, Forbes for three years in a row.

We offer state-of-the-art production with factories and local subsidiaries in 50 countries, plus 400 sales offices and a distribution network in a further 32 countries.

**Contact us for a free consultation on +27 11 568 2407**



4<sup>TH</sup> ANNUAL

# ENVIRONMENTAL CRIMES CONFERENCE

-COMPLIANCE, ENFORCEMENT & PROSECUTION

Date: 9 & 10 September 2015

Venue: Indaba Hotel, Fourways, Johannesburg

## REGULATORY UPDATE - DAY 1



**Dr. Thuli Mdluli**  
Chief Director: Air Quality  
Management  
**DEPARTMENT OF  
ENVIRONMENTAL  
AFFAIRS**



**Nigel Adams**  
Acting Chief Director:  
Enforcement  
**DEPARTMENT OF  
WATER AND  
SANITATION**



**Rainy Disebo Mashitsho**  
Chief Director: Compliance &  
Enforcement  
**GAUTENG DEPARTMENT  
OF AGRICULTURE &  
RURAL DEVELOPMENT**

## EXPERT ADVICE - DAY 2



**Rudolph Mbumba**  
Regional Specialised  
Officer  
**INTERPOL REGIONAL  
BUREAU HARARE**



**Robert Wabunoha**  
Legal Officer & Africa  
Regional Coordinator  
Environmental Governance  
**UNITED NATIONS  
ENVIRONMENT  
PROGRAMME**



**Advocate Connie Erasmus**  
Senior Deputy Director of Public  
Prosecutions  
**NATIONAL PROSECUTING  
AUTHORITY**



**Douw Steyn**  
Director: Sustainability  
**PLASTICS SOUTH  
AFRICA**



**Dr Isaac Rampedi**  
Senior Lecturer & HOD: Dept of Geography, Environmental  
Management & Energy Studies  
**UNIVERSITY OF JOHANNESBURG**

## DUAL PRESENTATION:

### PRO-ACTIVE ENVIRONMENTAL COMPLIANCE – A PETROCHEMICAL CASE STUDY



**Shirley Moroka-Mosia**  
General Manager CHSEQ  
**ENGEN PETROLEUM  
LIMITED**



**Sandra Redelinghuys**  
Corporate Environmental Manager  
**ENGEN PETROLEUM  
LIMITED**

## KEY STRATEGIES TO BE DISCUSSED:

- Reporting requirements in terms of the National Environmental Management: Air Quality Act 39 of 2004
- Enforcement within the Regulatory Framework – through change management
- Escalating environmental enforcement through strengthening collaboration between key government departments
- Evaluating the quality of selected Environmental Impact Assessments for effective decision-making processes
- Emerging legal trends in inclusive green economy
- Discussing INTERPOL's tools and services manifested both regionally and globally
- Zero plastics to landfill 2030
- Safeguarding the environment through strong monitoring and prosecution



ITC is a proud member of:



ITC IS ETPD SETA ACCREDITED & A LEVEL 2 B-BBEE COMPANY

Researched & Developed By:  
**ITC**  
Intelligence Transfer Centre

For easy registration contact Zakhele: +27 (0) 11 326 2501 or email [bookings@intelligencetransferc.co.za](mailto:bookings@intelligencetransferc.co.za)  
or fax: +27 (0) 11 326 2960 or visit: [www.intelligencetransferc.co.za](http://www.intelligencetransferc.co.za)



## Are the days of energy saving numbered?

Are the days of energy saving numbered? The simple answer is no. But according to the world's leading pneumatics provider SMC, energy saving is still a numbers game for its customers.

South Africa remains the one of the highest emitters of greenhouse gas CO<sub>2</sub> per capita in the world. The economic benefits of increased energy efficiency is well documented and self-evident. In the first Energy Efficiency Strategy document published for South Africa in 2005, the government outlined clear and practical guidelines for the implementation of efficient practices within the economy. This included the setting of governance structures to promote energy efficiency in industry. The national energy efficiency improvement target was 12 % by 2015.

Europe is much further ahead with their energy saving conversations. By 2020, the European Council has set some ambitious targets for energy saving. It has pledged to save 20 % of the EU's total energy consumption, reach 20 % of renewable energy in the total consumption in the EU and reduce emissions of greenhouse gases (GHG) by 20 %.

With governments throughout Europe putting increasing pressure on manufacturers to help deliver the Union's 20:20:20 targets, industries will be forced to implement national and international policies that focus on reducing GHG emissions, in order to meet their environmental responsibilities. "South Africa is fortunate in that we are able to learn from the studies and solutions implemented in Europe to help achieve our own target," comments Adrian Buddingh, general manager of recent new comer to the local arena, SMC Pneumatics South Africa.

In Europe over 70 % of manufacturers use a compressed air system and generate as much as 55 million tons of CO<sub>2</sub> every year, there is a real opportunity for companies to sharpen up their environmental practices and reduce energy costs.

Despite being one of the main energy sources used by industry, compressed air is often misused and many operators are unaware of the potential saving opportunities, both financial and environmental, that well managed systems can deliver.

"We are fortunate that we are able to have insight into best practice and international studies through SMC's vast experience in the energy saving field. The company's collective data speaks for itself: as much as 50 % of the energy consumed can be easily saved.

This comprises 20 % being saved from air leakage monitoring and control and 30 % from optimisation, which includes working with the right pressure, sectorisation or using energy efficient components," adds Buddingh.

SMC's Energy Saving components feature the air amplifier, energy efficient air blow guns, nozzles, actuators or the multi-stage vacuum ejector, all of which provide significant savings both financially and environmentally. And the efficiency of these savings can be measured through SMC's market leading online Saving Assessment Tools.

Designed to be easy to use, the Saving Assessment Tools combined with SMC's energy efficient components means the numbers still stack up in favour of compressed air systems, while helping customers to meet their environmental aspirations.

**Enquiries: Email [sales@smcpneumatics.co.za](mailto:sales@smcpneumatics.co.za)**



*Adrian Buddingh, general manager SMC Pneumatics (South Africa).*

### **Japanese multi-national makes major investment in South Africa**

*SMC Corporation Japan, pneumatics and industrial automation component technology specialists, has opened a new subsidiary in Johannesburg, South Africa. The creation of SMC Pneumatics (South Africa) will enable companies in South Africa and neighbouring countries to have easier access to SMC's range of over 12 000 basic components, which are available in over 700 000 variant forms.*

*Established in 1959, the Tokyo based SMC Corporation has steadily expanded into international markets worldwide and now has global production with factories and local subsidiaries in 50 countries, plus 400 sales offices and a distribution network in a further 32 countries. Adrian Buddingh, recently appointed as general manager of SMC South Africa said, "We have a brand new 4 000 m<sup>2</sup> office, with trade counter, showroom, warehouse and manufacturing facility under construction. It is a very exciting time." Buddingh is no stranger to the industry and holds a 28 year career which spans across the pneumatic, automation and mechatronic industries. He is also an active member of the South African Institute of Mechanical Engineers. He holds a qualification in mechanical engineering and was employed as engineering manager for a large local German pneumatics firm for 13 years, after which he was appointed as the managing director of an Italian pneumatics company with offices in South Africa. Adrian has a keen passion for education and was part of the founding members who started off the PneuDrive Challenge mechatronic design competition for engineering students in 2008.*

## LED systems for industrial lighting and floodlighting

**ACDC Dynamics** is the sole distributor of the Italian designed Gewiss product ranges in Southern Africa. We would like to introduce you to the Smart [4] LED lighting range for industrial lighting and floodlighting applications. Intelligent lighting provides the ability to adapt to the environment. This can be achieved by selecting the best solutions in terms of effectiveness and efficiency, for any application and in any environment.

Smart [4] is the new lighting range by GEWISS that interprets intelligence exactly from these points of view and provides versatility and adaptability, thereby defining the unique aspects of its identity and in doing so, offering sustainable lighting. Another unique point would be that Smart [4] offers the most varied types of application and in which lighting performance is a must. Smart [4] can be a floodlight, high bay or ceiling light as needed, offering different



Meet ACDC Dynamics at the FESPA/Lighting Africa Exhibition from 22 – 24 July 2015 at Gallagher Estate, Hall 1, Stand 20, 21, 23, 24.

photometry's depending on the different applications. The benefit of the new luminaires guarantees optimal lighting performance in any application, from industrial to sports environments, indoor or outdoor.

That is not all. The horizontal and vertical modularity of the new product is combined with the ease of installation and maintenance, with the use of 'green' materials and with the unmistakable style of an Italian design. Energy efficiency, light quality and an immediate return on investment, ease of use and speed of implementation: these are the characteristics that make Smart [4] a truly intelligent product.

Benefits of Smart [4] include:

- Performance: Smart [4] was developed by the GEWISS research centres to reduce the Total Life Cycle Cost and therefore make it affordable to replace lighting systems.
- Energy consumption: Using Smart [4] products instead of traditional light sources yields energy savings of up to 60 %, in comparison to other systems and up to 80 % in comparison to obsolete or poorly maintained systems.
- Configuration: Various methods and configurations ensure a flexible solution for any application
- Installation: The entire Smart [4] product range was designed and developed to make it easy to install and retrofit on existing devices and in obsolete lighting systems.

ACDC prides itself in providing only the highest quality product ranges.

**Enquiries: Tel. Charlton Opperman. Tel. 010 492 3100 or email CharltonO@acdc.co.za**

## New to the biogas generator market

With the build of our first biogas fuelled generator, **Diesel Electric Services** has now entered the biogas market, one that is sure to grow as we look for alternative sources of energy. In this case, the source of the energy is waste material from a chicken abattoir. The gas generated from the digestion of this material has sufficient quantities of methane to generate power. The unit supplied can export 150 kW of electrical power. The prime mover is a 6 cylinder, spark ignited reciprocating piston engine with turbocharging and

intercooling. To gain as much use out of the biogas as possible, 230 kW of heat is recovered from the engine jacket, oil cooler and exhaust gas. This heat is used to heat water from ambient conditions to 80 °C which is then used at various places in the process. The generator will operate on a continuous, 24/7/ 365 basis, parallel to mains and offset the load from the rest of the plant. In the event of a power failure, the generator will supply power to the auxiliary systems of the biogas plant to ensure there is no loss

in production of the biogas. As is often the case with new technologies, several 'teething' problems were encountered once the build was complete. These were overcome through extensive in-house testing, made possible by the installation of a permanent natural gas line earlier in the year. The end result is a product delivered to site that only requires minor adjustment of settings to accommodate the biogas fuel.

**Enquiries: Alain Bonfrer. Tel. 086 110 6633**

## New range current transducers

**LEM**, Geneva, Switzerland has released a new range of current transducers designated the HO series. The HO series is a breakthrough in the trade-off between performance, cost, size and mounting versatility. The six families cover nominal current ranges from 2,67 A to 250 A. PCB, through-hole, surface-mount or multiple panel mounting versions. Apertures, or integrated primary conductors, are also available. The LEM HO series is based on new LEM ASIC (Application Specific Integrated Circuit) which brings open-loop transducer performance closer to closed-loop types, providing better control and higher accuracy at a significantly lower price. Important features include:

Single +5 V or +3,3 V power supply	Fast response time from 2,5 to 3,5 µs
Up to 8 mm creepage and clearance	Over-drivable reference voltage
Half the offset and gain drifts of previous generations	Fault report function
Overcurrent detection on a dedicated connection	Versatile panel mounting version (3 ways).
	-40 to 105°C operation



**Enquiries: Denver Technical Products. Tel. 011 626 2023 or 083 601 8438/9 or email denvertech@pixie.co.za**

## Revised lightning protection guide launched

For three decades, the lightning protection guide from **DEHN** has been the trademark for practice-oriented technical literature in the fields of lightning and surge protection for buildings, installations and systems. Over time, the book has been revised and enlarged, due to changes in standardisation and technical advances. Now the third revised edition of the English language lightning protection guide is available.

The lightning protection guide provides expert knowledge for the practical understanding of lightning and surge protection, and spans almost 500 pages. The topics covered by the book range from the characteristic lightning parameters up to the practical application of lightning protection components and surge protective devices. It documents the state-of-the-art technology and recommendations based on the IEC and EN 62305 standards. Wherever no international or European standards exist, reference is made to pertinent German standards. The book includes materials, components, devices and systems, standards, regulations, design fundamentals and 34 practical solutions for specific applications. Informative illustrations additionally explain the function of lightning and surge protection systems and show possible application scenarios.

The lightning protection guide gives both non-specialists and experienced experts an overview of normative, technical and practice-relevant aspects of lightning and surge protection and offers support in the selection and sustainable design of buildings, installations and systems. The Lightning Protection Guide can be directly obtained from DEHN and is also available as pdf document at [www.dehn-international.com](http://www.dehn-international.com).

*Enquiries: Alexis Barwise. Tel. 011 704 1487 or email [alexis.barwise@dehn-africa.com](mailto:alexis.barwise@dehn-africa.com)*



Scan and go directly to our  
Electricity + Control Spot On website



ELECTRICITY + CONTROL  
E+C Spot On



## Bizz Buzz

### Next-generation platform for Advanced Control and Estimation

**Yokogawa** and **Shell** have jointly developed Platform for Advanced Control and Estimation, a software suite that speeds up and simplifies the process of designing, deploying, and maintaining advanced process control applications. This software suite brings together the advanced process control technology that Shell has acquired by operating its plants and the real-time control technology that Yokogawa has developed as a control system supplier. This product will help companies to improve their productivity. Advanced process control systems improve product yield and reduce energy consumption by not only maintaining process values such as temperature, flow rate, and pressure within a set range but also keeping them as close as possible to their optimal set points.

*Enquiries: Email [Christie.cronje@za.yokogawa.com](mailto:Christie.cronje@za.yokogawa.com)*

### ERP – now in Africa

Cloud ERP has officially arrived on the shores of Africa, the ERP revolution is here. This was the message from **Acumatica** when it recently announced its intentions to capture the ERP market in Africa. Businesses across all geographies and sizes are realising the game changing benefits that a Cloud ERP with integrated CRM brings to their growth strategy. Locally the company is partnering with **One Channel**. It is important for companies to tailor their business management applications to fit their exact needs, no matter how specific their requirements. It empowers people. Your business is not confined to four walls, why should the people that impact your business be?

*Enquiries: Email [dang@acumatica.com](mailto:dang@acumatica.com)*

### Energy masterplan improves lives

The KwaDukuza Municipality's new energy masterplan, developed by **Aurecon**, not only strengthened existing electricity networks to enable economic growth, but it also provided access to basic electricity supply for a number of residential dwellings within the municipal boundary areas. The effect of the Electricity Priority Projects (EPP) programme has also spilled over to nearby suburbs and districts in the region. The EPP programme has unleashed new development potential within the Ballito Old Central Business District, which was stagnating in growth. It also enabled the Municipality to roll-out an extensive Rural Electrification programme that has resulted in many previously disadvantaged communities gaining access to electricity.

*Enquiries: Email [Adrienne.Brookbanks@aurecongroup.com](mailto:Adrienne.Brookbanks@aurecongroup.com)*

## Engineering with heart

In support of the Mayor of Msunduzi's 'Take a girl child to work day', consulting engineering firm Royal HaskoningDHV, played an important role in exposing youth to the field of engineering, and in particular the role of a consulting engineer.

On Friday 29 May 2015, **Royal HaskoningDHV's** Pietermaritzburg office hosted students from Sukuma Secondary School in Imbali and Msumudi High School in Sweetwaters, exposing them to this exciting career path. Over the course of the day, students were exposed to the office as well as site environment engaging with civil engineers, technologists and technicians. They gained insight into the daily duties of a team focused on assisting Government in improving the infrastructure of our country. Royal HaskoningDHV is committed to growing our country's much-needed engineering skills, in both the public and private sectors. Without engineer-

ing skills there will be no provision of water, housing or roads. A number of the students are part of Royal HaskoningDHV's Saturday Schools Initiative, which is a weekly programme where Engineers and Technicians volunteer their time to tutor matric students in maths and science. Others were from schools in and around the Pietermaritzburg area. The first part of the day was spent on the development of designs in consultation with government officials.

Thereafter students were taken to a construction site in Greytown, one of a number of sites in the area that aims to eradicate the water shortages in the Umzinyathi district. These projects demonstrate that Government and engineers are hard at work in an effort to improve our country's infrastructure.

**Enquiries: Hillary Erasmus. Tel. 011 798 6000  
or email [hillary.erasmus@rhdhv.com](mailto:hillary.erasmus@rhdhv.com)**



Scelo Ngcobo (Royal HaskoningDHV) with students.

## Africa Utility Week

**Voltex** received a record number of visitors on its stand at African Utility Week held at the CTICC from 12 to 14 May 2015. Positioned as the global meeting place, conference and trade exhibition for African power and utilities, this year's event attracted over 6 000 attendees made up of utility heads, the continent's leading renewable energy project managers, investors, technology providers and international professionals. Eighty-two percent of the attendees were from Africa with the balance coming from Europe, Asia and the USA. The Voltex exhibit offered visitors interactive product displays of MV/LV Solutions - Distribution Board, Weidmuller enclosures, LSis circuit breakers, the Elspec Activar and a 25 kVA generator as well as energy efficient solar lighting products. Not surprisingly, the 25 kVA generator and Activar were the talking points on the stand. Shawn Roets, Western Cape Regional

Manager, stated: "With the current instability in power, businesses have no choice but to look for reliable standby power solutions in order to keep their operations going. The 25 kVA generator therefore attracted keen interest from prospective buyers, particularly in the agricultural and commercial sectors."

**Enquiries: Email [daryl@urbrand.co.za](mailto:daryl@urbrand.co.za)**





**‘Schneider is On’**

Schneider Electric introduced its new company strategy to South Africa’s online and traditional media representatives at its recent annual media forum. Called ‘Schneider is On’, it focuses on five key priorities to follow in order to achieve the company’s 2020 vision. These are: Do More, Digitise, Innovate, Step Up, and Simplify. “Our ambition is to serve our customers better by listening more closely to them, thus understanding their challenges and aligning our actions with their needs accordingly,” said Eric Leger, country president for southern Africa at Schneider Electric. “With this programme, we start a new chapter in the evolution of our organisation,” added Leger.

**Enquiries: Ntombi Mhangwani.**  
**Email [ntombi.mhangwani@schneider-electric.com](mailto:ntombi.mhangwani@schneider-electric.com)**

**Back left to right:** Wilhem Swart, Marc Ramsay, Jeremy Thomas, Sihle Maake.  
**Front left to right:** Eric Léger, Ntombi Mhangwani, Geoff Gregson.

**Transformer and High Voltage Customer Symposium**

Global and local Siemens experts hosted over 180 technicians, engineers and specialists from Eskom, the local municipalities as well as the private mining sector, at their annual Transformer and High Voltage Customer Symposium, at their head office in Midrand, 19 – 20 May 2015. The symposium gave engineers the opportunity to see the latest technologies, network with other experts in the industry as well as discuss challenges and solutions for the future. This promotes new technology and allows for further innovation. Ronnie Naidoo, head of transformers and HV products, energy management, Siemens Southern and East Africa says: “The engagement of engineers in various fields allows a free flow of information sharing that stimulates growth and relationships and improves the sector in which we so actively participate.”

**Enquiries: Keshin Govender. Email [Keshin.govender@siemens.com](mailto:Keshin.govender@siemens.com)**



**JB Switchgear**



*Daphne Archer,  
creditors*



*Kehilwe 'Mengo'  
Salobodive,  
office assistant*



*Sulayman Ally,  
senior estimator*



*Veronica Ntshiba,  
receptionist*



*Marilie Voogt,  
CAD*



*Evan Atherton,  
technical assistant*

**Tectra Automation**



*Wayne Neethling,  
branch manager,  
Cape Town office*

2015 SAEEC.....12	Cbi-electric.....OFC	Environmental Crimes Conference.....46	Powertech.....35
ABB.....31	Countapulse Controls.....21	ifm electronic.....OBC	SEW Eurodrive.....IBC
ACDC Dynamics.....IFC	CPUT Conference.....2	Krohne.....25	Siemens.....11
ACTOM.....33	Endress+Hauser.....23	Mecosa.....22	SMC.....45
Beckhoff.....15	Engen.....7	Mitech.....39	Woodbeam.....13

**INDEX TO ADVERTISERS**

**The 3<sup>rd</sup> POWER-GEN Africa and DistribuTECH Africa**  
15 – 17 July 2015,  
Cape Town International Convention Centre,  
Cape Town  
**Enquiries: Email [ferrial@tradeprojects.co.za](mailto:ferrial@tradeprojects.co.za)**

...

**ICUE-2015 Conference (Industrial and Commercial Use of Energy)**  
17 – 19 August 2015,  
Cape University of Technology  
**Enquiries: Email [icue@cput.ac.za](mailto:icue@cput.ac.za)**

...

**4<sup>th</sup> Annual Infrastructure Africa**  
1 – 2 September 2015,  
Sandton Conference Centre, Johannesburg  
**Enquiries: Email [liz@infrastructure-africa.com](mailto:liz@infrastructure-africa.com)**

...

**4<sup>th</sup> Annual Environmental Crimes Conference Compliance, Enforcement, Prosecution**  
9 – 10 September 2015,  
Indaba Hotel, Fourways,  
Johannesburg  
**Enquiries: Email [bookings@intelligencetransfer.co.za](mailto:bookings@intelligencetransfer.co.za)**

**25<sup>th</sup> AMEU Technical Convention 2015**  
4 – 7 October 2015,  
Sandton Convention Centre, Johannesburg.  
**Enquiries: Jean Venter. Tel. 011 061-5000**

...

**10<sup>th</sup> Southern African Energy Efficiency Convention (2015SAEEC)**  
11 – 12 November 2015, Emperors Palace  
The Southern African Association for Energy Efficiency (SAEE) aims to become the Association in Southern Africa that brings all energy stakeholders in the region together. In order to achieve this synergy, the SAEE is hosting the 10<sup>th</sup> Southern African Energy Efficiency Convention (2015SAEEC), as an event serving the energy management-, environmental-, facilities building upgrades-, energy engineering-, cogeneration-, power generation-, and efficiency improvement industries.  
**Enquiries: Erika Kruger. Tel. +27 (0)18 290 5130 or email [convention@sae.org.za](mailto:convention@sae.org.za)**

...

**Energy Training Foundation (EnTF) courses 2015**  
**Enquiries: Tel. 041 582 2043 or email [info@entf.co.za](mailto:info@entf.co.za)/[thieda@entf.co.za](mailto:thieda@entf.co.za)**  
**Visit [www.energytrainingfoundation.co.za](http://www.energytrainingfoundation.co.za)**

**effiDRIVE**<sup>®</sup>  
Energy saving that pays off.



Dwindling resources, rising energy costs, efficiency regulations and pressure to reduce CO2 emissions means it's time for you to start looking at your energy consumption.

SEW-EURODRIVE offers an energy consulting service which will help you achieve all that and save on energy costs. You can find hidden energy consumers, calculate savings potential and develop alternative solutions by making use of our expert in house services.

Start saving today. Set up your energy consultation.

Tel: +27 11 248-7000  
Web: [www.sew.co.za](http://www.sew.co.za)

**SEW**  
**EURODRIVE**

ifm electronic



## Programmable resolution

# Intelligent incremental encoder with display and IO-Link



- ✓ **No compromises**  
The magnetic sensing principle provides the accuracy of photoelectric encoders and the robustness of magnetic systems.
- ✓ **Simple**  
Resolution and signal level can be programmed. The encoders have a wide voltage range of 4.5...30 V DC and are therefore suited for universal use.
- ✓ **Multifunctional**  
Performance Line encoders have an integrated signal evaluation for speed monitoring, counter functions and detection of the direction of rotation.
- ✓ **Intuitive**  
The encoders provide easy setting, position indication by means of display and operating keys and intuitive menu navigation.
- ✓ **Networked**  
Diagnostic and parameter data are reliably transferred via IO-Link.  
Ready for Industry 4.0.



ifm electronic – close to you!

National: 0861 IFM RSA (436 772)  
International: +27 12 450 0370 / 0400



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