



Switch on simplicity without trading off efficiency.  
ACS580 general purpose drive.

#### FEATURES:

- Drives, motors + switchgear
- Control systems + automation
- Temperature measurement
- Plant maintenance, test + measurement
- Lighting
- Energy + enviroFiciency



# WIRED FOR INNOVATION



Fast, compact and automatic connection



Longitudinal grooves, transversal drawing and rounded upper edge ensure the highest mechanical resistance



Quick installation with the use of screw-less supports for all type of loads



BFR by Gewiss, is an innovative system of steel wire cable trays. Offering great flexibility and the ease of creating bends, ascending/descending sections and fixing according to your requirements makes this an ideal solution for all architectural applications. The wide range of dedicated supports allows for fast, simple and screw-less installations. The BRN system completes the range offering perforated cable trays in galvanized steel.

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

JOHANNESBURG Tel: 010 202 3300  
CAPE TOWN Tel: 021 510 0710  
PINETOWN Tel: 031 700 4215  
GERMISTON Tel: 011 418 9600  
RIVERHORSE Tel: 031 492 4800

*Distributors and Franchises throughout Southern Africa.*

**GEWISS**

LIGHT UP THE FUTURE

**Editor:**  
Wendy Izgorsek

**Design & Layout:**  
Adel JvR Bothma

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

**Circulation:**  
Karen Smith

**Publisher:**  
Karen Grant

**Editorial Technical  
Director:**  
Ian Jandrell

Quarter 2 (April - June 2015)  
Total print circulation: 4 735



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@crowm.co.za  
admin@crowm.co.za  
Website: www.crown.co.za

Printed by: Tandym Print

Electricity+Control is supported by:



South Africa seems to be a nation of tipping points. We enjoy the excitement. As far as I can see, through a series of battles, wars, disease and policy environments, many people have been predicting the demise of this country for centuries. We seem to wobble from one crisis to the next.

Yet here it is; here we are. The reason for this, I believe, is that we seem to fall on the right side of history each time. But it takes a crisis; and it takes reaching that tipping point.

I am fascinated by the current and fluid situation around higher education. These are issues that I have been unable not to comment on previously – because it is education that builds our nation.

Historically, we have not taken education seriously. Students have recognised this and their argument is to succeed individually and collectively, what you need is a world-class education. Many are being excluded from this opportunity and we need to find ways to carry them through their lives as a result.

Make no mistake, violence and criminal activity cannot ever be accepted. That is clear. Whereas I endorse the calls by students, I simply cannot endorse the methods used. But frustrations are high.

Let us just remind ourselves: at basic education level (and there are many exceptions) we rank, consistently, at or near the very bottom of the international pile. This is shocking – and it is a situation that has persisted, even though numerous calls have been made to those who can address this, to do so. You will recall that delivery of text books has been a logistical nightmare – yet we can put up supermarkets right around the country with our eyes closed.

Without doubt, we have sufficient funding to run basic education... so what could be wrong? Well, now the products of that system are beginning to spot the problem. In higher education, however, we have a more profound problem: the sector is massively under-funded by any measure you care to think of.

Worldwide, the proportion of GDP spent on university budgets is 0,84%; in Africa (the whole continent), the average GDP spend on universities is 0,78%. Within the Organisation for Economic Cooperation and Development (OECD) countries, the proportion is 1,21% of GDP. South Africa's budget for universities as a percentage of GDP was only 0,75%.

I would argue that, if we reflect on what our objectives are, we need to align with the OECD countries. In essence, between 2000 and 2010, state funding per full-time equivalent student (FTE) fell by 1,1% annually in real terms. Be aware that a weakening Rand does little to ease the pressure.

We now have South African (public) universities where the state-funded component of the operation is less than 25% of the total income. That is almost like a private university. Whereas the concept of a private university is in no way offensive, one has to question the wisdom of this given the State's need and claimed objective to prioritise education.

We know that the money is there, but it would require reprioritisation, by the State, of the current spend.

Easy? No. Doable? Of course.

Are there imaginative ways of doing this? Yes. They have been discussed.

I find myself wondering whether these young people may have conveyed a message that academics, industrialists and economists have not been able to get across for the past twenty years – or at least since 2000.

This is indeed a tipping point. I am certain we will, again, fall on the right side.



Ian Jandrell

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

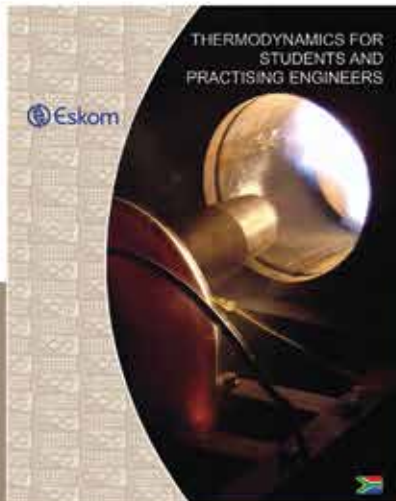
*Ian*





Get your hands on these **3** essentials ...

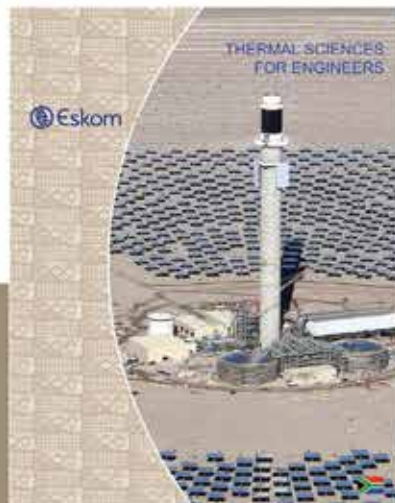
## Eskom Power Series' Volumes 10, 11 and 12



### VOLUME 10

An understanding of thermo-flow processes requires a thorough understanding of the basic principles. In 'Thermodynamics for Students and Practising Engineers' the basic concepts are introduced with a ramp up to the analysis of operating engines, gas turbines and steam plant.

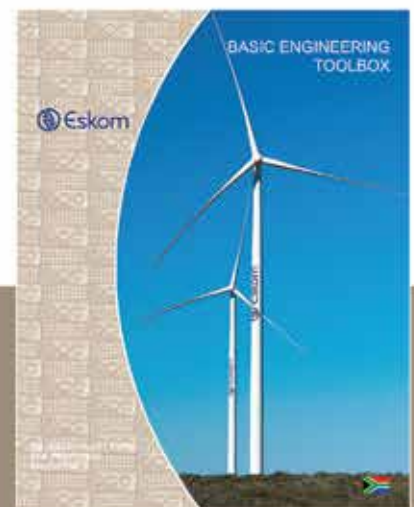
**R655.00** (excl VAT)



### VOLUME 11

The key objective of 'Thermal Sciences for Engineers' is to present the influence of thermodynamics, fluid mechanics and heat transfer on the technical component of generating and new build businesses. More importantly, the application of the essential theory to operating plant and new designs is discussed using language familiar to engineers.

**R822.00** (excl VAT)

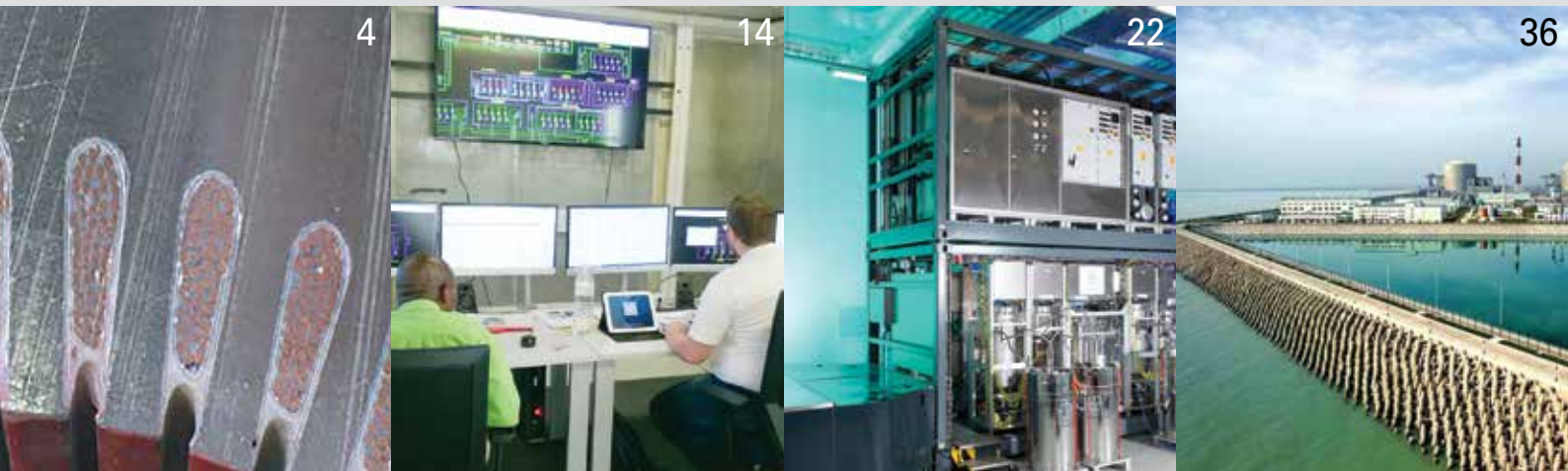


### VOLUME 12

Basic Engineering Toolbox (six excellent apps) presents six indispensable tools that are excel based, require little set up and are easy to use. The apps are for simple fluid flow; basic generation plant for gas engines and gas turbines; wind turbine site classification for three year measured data sets; coal calorific value determination based on supplied volatile and non-volatile compositions; solar angle calculator based on the geographic plant location; and a concentrating solar plant levelised cost estimation tool for central receiver plants at 100 MW capacity. The last app is based on Upington (South Africa) data and is presented as a capacity factor versus solar multiple curve for various storage hours. The user will need to generate these curves using bespoke software for other locations.

**R399.00** (excl VAT)

**BUY ALL 3** **R1500.00**  
(excl VAT)



**Drives, motors + switchgear**

- 4 Hybrid curing systems to improve rotational machine resin impregnation efficiency... by J de Beer, Tectra Automation
- 8 Grid defection: Cutting Eskom ties... by J Ward, Soltra Energy
- 10 Success for first South African girth gear installation... by R Obermeyer, SEW-EURODRIVE South Africa
- 11 Round UP

**Control systems + automation**

- 14 Scaling down a small island control and distribution system for use as a Microgrid power solution in Africa... by T Spearing, Lucy Electric UK and R St John, Lucy Electric South Africa
- 18 Round UP

**Temperature measurement**

- 22 'Smart scale' applies to process instruments... by J Pichura, WIKA
- 25 Round UP

**Plant maintenance, test + measurement**

- 26 Retrofitting a sewage plant with lightning and surge protection... Lightning Protection Guide, DEHN
- 29 Round UP

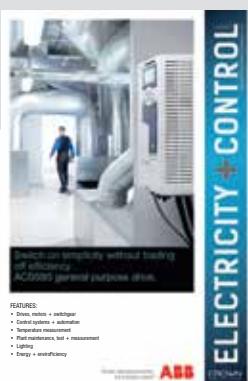
**Lighting**

- 32 Large manufacturer saves big with energy efficient lighting... by G Burley, QDM
- 34 Efficient building lighting... by Engineering Council of South Africa (ECSA)
- 35 Round UP

**Energy+enviroFiciency**

- 36 Design and construction management technology for complex engineering facilities... Information provided by Rosatom
- 40 Round UP

www.electricityandcontrolmagazine.co.za



**Cover**

Effortless energy efficiency is the best way to describe the new ACS580, **ABB**'s new all-compatible general purpose drive. *Read more on page 13.*

**Regulars**

- 1 Comment
- 13 Cover Article
- 40 CESA
- 41 Light+Current
- 41 Bizz Buzz
- 42 Social engineers
- 44 Clipboard
- 44 Advertisers



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

# Hybrid curing systems to improve rotational machine resin impregnation efficiency

By J de Beer, Tectra Automation

*In modern rotational machine manufacturing plants production rate, energy efficiency and ease of maintenance must be obtained from each production machine.*

Existing resin impregnation machines used to impregnate secondary insulation onto rotating machines still rely on outdated curing methods. Where energy efficiency and high production rates are required, a possible combination of resin curing systems to overcome one another's shortcomings could result in greater energy efficiency, production rates and ease of maintenance.

During the manufacturing of rotational machines such as electrical motors and alternators, the rotor is impregnated with a resin as secondary insulation [1]. This resin impregnation is crucial to the performance of the rotational machine as it keeps the copper coils together when in operation up to 18 000 rpm. This prevents coils loosening due to vibration and causing internal machine damage. Resin impregnation also increases the thermal conductivity of the rotor coil, thereby conducting heat away from the core while protecting the coil from water damage. During curing of the impregnation resin, the curing time can be decreased using a number of curing methods [2]. It is possible to use a number of different curing methods depending on the part, cycle time and preferred resin. This research will focus on the possibility of combining existing curing methods into a hybrid curing system in order to determine if decreased curing times, increased production rates and increased electrical efficiency can be achieved while the resin's mechanical properties do not decrease. *Figure 1* is an illustration of secondary insulation, also called ground insulation, on an alternator rotor where the impregnated resin can be seen.

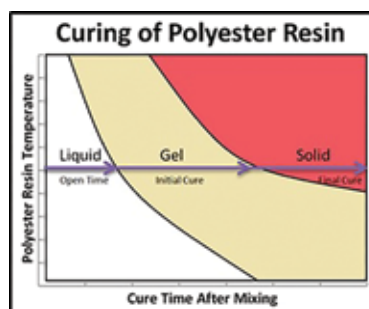


*Figure 1: Secondary resin insulation holding coils together [6].*

During the resin curing process, internal crosslinking, which transforms the structure of the resin from a liquid to an infusible solid structure, takes place. This process is also called polymerisation. *Figure 2* is a graphical illustration of typical resin curing phases. It can be seen from this illustration that resin, typically, has three curing stages where it crosses from one stage to another with the addition of heat.

The heat required to cure resin can be supplied by an external source or heat created by the polymerisation process. The external process of curing resin is an exothermal process, which can be initiated by an initiator. To cure resin, a number of processes have been developed over the years. Some processes cure by increasing the temperature of the resin, while the addition of a photo initiator makes it possible to cure resin with UV radiation [4]. Curing resin with a microwave is also possible – as the microwaves heat up, the resin polymerisation takes place. As the resin is subjected to additional external thermal

heat contributing to the existing thermal heat generated by the polymerisation process, the resin curing speed is increased and the curing time decreased.



*Figure 2: Curing of resin [3].*

Each of these technologies has their own advantages and disadvantages. When early impregnation machines were developed, energy was relatively inexpensive and readily available. This led to most of the early impregnation machines making use of thermal curing as a preferred curing method.

Impregnation machines, typically, have four stages: initial heating of the part; impregnating of the part with resin; curing of the resin; and cooling of the part. *Figure 3* shows an existing impregnation machine where the process flow is from left to right. Thermal curing requires a large amount of energy to cure resin – typically in the region of 190 °C. These early impregnation machines require a large amount of maintenance due to a high number of internal moving parts and elevated temperatures, which cause parts to fail prematurely. Traditional thermal convection ovens have to heat up large volumes of air in order to heat the resin for curing. Alternative curing sources such as UV radiation can be focused directly on to the part, limiting unwanted energy being consumed.



- During the manufacturing of rotational machines, the rotor is impregnated with a resin as secondary insulation.
- Resin impregnation is crucial to the performance of the rotational machine.
- Resin impregnation increases the thermal conductivity of the rotor coil.



- rpm – revolutions per minute
- UV – Ultraviolet

Abbreviations/Acronyms



Figure 3:  
Existing impregnation machine  
(photograph taken at Robert  
Bosch Production Plant, Brits).

Later developments allowed resin to be cured by UV radiation thanks to the addition of a photo initiator into the resin. The photo initiators produce free radicals when exposed to a UV radiation source, thus cross-linking and curing the resin. The benefit of curing resin with UV radiation is that it cures from the surface, limiting run-off after the resin

dipping process. Emissions released during curing are now trapped beneath the already cured resin surface, limiting the need for cumbersome and energy consuming emission control systems such as extraction fans. Some currently available UV curable resins, such as a product produced by Elantas called UP 142 UV, has the capability to be cured with either UV radiation or thermal heat. Once the photo initiators have been irradiated by the UV source and the polymerisation process started, the process of cross-linking produces external thermal energy as a by-product of the polymerisation process. This thermal energy, in turn, continues the polymerisation process, ensuring that resin not exposed to the UV source will still fully cure. During the curing process using a UV radiation source a large amount of heat, up to 600 °C, is generated. This additional heat can be utilised to increase the curing rate. Further technologies capable of curing resin

include microwave oven curing where the exposure to the microwave source can be controlled.

Resin can also be fully cured with a microwave source. It heats up the resin, thus initiating the polymerisation process. This additional microwave source heat, added to the exothermal heat produced by polymerisation, increases the curing rate. Heat transfer to the resin by microwave is direct and evenly distributed throughout the resin, unlike thermal heating which initiates heating at the surface of the resin. Tests conducted show that it is ideal to reduce the wattage of the microwave down to 120 W. This will avoid sparking inside of the microwave oven [5].

The benefit of using microwave curing is that the resin can be directly targeted, thus reducing energy consumption. Researchers studying the possibility of using microwave curing found that the cross linking density is higher with microwave curing than existing thermal curing systems. A higher cross-linking density will contribute to the fully cured resin having increased mechanical properties. It was also found that, typically, curing time is reduced when using a microwave source. The test conducted was, unfortunately, not done to optimise the curing time only in order to show that microwave curing can be used as an alternative curing method [5]. During the author’s research project, tests will be conducted to determine if the presence of metal in the resin to be cured will cause sparking and a potential fire hazard. The tests will also be used to optimise the curing time while still achieving a good high-density cross-linked resin.

Before resin impregnation of the rotational machine, the part is pre-heated to reduce curing time. When the part is dipped in a resin tub, the pre-heat ensures that gelation of the resin can be achieved as soon as possible. Once the resin has reached the gel curing point, resin run-off is reduced and the part can be further processed. After

FOU CARETOWN 000656CTE

## 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.



the part has been fully cured in the curing oven, it will travel through a cooling tunnel where excess heat is removed – it is possible to extract excess heat from both the pre-heating and cooling phases. This additional excess heat, which would traditionally be dumped into the environment, can now be funnelled back into the curing oven greatly reducing heat loss and increasing efficiency. Although the current scope of the research project does not cover extraction and re-use of excess heat, it would be a natural next step to greatly reduce energy loss in impregnation machines.

*During the resin curing process, internal crosslinking, which transforms the structure of the resin from a liquid to an infusible solid structure, takes place.*

## Conclusion

It is clear from existing research and data that different curing methods will result in cured resins with different mechanical properties. The curing source will also influence the time required to complete curing. The combination of curing sources could offer a number of benefits while limiting one another's shortcomings. Experiments will be carried out on each individual curing source, the data will then be analysed to determine the optimal hybrid curing solution. Once a hybrid resin curing system has been configured, experiments will be carried out to establish if such a curing system will reduce the curing time while increasing energy efficiency. Comparisons will then be drawn between existing curing methods and the proposed hybrid curing system. Analysis will be carried out on the fully cured resin in order to compare mechanical properties of resin cured by existing curing methods to a hybrid curing system. The resin properties tested include hardness, compression strength, tensile strength, tensile modulus, toughness, stress and strain. In the manufacturing industry, energy efficiency and production rates are crucial to ensure the products manufactured are of the best quality while being environmentally friendly. The tests completed on hybrid curing systems will also showcase the possibility of combining curing systems that are less cumbersome, requiring less maintenance while still achieving a fully cured resin with similar or better mechanical properties to existing thermal curing systems.

## References

- [1] Stone GC et al. 2004. Electrical Insulation for Rotating Machines. 445 Hoes Lane Piscataway, NJ: John Wiley & Sons, INC. Publications.
- [2] Senior P. 2005. A Review of Methods of Impregnation of LV Motors. Electricity + Control, June 2005.
- [3] Power Blanket (2015) Curing Epoxy Resins, Available at: <http://www.powerblanket.com> (Accessed: 22 June 2015).
- [4] Endrmeit A, Johnson MS, Long AC. 2006. Curing of Composite Components by Ultraviolet Radiation: A Review. POLYMER COMPOSITES, Volume 27 (Issue 2), pp. 119-128.
- [5] Rahmat AR, Day RJ. 2003. Curing Characteristics of Unsaturated Polyester/aramid Reinforced Composite: Microwave vs. Thermal Energy. Jurnal Teknologi, 39(I), pp.

- [6] Senior P. 2007. Impregnation of Low Voltage Motors with Thixo-seal Epoxy Resin. Electricity+Control.

## Bibliography

- Altana. 2011. Dobeckan MF 8044, Grobmannstrabe 105, Hamburg: ELANTAS Beck GmbH.
- Altana. 2011. Dobeckan MF 8044 UV, Grobmannstrabe 105, Hamburg: ELANTAS Beck GmbH.
- Strobl GR. 2007. The Physics of Polymers, 3<sup>rd</sup> edn., Berlin, Heidelberg: Springer.
- Matse. 1995. History of Polymers, Available at: <http://matse1.matse.illinois.edu> (Accessed: 16 June 2015).
- Gherardi P, et al. 2008. Polymers for Electrical Insulation. 1st Ed. Elantas.
- [1] Stone GC, et al. 2004. Electrical Insulation for Rotating Machines. 445 Hoes Lane Piscataway NJ: John Wiley & Sons, INC., Publications.

## Acknowledgements

The author would like to thank the following companies/individuals for their contributions and inputs towards this research project. Without the help of these individuals, this research project would not be possible.

- Tectra Automation: Kevin Lombard (General Manager): Research project sponsor while supplying continuous mentoring
- Tshwane University of Technology (TUT): Dr. Jamiru, Tamba (PhD Field of specialisation: Materials): Supervisor to my research project who continuously gives mentoring and inputs towards this research project
- TUT: Professor Sadiku, Rotimi (PhD Field of specialisation: Materials): Input and mentoring towards this research project
- Robert Bosch: Nelis Gouws (Project Manager): Contact at Robert Bosch, the entity for which the research project is being conducted
- Wilec South Africa: Paul Senior (Business Development Executive): Technical assistance with resin selection and supply of resin used for testing



Jaco de Beer is a Project Engineer at Tectra Automation, responsible for the company's Project Department. With five years' experience in turnkey automation projects, Jaco takes customers' specifications and turns them into working systems. Jaco has a B.Tech in Mechatronics, and is currently completing his Master's Degree in Mechatronics. He is

certified as having completed the following courses:

- National Diploma: Mechatronics
- Baccalaureus Technologia (B.Tech): Mechatronics
- Academic Excellence Award: Diploma and B.Tech
- Programme in Project Management: Certificate with Distinction
- Research Methodology: Certificate
- Courses: Advanced Excel, MS Project and Pneumatics

Enquiries: Email [jaco.debeer@tectra.co.za](mailto:jaco.debeer@tectra.co.za)



# Junction Boxes and Klippon® Control Stations



**Certified safety control work processes for hazardous areas.**

- ▶ Robust, quality products and devices
- ▶ Assembled to customer requirements
- ▶ Compact design
- ▶ Available in standard sizes with up to four control and display elements

011 452 1930  
021 551 8813  
031 914 4712

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



 Proudly  
Bidvest

**Weidmüller** 

# Grid defection: Cutting Eskom ties

By J Ward, Soltra Energy



*Renewable electricity generation, especially solar Photovoltaic (PV) generation, is rapidly gaining ground and becoming much cheaper when compared to long-term soaring electricity prices; distributed electricity storage is doing the same.*

**G**lobally, solar power is starting to cut into power utility company sales and revenues. It is a trend that has the potential to disrupt the viability of utility companies, including South Africa's Eskom, as customers move to cut their ties and live off the grid.

The tremendous advances in solar PV technology combined with the massive strides being taken in battery design can make the electricity grid optional for many customers – sooner than was anticipated. Grid defection is today entirely possible. Equipped with a solar PV system and battery storage, customers can 'opt out' of the traditional utility service with what is described as a 'utility-in-a-box'.

Previously, solar PV (and other distributed resources) without storage required some degree of grid dependence. However, the utility-in-a-box or 'solar-plus-battery' concept has changed that largely because the point at which the system is able to reach grid parity is so much closer now.

In some areas in the United States of America (USA), this point has arrived, while for many others it is imminent as early as 2020, for tens of millions of commercial and residential customers.

Generally speaking, grid parity arrives sooner for commercial than residential customers, based on average load profiles.

Such parity and the customer defections could – and should trigger economic alarm bells for Eskom which continuously implores its customers to use less of its product while regularly denying them access to it during frequent 'load shedding' events.

*Market watchers are accepting the 'utility death spiral' which they say will result in the demise of traditional utility business models.*

As grid defections grow in number, electricity revenues would fall, prompting a rise in electricity prices that would make solar-plus-battery systems even more attractive and speed the cycle. It is a reality that Eskom and NERSA (National Energy Regulator) will have to address – sooner or later.

Importantly, solar-plus-battery systems are commercially available in South Africa today. They are cost effective, their technology is relatively mature, and they can operate independently of the grid

on installation. Globally, many utility companies have acknowledged the threat of impending solar-plus-battery grid parity. However, unlike Eskom, they are also seeing it as an opportunity to add value to the grid and their business models by offering grid-tied private electricity generators as a feed-in tariff for their over-supply.

Interestingly, in Australia, rural customers living off the grid are a boon for the electricity company as it supplies power to remote farms and homesteads at a loss.

One of the trends underpinning the surge in solar-in-a-box adoption is the advances in storage battery technology. Electric vehicle market growth world-wide is driving the lithium-ion battery industry's rapid expansion. Though it lags behind the growth of the solar PV market, it has nevertheless been significant in recent years.

One of the most important innovators in this arena is Tesla Motors, the electric car manufacturing company established in the USA by South African, Elon Musk.

Tesla has recently launched its Powerwall lithium-ion-based energy storage product at its Gigafactory that is expected to slash the cost of battery storage by between 30 and 60%. Panasonic, the Japanese electronics giant, is a major investor.

Significantly, there are many other battery chemistries under development. Disruptive new innovations in battery technology, together with accelerated demand-side energy usage improvements (where 50% is a targetable figure), may well accelerate the time-frames for reaching grid parity with solar-plus-battery systems.

For those who believe South Africa's electricity prices will escalate further in the years to come, it is encouraging to note that in Hawaii grid parity has arrived for commercial customers with solar-plus-battery systems and a standby generator. (Note that adding a standby generator to a solar-plus-battery system reduces the capital required for the battery bank, bringing grid parity sooner.)

In other countries and regions with high commercial retail electricity prices, these systems will potentially become competitive within the next five to ten years.

In all countries, even those with the cheapest electricity parity will happen within the next 30 years in terms of most modelling scenarios.



NERSA – National Energy Regulator of South Africa  
PV – Photovoltaic

## Abbreviations/Acronyms

### Conclusion

Market watchers are already accepting the so-called 'utility death spiral' which they say will result in the eventual demise of traditional utility business models. Solar PV early adopters will increase their pain and speed the day of grid parity. Will Eskom accept the change or cling obstinately to its increasingly-challenged, legacy business paradigms?

Another important question is will Eskom, NERSA, technology providers and customers be able to work together to reshape the market either within existing regulatory frameworks or under an evolved regulatory landscape to build an electricity system of the future that delivers reliability as well as value and affordability to the South African consumer?

- Solar power is cutting into power utility company sales and revenues.
- Advances in solar PV technology and battery design will soon make the electricity grid an option for many.
- Solar-plus-battery systems are available in South Africa today.



take note



Jack Ward is the Chief Executive Officer of Soltra Energy, a leader on the African continent in the field of solar photovoltaic power provisioning systems and infrastructures. Enquiries: Garreth Johnson. Email [garreth.johnson@soltra.co.za](mailto:garreth.johnson@soltra.co.za)



- Low Voltage TEFC frame Electric Motors to IEC60034
- Ratings from 0,37kW up to 450kW at 400V, 525V and 1000V
- High Efficiency to IEC 60034-30 (IE2)
- IP65 / IP66 & Class H Insulation

**LS5**  
High Efficiency

## ELECTRICAL MACHINES

A division of ACTOM (Pty) Ltd

# ACTOM

# Success for first South African girth gear installation

By R Obermeyer, SEW-EURODRIVE South Africa

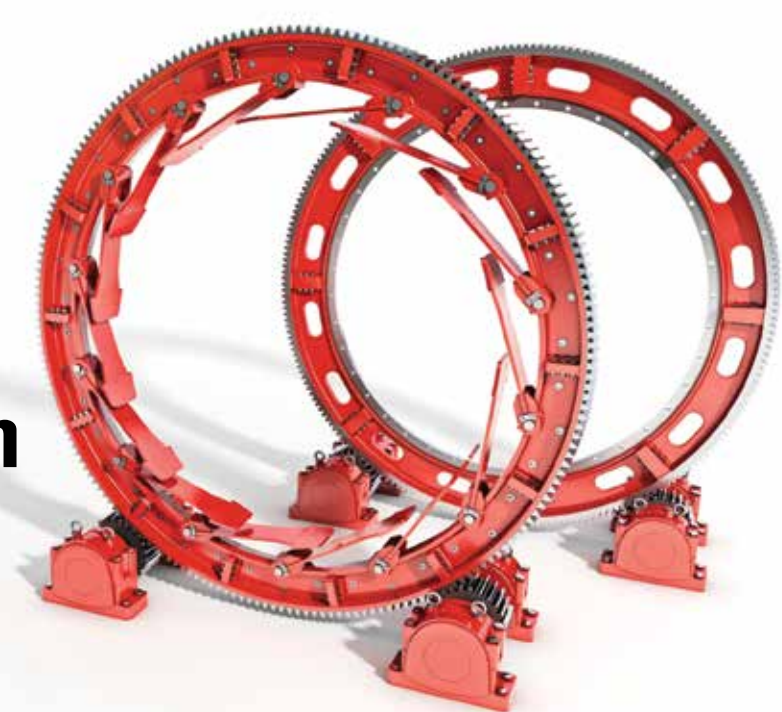
*SEW-EURODRIVE South Africa has successfully installed its first-ever girth gear in a rotary kiln at the R1,8M Mamba Cement plant currently under construction in Limpopo.*

The Mamba Cement plant is expected to be operational by mid-2016, with the capacity to produce more than one million tonnes per year of cement, which will be sold to readymix and construction industries across South Africa. This turnkey solution was made possible thanks to a synergistic partnership between SEW-EURODRIVE's South Africa and China branches. The girth gear was designed in China and commissioned before being installed locally to exact client specifications. The girth gear will be used to transfer the drive torque from the gear motor to the rotary cylinder. Its major advantage is that it weighs less than half of conventional girth gears, while still maintaining the same safety factor. This is possible because the gear is manufactured from first-generation Austempered Ductile Iron (ADI) – a family of heat treated cast irons. The austempering heat treatment converts ductile iron to ADI, resulting in excellent strength, toughness and fatigue characteristics.

## Installation process

Once the kiln was installed onto its trommel rollers, the girth gear was assembled and clamped onto the kiln body using the clamp-on tooling. The girth gear was manufactured in 12 segments. The advantages of this is ease of transport and installation, as well as the possibility to replace one segment, should a tooth fail. The kiln was rotated 360 degrees with the barring drive, while radial and axial readings were recorded at each of the positions.

Minor adjustments were made, and measurements were well within tolerance. The girth gear was held in position with special adjusting jacks and clamps. The clamps pressed the spring plates against the kiln body. Welders were positioned on each side of the girth gear, and the first weld of 20 mm long was made on both sides of each spring plate. The kiln was then rotated 360 degrees, recording the radial and axial run-out in each of the 12 positions. This process continued on every run of weld until the welding was completed, to ensure the girth gear remained within the radial and axial tolerances. After the final weld, the kiln was left to cool for 12 hours. A final reading of the run-out was noted on the commission sheet before SEW-EURODRIVE experts began to set up the pinion that drives the



girth gear, after installers confirmed the specified tolerances. The backlash of the gear teeth and tooth contacts were recorded in the same 12 positions. This was followed by aligning the main drive gear box output coupling to the pinion half coupling, and recording the radial and axial run-out. This process was repeated with the electric motor to input the coupling of the main drive gearbox.

## Conclusion

All final run-out readings were checked against the maximum and minimum tolerances provided by SEW-EURODRIVE and recorded in the commissioning documents. The company's service technician was on-site to assist throughout the process and was available at any hour if needed. The field service team also checked and recorded the alignment of the whole gear train for commissioning purposes. The next stage will see the commissioning of the lubrication system, expected to take place in late 2015.

*“We have not only successfully installed our first girth gear, we have also offered a complete turnkey project solution which included installation, commissioning as well as after-sales service and maintenance when required”.*

- A girth gear has been installed in a rotary kiln at a cement plant.
- The girth gear was designed in China and commissioned before being installed locally to client specifications.
- This was a complex project with minimal challenges encountered.



Raymond Obermeyer has more than 25 years' operational experience at SEW-EURODRIVE. In July 2015 he became Managing Director of SEW-EURODRIVE South Africa. He was instrumental in the upgrading of the company'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. Raymond was initially the Nelspruit branch manager before his promotion to operations and logistics general manager ... and now, Managing Director.

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



## Reliable protection for 3-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.

Protection is also provided against thermal overloads, locked rotor and running stall/jam protection. As the relay protects against short circuit faults, it automatically takes care of trip coordination so that the main contactor is not used to disrupt high-energy faults.

Designed for advanced motor protection, the MA comes complete with integrated current transformers with 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. Additional MA features include real time and date stamping recorded by the relay for the last four trips, a recording utility of actual RMS loads, thermal conditioning, mains phase voltage, line voltage, as well as status of digital inputs and output contacts.

The user has the possibility of expanding the unit for fieldbus communications via Profibus DP, Modbus RTU and Canbus protocols.

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



## Acquisition

**BMG – Bearing Man Group** - part of Invicta Holdings Limited, has acquired **Hansen Transmissions South Africa (HIT-SA)** from Hansen Industrial Transmissions, part of the Sumitomo Group. This strategic acquisition - effective 30 September 2015- has been approved by the South African Competition Commission.

“HIT-SA, which assembles and distributes Sumitomo and Hansen branded industrial gearboxes throughout Southern Africa, now forms part of BMG’s electromechanical division,” says Mark Barbour, BMG Business Unit Manager. “Through this acquisition, BMG broadens its mechanical drives range and strengthens its long term partnership with Sumitomo as the exclusive distributor locally of Sumitomo speed reducers”

**Enquiries: Mark Barbour. Tel. 011 620 1500 or email [markb@bmgworld.net](mailto:markb@bmgworld.net)**



*Fritz Fourie, Managing Director, Hansen Transmissions, Gavin Pelsler, Managing Director, Engineering, BMG, Charles Walters, Chief Executive Officer, Invicta Holdings Limited, Byron Nichles, Chief Executive Officer, BMG and Shaun Dean, Chief Executive Officer, Hansen Industrial Transmissions.*

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](mailto:LP@za.abb.com)

Power and productivity  
 for a better world™



## Diversified strategy delivers value

At its recent open day, **Efficient Engineering's** managing director, Graham Hartley, said that withstanding plunging commodity prices and resulting slowing demand, the company continues to be part of the solution within the steel industry which plays a critical role in mineral beneficiation and is a key enabler of every part of the economy. The top five steel consuming industries include the automotive, mining, construction, energy, and infrastructure sectors and jointly contribute 15% of the total of South Africa's GDP and employ more than eight million people.

Through developing their own intellectual property in the areas of custom engineering mining solutions, pressure vessels and modular solutions, Efficient Engineering continues to diversify its business even further. The company has gone from purely mechanical design and manufacture, to including electrical design, and full fit out and testing of modular power control, electro houses and generator sets. **Efficient Power**, which was launched 18 months ago, has since turned over more than R100 M.

"We offer first to market, tailor made solutions to our clients through the expertise of our management team which has more than 200 years' cumulative experience, in harnessing contemporary machinery and industry leading manufacturing processes.

"This has led to our robust growth and has seen us evolve from a respected family business to becoming the preferred supplier for numerous blue chip original equipment manufacturers in the local and international mining, material handling, oil and gas, satellite communication and radio astronomy, petrochemical as well as engineering industries. Further, we continue to add to our diverse portfolio through acquisitions such as that of Trotech, a division recently gained through the business rescue process."

Trotech, now known as **Efficient Trotech**, offers specialist services in the field of engineering, design, manufacture and installation of bulk storage tanks, pressure vessels, heat exchangers, reactors, air receivers and fired heaters to the petrochemical, mining and minerals industry, as well as to the pulp and paper sectors. It is an exciting addition to Efficient Engineering's site which currently boasts a total manufacturing surface area of 21 600 m<sup>2</sup>, fully equipped to undertake any engineering job, regardless of its size or complexity.

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



## Flexible servo drive system for demanding applications

**Siemens** has expanded its extensive drive portfolio for servo applications to include the Simotics S-1FG1 servo geared motor that is optimally harmonised with the Sinamics S120 converter system. The complete integration of this drive system into Totally Integrated Automation (TIA) makes configuration and commissioning easy. Prefabricated Motion Connect signal and power cables offer an easy and reliable method of connecting the components. The components have electronic rating plates, and the motors are connected via the Drive-Clq system interface so that the system can be brought into operation quickly. This servo drive system from Siemens is suitable for use in a multitude of applications, such as printing and packaging machines, storage and retrieval machines, conveyor systems and dosing pumps.

The highlights of the compact Simotics S-1FG1 servo geared motor are its high efficiency and low torsional backlash for precise, dynamic motion sequences. The Simotics S-1FG1 is available in the following versions: helical, parallel shaft, bevel and helical worm gearboxes – and with up to 25 transmission ratios, depending on the type of gear and size. The helical gearing of the gear wheels makes the gearboxes run very quietly, thereby reducing the generation of noise. The small diameter of the plug-on pinion inserted into the motor shaft enables the first gear stage to have a high transmission ratio. This in turn means that in some cases a two-stage gearbox can be used instead of a three-stage one.

On account of its highly integrated functionality and scalable number of axes, the Sinamics S120 converter system is suitable for use in a multitude of demanding Motion Control applications.

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





# New ABB drive gives advanced energy efficiency with effortless simplicity



Effortless energy efficiency is the best way to describe the new ACS580, ABB's new all-compatible general purpose drive. Through drive selection, set up, operation and maintenance, the ACS580 simplifies control processes efficiently. "The drive is virtually plug-in-ready to control pumps, fans, conveyors, mixers and many other variable and basic constant-torque applications, while requiring very little time for set up and commissioning," says Riaan van Jaarsveld, Variable Speed Drives Sales Manager for South Africa. "Furthermore all essential features are built-in, making drive selection and use easy, and giving users better management and savings of precious energy." The ACS580 power range is 0,75 to 250 kW and voltage range is 208 to 480 V. A wall-mounted drive is available with IP21 enclosure or IP55 enclosure optional.

## The drive becomes an energy-saving tool

The drive controls the process more energy efficiently based on actual need, rather than fixed-speed and mechanical flow control often used in applications like pumps and fans. An energy optimiser feature ensures maximum torque per ampere and reducing energy drawn from the supply. The kWh counters monitor hourly, daily and cumulative energy consumption of the drive. The energy saving calculators show savings for energy, CO<sup>2</sup> emissions and money when the drive replaces other control methods.

## Easy and intuitive user interfaces

The control panel and PC tool simplify the use of the drive. The control panel's settings menu and built-in assistants speed up commissioning. Each menu is clearly named by function, such as motor, ramp and limit settings. The basic set up is done in minutes. The I/O menu shows how the electrical terminals are configured, and gives quick access to related terminal settings like filtering, scaling, delay or function selections. The free basic Drive composer PC tool provides

extensive drive monitoring and process tuning capabilities while the advanced Dedicated Drive composer pro provides advanced features such graphical control diagrams that help users set the drive's logic quickly.

## All features built-in

All the essential features are built into the drive as standard, reducing the need to deal with external components, extra cabling and space restrictions. The drive provides reduced harmonics with built-in second-generation swinging choke technology in a smaller and lighter design. Other built-in features include EMC filter, brake chopper up to frame R3, Modbus RTU fieldbus interface and safe torque off. The drive's capability can be extended with optional plug-in modules. A wide range of fieldbus adapters can easily be mounted inside the drive allowing connectivity to all the major industrial fieldbus protocols. The standard I/O can be extended by using optional analogue and digital extension modules.

## Standard software with versatile features

The drive's advanced software improves process control. A built-in, stand-alone process PID controller makes the ACS580 a self-governing unit requiring only an external process measurement. For pumping applications the sleep mode momentarily elevates levels or pressures, thus extending the sleep mode to save energy. The flying start catches a running motor with long freewheeling times, as in fan applications. The drive reduces motor noise by spreading the switching frequencies over a user-specified range. The higher used switching frequency reduces motor noise at low load without limiting full current at maximum load.

## All-compatible drives architecture for scalability without adding complexity

The ACS580 general purpose drives are part of ABB's all-compatible drives portfolio, offering customers scalability without adding complexity. The ABB all-compatible drives share the same user interfaces and options, meaning once a user has experienced one all-compatible drive, they will be able to quickly adopt and use others.



Enquiries: *Riaan van Jaarsveld*  
Tel: +27 (0)10 202 5000 or  
email: [riaan.van\\_jaarsveld@za.abb.com](mailto:riaan.van_jaarsveld@za.abb.com)



# Scaling down a small island control and distribution system for use as a Microgrid power solution in Africa

By T Spearing, Lucy Electric, United Kingdom, and R St John, Lucy Electric, South Africa

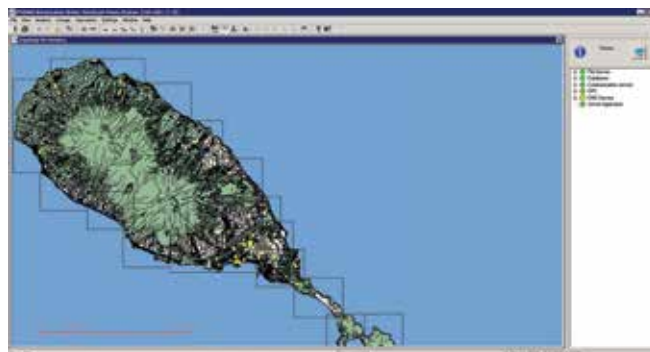
*Reviewing the suitability of taking a control system used to manage the supply of electricity of an island, and applying it to off-grid applications whilst supporting future opportunities to be part of the national utility infrastructure.*

Traditionally control of electrical power networks has been a centralised, top down system approach. These larger systems offered a wide span of control allowing the system operator to make informed decisions to manage load flows, and to manage the supply and demand by way of balancing the system. With the growth of embedded generation and other forms of Renewable Energy Sources (RES) being connected to the distribution network this level of control is becoming required at the distribution level. This has led to putting more intelligence at the plant level which has allowed greater autonomy and more local decisions to be taken. Area based approaches have been considered, whereby the network is divided into smaller regions, allowing decision making and control to be closer to the plant, whilst retaining the benefits of a wider system view. With the growth in renewable energy sources being introduced at Medium Voltage (MV) this approach also enhances the ability to enable hosting of these diverse power sources.

The developments of electrical distribution network control systems in Europe and the United States of America have been focused on being more efficient with the assets they have, and more recently to enable the hosting capability for renewable energy sources. Focusing on achieving a greater degree of local control and autonomy has led to the concept of the Microgrid. The Microgrid, which can be described as a set of interconnected loads and energy resources at the distribution voltage level, can operate in both island mode (off-grid) and grid connected mode. The author's company has provided the electric plant, control system and support infrastructure for managing an electrical grid on a relatively small island (similar to an off-grid network) in the Caribbean. This project provided immediate benefits to the system operator by enabling monitoring and controlling the electrical distribution network, but had also laid down the foundations to allow greater planning, more effective connection of distributed generation and renewable energy resources, as well as enabling the ability to manage customer resources.

## Control system for an island in the Caribbean

The project in the Caribbean was to design and implement a control system to manage the distribution of power and to improve the quality of service on the existing 11 kV network supplying small industry, hotels and residences. The overall size of the island is shown in *Figure 1*, being approximately 29 km long by 8 km wide. The island had a peak demand of approximately 40 MW which was on a small grid supplied from a single power station, comprising 10 diesel generators and 12 feeders. The power was distributed throughout the island via more than 60 secondary substations, both of ground mount and overhead design. The generators were managed by their own control system but there was no means of monitoring and reporting the performance to the end user. Equally, there was no remote control of the electrical plant on the 11 kV distribution network.



*Figure 1: Overview of island.*

The project involved installing a Supervisory Control and Data Acquisition (SCADA) system at a centralised control centre to manage the outgoing feeders from the primary substation, and to monitor and control selected switchgear on the secondary distribution feeders. The overall schematic of the control system is shown in *Figure 2*.



- GPRS – General Packet Radio Service
- LV – Low Voltage
- MV – Medium Voltage
- PCC – Point of Common Coupling
- RES – Renewable Energy Source
- RMU – Ring Main Unit
- RTU – Remote Terminal Unit
- SCADA – Supervisory Control and Data Acquisition
- UPS – Uninterruptible Power Supply

Abbreviations/Acronyms

The communications between the control centre and the secondary switchgear was a General Packet Radio Service (GPRS) on a redundant 3G cellular system which providing sufficient bandwidth and resilience for controlling the Ring Main Units (RMUs) and overhead switches on the distribution network. The control and monitoring at the RMUs and overhead switches was achieved by installing Remote terminal units (RTUs) at key strategic points on the network. These RTUs were either applied as an automation retrofit kit (motor actuators to drive the switches controlled by RTUs) to existing [oil insulated] RMUs or in some cases new SF6 switchgear was installed, where the existing switchgear was not suitable for an automation upgrade.

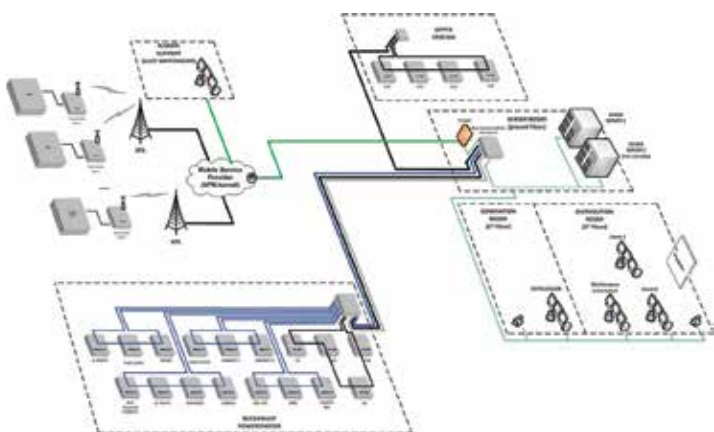


Figure 2: Overall schematic.

An important contributing factor to the success of this project was working with the utility customer, whose overall requirement was to develop a reliable electrical distribution infrastructure to improve the quality of service to end users on the island. The SCADA displays were customised to meet specific needs of the customer (system operator). The control room displays during the final stages of commissioning are shown in Figure 3.



Figure 3: Control room displays.

The benefits the customer sought were to see a reduction in the number of unplanned outages, having shorter outages, and being able to respond rapidly to the loss of supply. The additional benefits the solution provided were improved operational efficiencies and enhanced asset management information. This also laid down a foundation to support growth in RES on the island.

Off-grid development in Africa

The Caribbean island project is effectively a ‘large’ isolated Microgrid. In moving to an off-grid application the RMUs will provide the interface to the national utility when in non-islanded mode, but there will also be a transformation to Low Voltage (LV) for the distribution of power within the Microgrid. The communications system provided on the Caribbean project is suitable for off-grid projects in Africa as mobile phones and the supporting cellular communications infrastructure are in common use. The communications access and use of information is still relevant, and will be used to help enable the hosting capacity of the Microgrid.

As the electrification rate in Africa is relatively low for the majority of the countries, the energy availability is a key requirement for economic development. The work developed in reference [1] supports that the implementation a Microgrid will improve accessibility to electricity, and proposes a typical Microgrid architecture supporting improved reliability, accessibility and making use of location specificity.

The control and automation architecture deployed on the Caribbean island electrical distribution system can be scaled down to be more specifically applicable to meet the requirements of a Microgrid in an island mode (off-grid) and connected mode. The requirements for the management of an electrical distribution network on an island are not dissimilar from the requirements in developing an off-grid application in Africa. Figure 4 shows a potential scaled down structure of the Caribbean project, the main difference being that the majority of the distribution is low voltage, and the control system (if required) is in the form of a laptop computer inherently has a type of short duration Uninterruptable Power Supply (UPS).

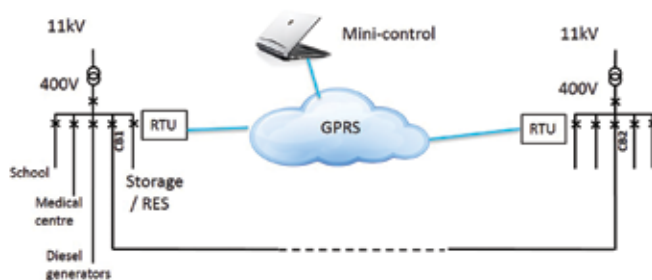


Figure 4: Microgrid structure.

The voltage level of a Microgrid is normally determined by generating capacity and load level of the network. Technically, it may be that the

voltage level of Microgrid is equal to the voltage of the distribution system it connects to, but it will be required to interface to the utility network via a distribution transformer. This will be the Point of Common Coupling (PCC) to the utility network should the Microgrid operate in non-islanded mode. This is a common solution in many countries and the author's company has been involved in this type of connection [3].

When the energy supplied from the embedded generation within the Microgrid is sufficient to support the load then the utility network connection is not essential and the local community may find it economically beneficial in doing this. Equally, for the utility in times of peak load, if the local generation can supplement the supply from the utility, then there is no need to cater for the maximum upstream capacity. This is an advantage to the utility because it removes the need for reinforcement.

*Availability of electrical power is essential for the economic development of rural areas in Africa.*

**Community engagement**

A key factor with developing a Microgrid in Africa would be community engagement as explained in reference [2]. This research highlighted that some of the challenge with the take-up of off-grid projects were because they can be of poor design, have a lack of local involvement, and suffer from a difficulty in transferring maintenance skills to the local community in order to make the solution sustainable.

The research concluded that local participation in technological choice and structural arrangements were essential to making the off-grid project a success. Community engagement will support the reason for developing a Microgrid and can provide the business case. For example, there are requirements to provide electrical lighting for schools in the evenings, and to provide power for refrigeration at the medical centers for storing vaccines. The control of the Microgrid can be used to enable greater hosting of embedded generation, which means this will encourage local entrepreneurs to make use of local assets and energy sources to produce electricity to support this grid.

**Hosting generation**

The ability to enable the Microgrid to host generation is important in this concept because this helps the wider community to exploit income generating opportunities through providing access to embedded generation and renewable energy sources.

The control elements of the Microgrid can not only be used for managing the voltage on the grid, but also for managing the amount of generation. It will be important to keep the Microgrid operational within its voltage and thermal limits through increasing and curtailing generation. In some cases it may be required that some generation is constrained, and in others instructed to increase. This will provide opportunities for local supply of RES and diesel generation.

**Integration into local utility network**

Whilst it is important that the local community have a sense of ownership, it is more than likely that the Microgrid will be owned by the local utility company. The electrical point of connection will be via the distribution transformer at the 400V interface. Having a basic measurement and control infrastructure will enable integration into the utilities control system, as shown in Figure 5. The communication with the utility control system will use standard open protocols such as DNP 3.0 or IEC 60870-5-101 [4] / IEC 60870-5-104 [5].

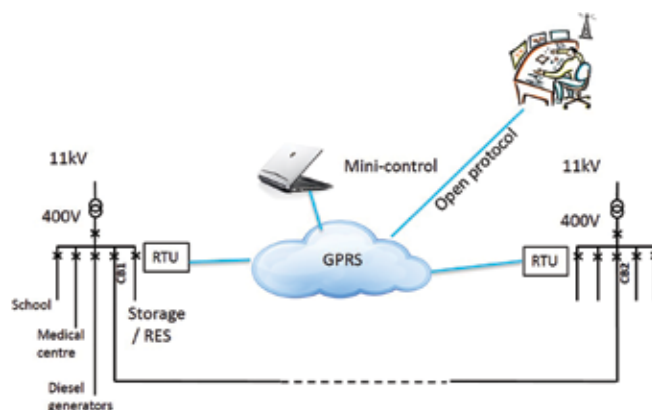


Figure 5: Microgrid interface to utility.

This is consistent with modern control system architectures and enables the ability to integrate the Microgrid control functionality and architecture into the utility SCADA system. This functional structure will support the local utility through being an integral part of its network when in connected mode, and by being self-sufficient when in island mode. This will allow the utility to maximise grid utilisation without reinforcement. The local control for the Microgrid provides the management interface to the utility SCADA. This structure can be replicated as a local building block in a geographical area, or as a consistent approach for the utility network across different regions. Each one of the Microgrids can form part of a wider network, as illustrated in Figure 6.

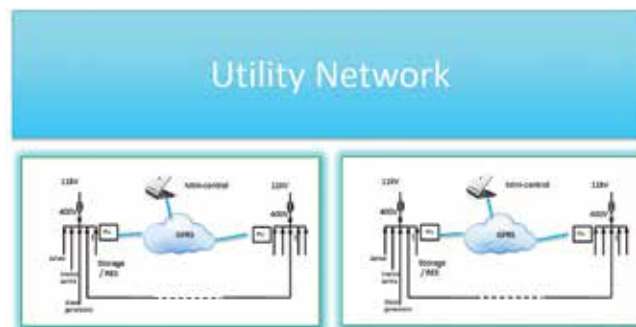


Figure 6: Expansion of Microgrid infrastructure.

However, in making the Microgrid suitable for connecting to the utility national grid, the Network Codes (for that particular country) must be considered. In addition, this system is now exposing the utility SCADA



to a wider environment and so it will be important that cyber security is implemented. Although not covered in this paper, the particulars of IEC 62351 [6] will need to be considered.

## Conclusion

Availability of electrical power is essential for the economic development of rural areas in Africa. The development of a Microgrid will increase accessibility to electricity and support growth in rural areas. Microgrids contain generation and load. The ability to disconnect from and parallel with the utility system is a function of running the Microgrid. Through adopting open standards there is the ability to upscale the Microgrid and develop clusters of such areas supporting the utility in planning and management of its distribution network. An enabler to achieving this will be with the adoption of international standards as these will support integration of the Microgrid into the larger Utility network.

## References

- [1] Evaluating the use of MicroGrid as a Power Solution for Africa's Rural Areas, 978-1-4673-2729-9/12.
- [2] A Community Based Approach for Sustainable Off-Grid PV Systems in Developing Countries, 2011 IEEE power and energy society general meeting.
- [3] Lucy Electric case study. Renewable Solutions Delivering on a short lead time. <http://www.lucyelectric.com/en/solutions/our-work/case-study-green-switch-solutions-ltd>
- [4] IEC 60870-5-101: 1990. Based on the EPA architecture (Enhanced Performance Architecture) and defines only the physical link and application layers of the OSI model.
- [5] IEC 60870-5-104. 2000. Network access for IEC 60870-5-101 using standard transport profiles. Enables communication between control station and substation via a standard TCP/IP network. The TCP protocol is used for connection-oriented secure data transmission.
- [6] DD IEC/TS 62351-1:2007. Power systems management and associated information exchange – Data and communications security – Part 1: Communication network and system security – Introduction to security issues.

- This project in the Caribbean involved installing a SCADA system at a centralised control centre.
- It provided immediate benefits to the system operator by enabling monitoring and controlling of the electrical distribution network.
- It laid the foundations for allowing planning and more effective connection of distributed generation and renewable energy resources.



Tim Spearing is responsible for the product management of the automation business in Lucy Electric. These range from secondary RTUs to complete SCADA and automation solutions. Tim is a Chartered Engineer, a Member of the IET, and a key supporter and contributor to IET Developments in Power System Protection (DPSP), the IET Midlands Power Group in the UK, the UK Smart Grid Forum, and EU Smart Grid Task Force.



Rick St. John is the Regional Director at Lucy Electric South Africa. He has over 40 years' experience in the industry having held many senior positions. He is currently on the management committees for several organisations including AMEU. Enquiries: Email [tim.spearing@lucyswitchgear.com](mailto:tim.spearing@lucyswitchgear.com)

## Cables, Wires & Accessories

HELUKABEL is a leading international manufacturer and supplier of wires & cables, custom cables, cable accessories, data, network & bus technology and media technology, as well as pre-assembled cable protection systems for robotics and handling systems.



Helukabel SA offer a massive range of cables and wires to suite your purpose. The range consists of - instrumentation, control, data & computer cables, drag chain, servo, motor and feedback cables. Heat resistant, rubber, trailing, robotic, chemical resistant, welding, thermocouple / compensating. Coaxial, panel, telephone, power, electronic, plus much, much more.



A broad range of Cable Accessories, form part of the extensive range offered by Helukabel. This includes Protective Tubing, Sleeving, Compression Glands, Reducers, Enlargers, Braids, Tube Holders, Drag Chains, Connectors and much more.



If your exact requirements are not available from our massive standard range, contact us and we will design and manufacture your Cable, Wire, Spiral cable or Harness to your exact requirements.



## Enquire about our exciting New Products



### Contact Details

TEL: +27 (0)11 462 8752  
FAX: +27 (0) 11 462 8638

[sales@helukabel.co.za](mailto:sales@helukabel.co.za)  
[www.helukabel.co.za](http://www.helukabel.co.za)

## YOUR INDUSTRIAL WIRELESS NETWORK SOLUTIONS



### WIRELESS MUX

The wireless MUX is supplied ready to use: unpack - connect-switch on- and you have a working wireless path.

### WIRELESS WLAN

Industrial WLAN access points offers maximum reliability, data throughput, and range. Faster and easier configuration and maintenance.



### WIRELESS ETHERNET

Mobile phone routers support high performance remote connection to industrial Ethernet networks, which can be used to transmit sensitive data securely over mobile phone networks.



### TRUSTED WIRELESS

Easy start up with I/O mapping, from a simple point to point connection to complex mesh networks. Transmits I/O signals as well as serial data.

#### For more information contact us on:

JHB: 011 801 8200  
 CT: 021 930 9666  
 DBN: 031 701 2701  
 PE: 041 364 0451  
[www.phoenixcontact.co.za](http://www.phoenixcontact.co.za)

### New version of UPS-CONF UPS software

The free UPS-CONF software enables the Qunit UPS-IQ and Trio UPS UPS systems to be monitored and configured conveniently and clearly. The new version 2.2.7.0 features improvements and enhancements. New warning messages signal, for example, whether the UPS remote control is activated or whether a communication error has occurred between the UPS and the batteries. The new COM trigger mode can be useful if several



PCs need to be shut down in a controlled manner in the event of a mains failure; here the signal contacts of the UPS initiate a shutdown of the PC via the COM port, which means that no permanent data cable connections are required, regardless of the Windows version being used. Dc UPS devices with 5,

10, 20, and 40 A from revision 06 can now switch off loads in a staggered sequence. When the UPS buffers a mains failure, two separate timers start, whereby previously defined consumers cease to be supplied by the battery after a set time. The software automatically detects the connected power storage, for example a lead battery with 12 Ah. All relevant operating parameters are displayed graphically and important messages appear in the foreground. The behaviour of the UPS modules can be changed via the software to suit individual requirements.

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

### Ethernet media converters

The new class 1000 Ethernet media converters from **Phoenix Contact** are designed for industrial applications with basic requirements. They offer a simple and cost-effective entry into optical transmission technology. Data transmission via fibre optics optimises Ethernet applications in terms of performance and transmission reliability. In addition to a higher range, the benefits of electrical isolation are also reaped. The compact units in robust metal housings

bridge distances of up to 9,6 kilometres. Multi-mode glass-fibres are used, optionally with SC duplex or B-FOC (ST) plugs. Start-up is simplified by auto negotiation and auto crossing. In addition, data rates of 10 and 100 Mbps can be firmly set. Besides numerous diagnostics LEDs, the media converters are equipped with



LFP function (Link Fault Pass-through). This ensures permanent and continuous monitoring of the connection. In the event of a connection loss, redundancy mechanisms can take over operation immediately.

*Enquiries: Patrick Rowland [patrickr@phoenixcontact.co.za](mailto:patrickr@phoenixcontact.co.za)*



## Extended machine lifespan and increased reliability

Simatic Migration Services enable companies to migrate to the latest Simatic technologies. This makes their legacy automation systems future-proof, increases plant availability and extends machine lifespan. The services are designed for manufacturing customers in all discrete automation industries. With Simatic migrations services, customers can retain **Siemens'** experts to perform the entire migration. The quick and simple changeover can be achieved through standardised migration offerings, which range from consulting and conception, through the implementation,



testing and commissioning to the handover of the new system, including technical training for the personnel. Precise planning minimises both the risks of migration and the scheduled downtime for the implementation. The services can be tailored flexibly to match a company's requirements. Both partial and complete migration of systems and machines are possible. Within the scope of the service, Siemens experts support users, in particular with the migration of ap-

plication software from Step 7, Protocol or WinCC Flexible projects to TIA Portal projects. If required, frequency converters and Motion Control systems can also be modernised. Companies that take advantage of Simatic migration Services benefit from a smooth migration, long-term spare part availability, integrated diagnostic functions that speed up fault correction, and reduced downtimes. Modern Simatic technology and network infrastructures also enable efficient interoperability of all components and greatest transparency across all levels: relevant information is available anywhere in the plant at any time. This increases the availability of machines and systems, as well as making them future-proof.

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

## Collaboration on solution for oil refineries

**Yokogawa Solution Service Corporation** and **Cisco Systems GK** have collaborated in providing a new solution for oil refineries that makes use of their respective information and industrial automation technologies. This platform integrates production, quality, progress control, and other information technologies with the control systems that are used to monitor and control production processes in real time, ensuring that facilities can be efficiently rebuilt and modified. It also improves the efficiency of corporate management by making it easier for information to be accessed by information management systems. As a result of a review of Japanese national energy policy, a new law known as the Sophisticated Methods of Energy Supply Structures Act was passed that requires the oil industry to make more efficient utilisation of fossil fuels. To accomplish this, oil refining companies are now consolidating their refinery operations, as part of which they must also reestablish and reconfigure their control and information systems. This requires an environment where control, MES, and ERP systems can be quickly built or reconfigured, and where various types of complex data can be accessed in an integrated and flexible manner at each system level.

### Features of the new solution

The solution improves efficiency by structuring and standardising a plant's control and information systems as well as the data handled by these respective systems. This improves the portability of data, establishes a framework that facilitates the integration, construction, and modification of all of a plant's control and information systems, and creates an environment with industry-leading security for all communications and information management. This is true not only for a plant's own control and information systems, but also for links between plants. In addition to facilitating the consolidation of a company's refinery operations, this solution is useful in the installation and expansion of plant facilities, and can deliver the same benefits. This collaboration of Cisco and Yokogawa Solution Service will not be limited to the oil-refining sector.

*Enquiries: Tel. +27 (0)11 831 6300 or email [Christie.cronje@za.yokogawa.com](mailto:Christie.cronje@za.yokogawa.com)*

## AUXILIARY RELAYS FOR EVERY APPLICATION



WoodBeam's range of industrial auxiliary relays are suitable for general purpose uses up to critical substation protection and control applications for demanding applications like power generation, petro-chemical plants, ports and water utilities.

The range includes:

- Instantaneous relays
- Bi-stable latching relays
- Timers
- Flag annunciators
- High speed master trip relays
- AC immune intertripping



rms

NIEAF SMITT

# 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](mailto:info@woodbeam.co.za)

## Co-sponsoring PneuDrive Challenge

Finding strategic partners who are committed to sustainable and meaningful corporate social responsibility, should be an important part of any international company's long-term plan when committing its resources in the South African economy. What does your favourite corporate do in this regard? **SMC Pneumatics (South Africa)** recently stepped forward as co-sponsors of the 2016 PneuDrive Challenge. This is an engineering design competition that has been providing South African mechanical, electronic and mechatronic engineering students with a bridging experience into business reality since 2008.

Adrian Buddingh, General Manager of SMC Pneumatics, strongly believes that the competition is an important platform for strengthening the quality of South African engineering qualifications. Buddingh points out how system integration is not often fully realised at a university level. "This competition offers the student an opportunity to get exposed to, and consider, other engineering disciplines apart from those covered in their separate faculties. Showing how



unusual pneumatic and drive components can be pulled together in a competition type experience is, in reality, a first taster of what they will experience when they get into industry".

### **Effective learning needs to go beyond speeches and academic theory**

It is important for local business to seek out opportunities that bring together academic theory, core business products and real-life business learning opportunities for young people. In the engineering industry, key employees of the future will need to be problem solvers, planners, designers and application constructors. Learning skills that subject matter experts at SMC Pneumatics are willing to encourage when they get opportunities to interact with students.

Buddingh expresses enthusiasm at being able to support a learning platform that gives students an opportunity to capitalise on their ability to apply theory, and explore innovative ways of bringing pneumatic and drive technology together. "It is a serious challenge for companies who seek to honour corporate social responsibility, to be able to link interventions with their own core business operations. We are confident that we can achieve this through the PneuDrive Challenge".

Strategic planning for the 2016 competition has commenced; the industry themes and problem statements will be announced before year-end.

**Enquiries: Email [media@positiv.co.za](mailto:media@positiv.co.za)**

*Adrian Buddingh, General Manager SMC Pneumatics South Africa.*

# Weidmüller

## More Performance. Simplified

### Our u-remote can do it all

u-remote from Weidmüller is the reliable interface between field bus and field level in automation. The modular system is based on various components: a field bus coupler, up to 64 I/O modules, optional power-feed modules and a wealth of accessories, such as markers and terminating elements. A clear status and diagnosis display on the connection also ensures rapid and precise checks for individual sensors and actuators.

- ▶ Speed things up with modularity
- ▶ Improve system availability
- ▶ Local and remote testing
- ▶ Intelligently separated
- ▶ A single power supply is enough
- ▶ Extremely fast with huge power reserves
- ▶ Simply plug and go

### One glance and you can see everything going on



Clear assignment of status and diagnosis has never been this simple. With one LED on the channel and status displays on each module, you can easily see all you need on u-remote. The technician can see and rectify errors without delay. Indispensable benefits for a safe start-up and rapid system maintenance.

**You automate high-performance machines and production lines - u-remote generates maximum efficiency in your projects**

**Let's connect.**



## PROFIBUS – the future of automation

Based on serial bus technology, **PROFIBUS** revolutionised automation in the 1980s, creating a foundation for the distributed environments common today. PROFIBUS is currently the world's most widely used industrial communications system, supported by more than 1400 equipment vendors around the world, and has 50 million nodes installed worldwide according to Karsten Schneider, Chairman of PI International.

PROFIBUS and **PROFINET International (PI)** comprise the largest automation community in the world, boasting 27 Regional PI Associations – PI South Africa being one of them. The organisation has 56 competence centres, including one in South Africa, 27 training centres, and 10 test labs. Speaking at a breakfast held recently at The Pivot Conference Centre, Monte Casino in Johannesburg, Schneider said that although there are still more PROFIBUS than PROFINET installed systems, PROFINET is the future. PROFINET is not only faster, it can also simply do more than PROFIBUS and it is easy to change from a PROFIBUS to a PROFINET system, he said. PROFINET has 10 million nodes installed worldwide. Although at present there are some areas where it is not practical to change to PROFINET – PROFIBUS is the future; as compared to PROFIBUS, it performs better and has better diagnostics.

PROFINET merges the industrial experience of PROFIBUS with the openness and flexibility of Ethernet. The vast field experience gained from PROFIBUS is embedded deeply in the PROFINET solutions available today, and provides a single standardised approach.

In addition, a fieldbus-enabled plant delivers more and better data to supervisory systems, supporting improved management strategies across the enterprise. PROFINET is essentially a further development of the PROFIBUS DP. However, it offers a number of advantages, including high-speed operation as a result of high-speed process data exchange, simple network structure, and more cost-effective technology. Some exciting news, which was met with interest by those attending the breakfast, is that a new PROFIBUS Certified System Design Course will be available in South Africa through the PROFIBUS Competence Centre next year. More details on the dates of the course are still to be announced.

**Enquiries: Contact details: Dave Bean. Email [daveb@idxonline.com](mailto:daveb@idxonline.com)**

*Dave Bean  
(PROFIBUS  
Competence  
Centre, South  
Africa); Karsten  
Schneider  
(Chairman, PI  
International).*



## Heavy-duty line fibre optics

**RET Automation Controls** introduces new heavy-duty Vantage Line fibre optics to complement its industry-leading fibre amplifier product family. Featuring a flexible 304 stainless steel tube, the polyethylene jacketed plastic fibre is protected from crushing or abrasion in harsh industrial environments. To accommodate diverse applications, the heavy-duty Vantage line plastic fibres are available in eight different models, four with opposed sensing mode and four with diffuse sensing mode, in one and two meter options. All heavy-duty fibres are compatible with Banner's existing plastic fibre amplifiers, including the DF-G family. "Our new heavy-duty vantage line of plastic fibres offer enhanced durability and stable performance at a cost effective price," said Dennis Smith, Senior Technical Marketing Manager, Banner Engineering. "With these heavy-duty models, our customers can use plastic fibres in rugged environments where they previously used more expensive glass fibres."

**Enquiries: Brandon Topham.**  
**Email [brandon.topham@retautomation.com](mailto:brandon.topham@retautomation.com)**



## SIEMENS

### SINAMICS V20

#### Cost Effective Drive Solution

Basic Performance inverter that sets itself apart through

- Quick commissioning times
- Ease of operation
- Robustness
- Cost-efficiency.



With five frame sizes, it covers a power range extending from 0.12 kW up to 30 kW



## H B Systems

Factory Automation & Electrical  
Somerset West, Western Cape



Tel 021 852 1189  
Cell 082 920 4979  
Cell 082 727 9816

Solution  
Partner

SIEMENS

Automation  
Drives

[info@hbsystems-electrical.com](mailto:info@hbsystems-electrical.com)  
[www.hbsystems-electrical.com](http://www.hbsystems-electrical.com)



Modular F<sup>3</sup> Factory production container. Image courtesy INVITE GmbH.

# 'Smart scale' applies to process instruments

By J Pichura, WIKA

*The trend towards miniaturisation must be followed by manufacturers of process instrumentation - with instruments in the smallest format possible, without any sacrifice in their performance spectrum.*

**P**roduction plants in the chemical industry are shrinking. Companies are increasingly relying on smart scale units: modular in construction and extremely flexible, and therefore cost and resource efficient.

The future lies in a container, a standard 20-foot shipping container. More space than this is not required for chemical production. That has been emphatically proven by the INVITE research centre – a cooperation between TU Dortmund University and Bayer Technology Services – within the scope of their 'F<sup>3</sup> Factory' project. Fitted within the floorplan and height of such a container, INVITE developed a production plant for a two-stage synthesis process. This plant consists

of a number of equally sized modules with different components, which can be interchanged and combined as required.

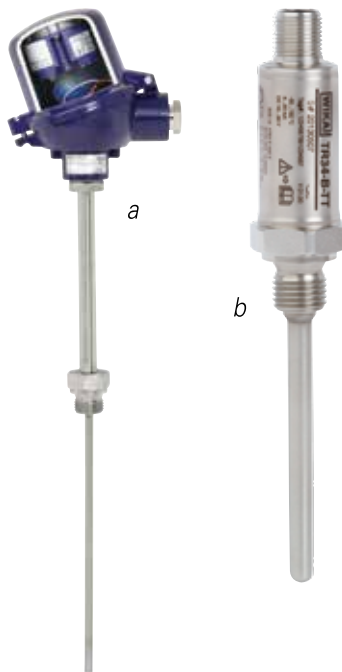
The F<sup>3</sup> production container epitomises an ideal 'smart scale' plant: All modules can be combined, with comparatively low installation expenses, to make new production lines. Customer-specific batches can thus be manufactured efficiently, and not even fixed to one location due to the size of the plant. By combining two or more production units, the capacity can be increased correspondingly.

Flexibility is the major advantage of such highly automated modular systems over 'world scale' plants, which operate continuously and whose competitiveness is achieved through a steady increase in the



size of the plant (scaling effect). In some chemical companies, already more than 80% of their plants carry the label 'smart scale'. In them, customer-specific, highly complex innovation products with high added value are manufactured, which ensures the competitiveness of a business.

A basic requirement for the success of smart scale is the appropriate process instrumentation. With reduction in size and the modularisation of a plant, then the size of the process instruments must also shrink. Ultimately, the available space for mounting a temperature measuring point, for example, is much more restricted than in a 'mega plant', in which traditional thermocouple designs with connection heads or field cases are generally used. The smart-scale experts in TU Dortmund University see the development potential not only in terms of miniaturisation and robustness of sensors and actuators, but rather also in the explosion protection within the fast, fully automated production processes.



Figures 1a and b: Size comparison of a traditional resistance thermometer with DIN form B connection head and a built-in transmitter versus a miniature resistance thermometer with an integrated transmitter within its case.

Against this background, the design of the new range of miniature electrical resistance thermometers from WIKA should be considered. Each of these instruments has a case with a diameter of only 19 mm, in which, depending on the version, a transmitter with a 4 ... 20 mA output signal is integrated. The newly developed digital electronics of this transmitter fulfil the 2014/30/EU EMC directive, which is applicable from 20 April 2016, and the increased EMC requirements in accordance with NAMUR NE 21.

The miniature resistance thermometers, which are screwed directly into the process, protrude a maximum of 68 mm, depending on the height of the selected connection. An additional neck tube is only required for a medium temperature of more

Pressure, Temperature, Level & Flow Measurement



Part of your business

As a family-run business acting globally, with over 7,900 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement.

The company also sets the standard in the measurement of level and flow, and in calibration technology.

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

Talk to us.



than 150°C, though even this variant is suitable for the limited space available in a smart scale plant.

The thermometers have been designed for harsh environments. They feature a high vibration resistance of up to 20 g. All electrical components are protected against humidity (IP67 and IP69K ingress protection). Through an improved design of the electrical connection, the plastic connector insert is enclosed within a metallic sealing face. With an electrical connection through an IP69Kcertified M12 connection cable, this surface seals securely with the seal found in the mating connector. With this, the penetration of moisture to the plug contacts via the connection cable is reliably prevented. This instrument design defies the most adverse conditions in operation of the plant, as well as during its cleaning.



Figure 2: Standard M12 connector with exposed plastic connector insert versus M12 connector with integrated plastic connector insert and metallic sealing face.

The benefit of modularity with the manufacture of customer-specific batches or quickly changing products can only be fully realised with smart scale plants if, in addition to all other instruments, the measurement technology built in is suitable for the required flexibility in operation. This also includes explosion protection, especially for applications in the chemical industry. In smart scale plants too, for example, various substances with, to some extent, highly explosive properties are pushed and transported through pumps. Depending on the plant, compressors are used for the compression of gases in order to increase the energy balance for a subsequent reaction. Due to the compact nature of the plants and the chemical explosiveness of the substances used, temperature measuring points on ancillary equipment such as pumps and compressors must feature explosion protection, even if they are only measuring the seemingly harmless temperature of a cooling circuit. A spark with sufficient temperature and energy density could lead to ignition of any gas leaking into the environment or increased dust concentration. WIKA therefore offers its miniature resistance thermometers in an intrinsically safe version. The measuring instruments have a 'very high' protection level (EPL Ga and Da) in accordance with IEC 60079-0 and can thus be used in zone 0 (for gases) and zone 20 (for dusts): In hazardous areas there is no ignition risk in normal operation, foreseeable or rare failures or malfunctions. With applications that require EPL Gb or Db, instruments designated as 'ia' can naturally also be used in type 'ib' measuring circuits, with the same connection parameters.

- Production plants in the chemical industry are shrinking.
- More space than a standard 20-foot shipping container is not required for chemical production.
- The F<sup>3</sup> production container described epitomises an ideal smart scale plant.



Figure 3: Application example in the chemical industry. (Image courtesy @werbefoto-burger.ch).

The WIKA miniature thermometers together form a complete product portfolio. The TR21 model series is designed for sanitary applications, while for traditional machine-building applications there are the models TR31 and TR34, which are screwed directly into the process. Both series have the same unique feature: the combination of a transmitter integrated into a miniaturised case and ATEX/IECEX certification for ignition protection type Ex i.

Production plants in the chemical industry are becoming modular, flexible, cost and resource efficient smart scale units.

## Conclusion

In electrical temperature measurement, the new generation of thermometers is the result of a consistent pursuit of the smart scale approach. The development spectrum with process instrumentation is far from exhausted. Various prototypes of modularised production plant from research institutions and chemical industry businesses are indicating a trend to even-more compact models; for example, plants which enable a seamless transition from the process development to production, or continuous production rather than batches. 'Mini' remains a challenge for the future.



Jochen Pichura is a Product Manager in the Electrical Temperature Measurement division of WIKA in Germany. Enquiries: Email sales@wika.co.za

## First cooling unit on the market with corrosion-resistant GRP housing

An innovative active cooling solution for small outdoor electronics and instrumentation equipment cabinets sited in hot climates has been launched by **Intertec**. The company believes that its new MULTICOOL 1100 cooler is the first to feature a GRP (glass reinforced polyester) housing that is inherently resistant to corrosion – most comparable products are contained in metal enclosures that are susceptible to this problem. Offering 1 100 watts of cooling power – enough to cool many types of high power field equipment – the MULTICOOL 1100 is a completely self-contained module that mounts directly on the outside wall of the equipment cabinet. It is especially suitable for cooling outdoor cabinets that are sited in hot and humid environments, and wherever atmospheric contaminants such as salt, sulphur or carbon dioxide exacerbate metal corrosion. Typical applications include temperature regulation of field-based sample conditioning and process analyzer instrumentation, and cooling the type of small distributed electronic control and monitoring systems used in many civil engineering projects. A key feature of the MULTICOOL 1100 cooling unit is that there is no direct air path between the ambient environment and the inside of the equipment cabinet. The closed loop refrigeration system has two completely separate and thermally isolated compartments, one for its evaporator, the other for the condenser and compressor stages. The evaporator is

the only part of the system that is connected to the inside of the cabinet, via air ducts that are hermetically sealed to the cabinet walls, and employs fan-assisted air recirculation to maximise cooling performance. Heat is extracted from the cabinet by air flow over the evaporator and transported to the condenser via refrigerant gas. The condenser is cooled by its own separate fan, with

the hot air and waste heat from the compressor being exhausted direct to atmosphere.

**Enquiries: Email [sales@intertec-inst.co.uk](mailto:sales@intertec-inst.co.uk)**



## Contactless temperature measurement

Demonstrating innovative market competence in the area of optical sensor technology, **ASSTech's** new high performance Wenglor OptoTemp allows contactless temperature measurement within a range of -25 to 350 °C based on infrared radiation emitted by the object, regardless of the material it is made of and state of aggregation.

The sensor measures temperature with a spectral sensitivity of 8 to 14 µm. The measured value appears at the integrated, intuitively-operable display and is read out via the outputs of the RS 232 port. Due to its two switching outputs and an analog output, the sensor is suited for various measuring applications, for example target versus actual value comparison and absolute measurement. The integrated laser alignment tool and teachable emission factor make initial start-up quick and easy.

This is a genuine all-rounder with applications from conventional target versus actual value monitoring of liquids and raw masses, as well as process control for the prevention of temperature violations at non-metallic surfaces, right up to the monitoring of engines and system components in the automotive industry. Downtime is avoided, scrap can be reduced in production and uniform product quality can be assured throughout the entire value creation chain.

**Enquiries: Anastas Schnippenkotter. Email [info@asstech.co.za](mailto:info@asstech.co.za)**



## Worldwide launch of Endurance IR thermometer

**Fluke Process Instruments** (formerly Raytek, Ircon and Datapaq) has introduced the Endurance Series of high-temperature ratio pyrometers. These rugged and flexible instruments enable continuous visual process monitoring and are designed to meet the demands of harsh industrial environments, including primary and secondary metals manufacturing, carbon processing and silicon production. The Endurance Series pyrometers provide a robust solution for manufacturers seeking to improve product quality and

uniformity, reduce reject rates, maximize throughput, and minimize energy costs. They offer superior optical resolution (up to 150:1) for viewing critical process operations, as well as innovative tools to help make better sense of production data. Multiple lens, sighting and focus



options are available for different mounting distance and sighting needs. For example, on-board camera video sighting via Ethernet ensures the sensor is always sighted properly for remote and control room viewing. On-board laser sighting can be used to verify process alignment for local viewing when the sensor is located in a hard-to-reach area. On-board light-emitting diode (LED) sighting makes it easy to view the actual spot size projected on the target. The Endurance Series pyrometers are also exceptionally versatile and easy to install. Their broad temperature range covers an entire process with fewer units. The sensors operate with either Power over Ethernet (PoE) or dc power, and interface to various bus systems (Ethernet, Profinet and RS-485).

**Enquiries: Tel. 086 111 4217 or email [info@randci.co.za](mailto:info@randci.co.za)**

# Retrofitting a sewage plant with lightning and surge protection

Lightning Protection Guide: DEHN

The necessary high efficiency of sewage plants requires that the operating procedure be optimised and operating costs reduced at the same time.

The growing scarcity of drinking water resources is making the more efficient use of drinking water increasingly critical. Therefore, sewage plants are a key element of the drinking water cycle. High investments have been made in electronic measuring equipment and distributed electronic control and automation systems over the last years. However, these new electronic systems only provide a low resistance to transients compared to conventional technology. The structural conditions of the widespread outdoor wastewater treatment systems, with measuring equipment and control units extending over large areas, additionally increase the risk of interference caused by lightning discharges or surges. Thus, it is most likely that the complete process control system, or parts thereof, will fail if no protection measures are taken.

The consequences of such a failure can be serious, ranging from costs for re-establishing the availability of the sewage plant to the unknown costs for eliminating ground water contamination. Consequently, external and internal lightning protection measures must be taken to efficiently eliminate this threat and to increase the availability of the systems.

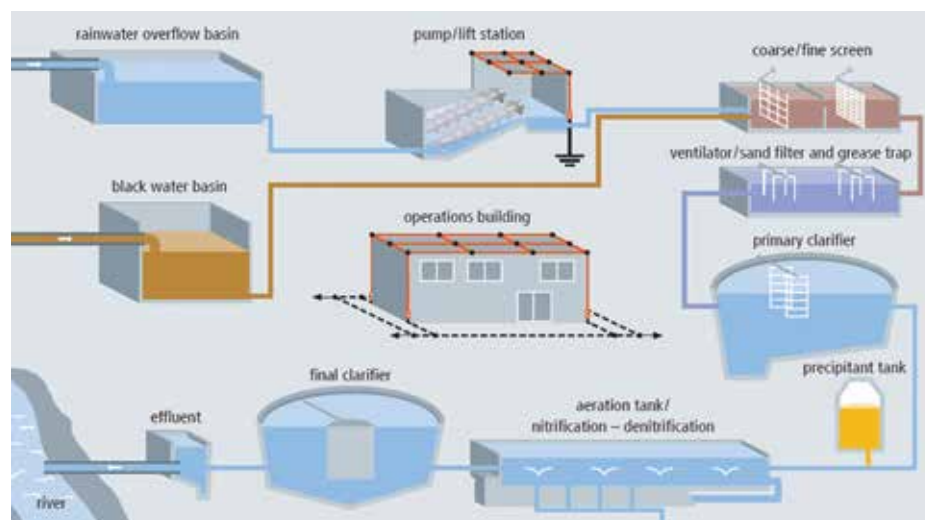
The example described in the following scenario was calculated based on the IEC 62305-2 (EN 62305-2) [1] standard. It should be noted that the procedure described is an example. In the following, only the essential characteristics of the example will be shown.

## Step one: Assessment of the risk for the operations building

Firstly, a questionnaire with important questions on the structure and its use was discussed and filled in together with the operator. This procedure allowed for the preparation of a lightning protection concept that was comprehensible for all parties involved. The concept included the minimum requirements which, however, can be technically improved at any time.

## Step two: Plant description

The complete process control system of the sewage plant was centrally located in the operations building. In case of a lightning strike, substantial partial lightning currents and surges were injected into the switch rooms via the extended cables leading to measuring stations and substations. In the past, this caused destruction and failure of the plant over and over again. The same applied to the power supply and telephone line. The operations building itself needed to be protected against damage resulting from fire (caused by a direct lightning strike) and the electrical and electronic systems (control and automation system, telecontrol system) from the effects of the Lightning Electromagnetic Pulse (LEMP).



## Step three: Lightning protection zone concept

To ensure maximum technical and economic protection, the operations building was subdivided into Lightning Protection Zones (LPZs). Subsequently, a risk analysis was carried out for each LPZ and the relevant

*The structural conditions of widespread outdoor wastewater treatment systems increase the risk of interference caused by lightning discharges or surges.*



LEMP – Lightning Electromagnetic Pulse  
 LPZ – Lightning Protection Zone  
 SPD – Surge Protection Device

Abbreviations/Acronyms

types of damage. Finally, the mutual dependences of the LPZs were examined and the required protection measures were defined to reach the necessary protection goal in all lightning protection zones. The following areas were subdivided into LPZ 1 and LPZ 2:

- Evaluation electronics in the control room (LPZ 2)
- Oxygen measurement device in the aeration tank (LPZ 1)
- Interior of the control room (LPZ 1)

According to the lightning protection zone concept described in IEC 62305-4 (EN 62305-4) [1], all lines at the boundaries of lightning protection zones must be protected by suitable surge protection measures.

**Step four: Lightning protection system**

The existing lightning protection system of the operations building was tested according to the requirements of class of LPS III. The indirect connection of the roof-mounted structures (air-conditioning systems) via isolating spark gaps was removed. Air-termination rods with the required separation distances and protective angles were used to protect the sewage plant from a direct lightning strike. Consequently, in case of a direct lightning strike to the control room, partial lightning currents can no longer flow into the structure and cause damage. Due to the dimensions of the control room (15 m x 12 m), the number of down conductors (four) did not have to be changed. The local earth-termination system of the operations building was tested at all test joints and the values were documented. Retrofitting was not required.

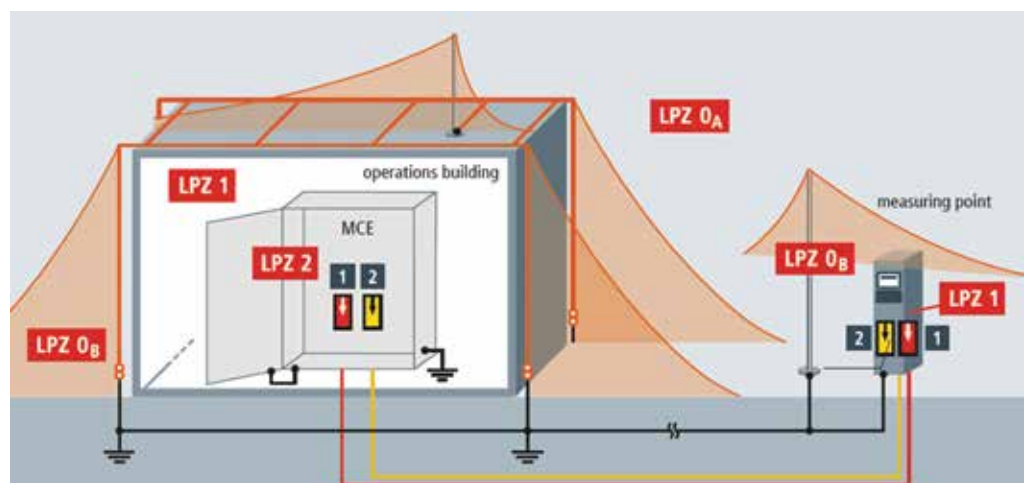
**Step five: Lightning equipotential bonding for all conductive systems entering the sewage plant**

In principle, all incoming conductive systems must be integrated in the lightning equipotential bonding. This was achieved by directly connecting all metal systems and indirectly connecting all live systems via surge protective devices. Type 1 SPDs (power sup-

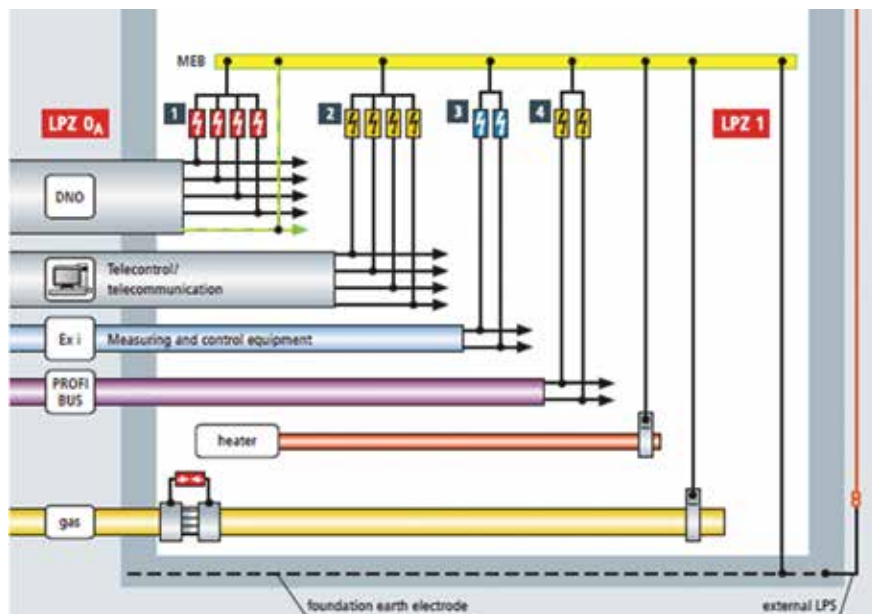
ply systems) and category D1 SPDs (information technology systems) must have a discharge capacity of 10/350 µs test waveform. Lightning equipotential bonding should be established as close as possible to the entrance point into the structure to prevent lightning currents from entering the building.

**Step six: Equipotential bonding**

Consistent equipotential bonding according to IEC 60364-4-41 [2], IEC 60364-5-54 [3] and IEC 62305-3 (EN 62305-3) [1] was established in the entire operations building. The existing equipotential bonding system was tested to avoid potential differences between different extraneous conductive parts. Supporting and structural parts of the building, pipes, containers, and so on were integrated in the equipotential bonding systems so that voltage differences did not have to be expected, even in case of failure. If surge protective devices are used, the cross-section of the copper earthing conductor for equipotential bonding must be at least 16 mm<sup>2</sup> for SPDs for power supply systems and at least 6 mm<sup>2</sup> for SPDs for information technology systems. Moreover, in areas with potentially explosive atmospheres the connections of the equipotential bonding conductors must be secured against self-loosening by means of spring washers.



	Protection for...		Type	Part No.
1	Power supply system	TN system	DEHNguard DG M TN 275	952 200
			DEHNguard DG M TN 275 FM	952 205
		TT system	DEHNguard DG M TT 2P 275 or	952 110
			DEHNguard DG M TT 2P 275 FM	952 115
2	Oxygen measurement device	e.g. 4 to 20 mA	BLITZDUCTOR BXT ML4 BE S 24 + BXT BAS base part or	920 224 + 920 300
			BLITZDUCTOR BXT ML2 BE 24 + BXT BAS base part	920 324 + 920 300



from the DEHNconnect or BLITZDUCTOR series. These SPDs could be installed in conformity with the lightning protection zone concept (category C2) and were compatible with the system. This ensured a consistent surge protection concept for the information technology lines.

Additional applications for protecting sewage plants can be found in brochure DS 107 E which can be downloaded at [www.dehn-international.com](http://www.dehn-international.com).

**References**

[1] IEC 62305: Lightning Protection Guide. Part 1: General principles. Part 2: Risk management. Part 3: Physical damage to structures and life hazard.  
 [2] IEC 60364-4-1:2005-12. Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock.  
 [3] IEC 60364-5-54: 2011. Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors.

No. in Fig.	Protection for	Surge protective device	*floating remote signalling contact	Part No.
<b>Power supply systems</b>				
1	TN-C system	DEHNventil DV M TNC 255 DEHNventil DV M TNC 255 FM*		951 300 951 305
	TN-S/TT system	DEHNventil DV M TT 255 DEHNventil DV M TT 255 FM*		951 310 951 315
<b>Information technology systems</b>				
2	Telecontrol, telecommunication	BLITZDUCTOR BXT ML2 BD 180 or BLITZDUCTOR BXT ML4 BD 180 + BXT BAS base part		920 247 920 347 + 920 300
<b>Measuring and control equipment</b>				
3	Intrinsically safe measuring circuits + systems	BLITZDUCTOR BXT ML2 BD 5 EX 24 or BLITZDUCTOR BXT ML4 BD EX 24 + BXT BAS base part		920 280 920 381 + 920 301
<b>Bus systems</b>				
4	e.g. Profibus DP	BLITZDUCTOR BXT ML2 BD HFS 5 + BXT BAS base part		920 271 + 920 300

**Step seven: Surge protection for the low-voltage power supply system**

In the described application, the VGA 280/4 surge protective device installed at the entrance point into the building was replaced by a DEHNventil M TNS 255 FM type 1 combined arrester, as since the 'old' SPD no longer fulfilled the requirements for lightning protection systems according to IEC 62305-3 (EN 62305-3) [1]. The VM 280 type 2 SPDs were tested by means of a PM 10 arrester test unit. Since the test values were still within the tolerances, the SPDs did not have to be removed. If further SPDs are installed for protecting terminal equipment, they must be coordinated with each other and with the terminal equipment to be protected.

**Step eight: Surge protection for information technology systems**

The entrance point into the building served as a transfer point between all information technology lines and the sewage plant. At this point, lightning current carrying SPDs (category D1), e.g. of type DRL 10 B 180 FSD, were installed. From the transfer point, the lines were directly routed to the switchgear cabinets and were connected there. According to the risk analysis, the incoming lines for the 20 mA signals and the telecontrol system needed to be protected by adequate arresters

- It is likely that the complete process control system on a widespread sewage plant will fail without adequate lightning and surge protection.
- The consequences of such a failure can be serious.
- External and internal lightning protection measures must be taken to eliminate this threat.



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. The book had to be revised and enlarged due to changes in standardisation and technical progress. Now the third revised edition of the English LIGHTNING PROTECTION GUIDE is available.

Link to Lightning Protection Guide:





## Downtime cut for Ecuador's state oil company

ABB is supplying an integrated intelligent energy management solution to Petroamazonas EP, Ecuador's state-owned oil company, helping it gain up to an extra week of productivity annually by avoiding unexpected generator shutdowns. Petroamazonas EP is installing ABB's Emax 2 air circuit breakers with integrated power management in four new facilities across Ecuador where diesel generators supply electricity for essential plant processes such as pumps and drills.

Maintaining continuous energy supply and process up-time are key success factors in the oil and gas sector. ABB's Emax 2 supports this by accurately protecting and supporting the balance between power consumption and power supply. As the only circuit breaker in the world with seven communication standards embedded, it can integrate into any automation or supervision system. Emax 2 protects the power network, and its integrated communication modules

also connect with Petroamazonas EP's local control systems, giving operators real-time access to energy consumption data. Through a remote diagnostic function it can interface with the plant's central intelligence to keep operations running smoothly by using preventive maintenance.

"ABB developed Emax 2, the only circuit breaker that monitors and controls power networks automatically, because energy management should be simple," said Giampiero Frisio, global managing director of ABB's Breakers & Switches business.

"With sensing, communication and new advanced protection capabilities built in, our solution improves productivity and energy efficiency. For its communication capabilities, it is also a great example of the Internet of Things, Services and People at work, a crucial element of our Next Level strategy."

Petroamazonas EP is using the latest technologies and global standards of quality to optimise oil production in Ecuador.

ABB's engineers have worked closely with the customer to develop a tailor-made intelligent solution that meets the demands of Petroamazonas EP's challenging operating environment to help reduce non-productive time at their facilities.

**Enquiries: Lynette Jackson.**  
Email [lynette.jackson@ch.abb.com](mailto:lynette.jackson@ch.abb.com)



## Compact photoelectric sensor series – fixed-field sensing

RET Automation Controls is stocking the S18-2 compact photoelectric sensor series with fixed-field background suppression mode configurations. The compact, self-contained sensors provide up to six detection ranges from 30 to 200 mm to satisfy diverse cost-sensitive and high-volume applications.

Featuring excellent optical design and an advanced electronic design, Banner's S18-2 background suppression sensors are resist-

ant to fluorescent light and offer a high level of crosstalk avoidance. With a small, bright red LED emitter beam, S18-2 sensors are easy to align to the target, and ensure very small shifts in the detection range caused by target colour variation.

"The S18-2 optics are factory calibrated to one of six sensing ranges between 30 and 200 mm to ensure consistent sensing performance," said Dennis Smith, Senior Technical Marketing Manager for Sensors

at Banner Engineering. "Machine builders can count on stable and robust detection with no risk of machine down time related to sensor adjustment.

For customers requiring a range not in our catalogue, Banner is able to quickly produce customer required fixed range sensors perfectly matched to a machine designer's requirements in a short time."

**Enquiries: Brandon Topham.**  
Email [brandon.topham@retautomation.com](mailto:brandon.topham@retautomation.com)

## Allow us to help you manage the delicate balance between input and output

South Africa's energy resources are limited and yet demand for industrial products continues to rise. Managing costs and still meeting output targets can be a fine balancing act. Talk to one of our Energy Advisors today and let us assist you in devising the most effective energy plan for your business.

Call our Eskom Contact Centre and request a call from an Energy Advisor on **08600 37566**.  
For more information go to [www.eskom.co.za/idm](http://www.eskom.co.za/idm)



Mohlateng\_2582\_E

## New label printer identifies cables, components, products and laboratory samples

Brady has launched the new BBP12 label printer, an entry level benchtop label printer for cable, component, product and laboratory sample identification that offers great value for money. The compact BBP12 offers a high print speed of 100 mm/second and can handle a wide range of highly durable and specialised Brady identification labels.

Brady's new and compact BBP12 label printer is compatible with a wide range of durable Brady identification labels, developed to perform in challenging conditions and contexts. In Electrical, Telecom and Datacom environments, BBP12 can print cable sleeves, self-laminating labels, flag labels and cable tags, able to resist abrasion, wide temperature ranges and/or UV-exposure.

In laboratories, the compact BBP12 prints Brady's specialised labels for slides, straws, tubes, conicals and bottles which are able to resist liquid nitrogen, freezer, hot water bath or autoclave temperatures and/or a range of typical lab chemicals.

In electronics, the BBP12 can be part of a low volume traceability automation solution and prints a wide range of product identification labels.

The compact BBP12 offers high precision printing which enables very accurate image and barcode positioning on small labels from 10 mm up to 112 mm. Combined with a standard 300 dpi print quality, the BBP12 is a great value for money entry level label printer. The printer's user-friendly LCD display calibration menu supports professionals to print durable labels in just a few steps, and the

printer's Ethernet connectivity or standalone capabilities allow for an easy implementation in any work environment.

A free label unwinder is included with every BBP12 to increase its already vast choice in label materials. On top of this, several options can be included with the compact BBP12 label printer. The printer is optionally available with peel and present, a technology enabling the printer to present a printed and ready-to-apply label without its liner. Also optional is Brady's comprehensive label creation software LabelMark 6 PRO.

**Enquiries: Email [emea\\_request@bradycorp.com](mailto:emea_request@bradycorp.com)**



## SAA's 24/7/365 Avionics Lab

Tucked away in a non-descript building in the Technical Area of OR Tambo Airport, is probably one of the most accurate and highly rated calibration test laboratories in Africa, if not worldwide. South African Airways' (SAA) Calibration Laboratory was set up in 1981, with the advent of fly-by-wire technology and the ensuing requirement to test and calibrate the myriad test tools required to keep a fleet of aircraft tested and maintained to the stringent levels aviation authorities require. With one assistant and three tech/admin staff, Dewald Vermeulen, Head of **Lab Avionics** (Test Equipment) runs this 24/7/365 laboratory, with the very impressive accuracy rating of 90 days. The norm for laboratories is an annual accuracy spec. The Lab is kept at a constant temperature of 23°C and a 50% humidity, optimum conditions to run the highly accurate and sensitive equipment that the lab houses. Most have never been and never will be switched off to protect their accuracy. Fluke's 5522A and 5720A multi-product calibrators, Fluke's 8508A Reference Multimeter and Fluke's 4950 Multi Function Transfer Standard, check and calibrate all of the test equipment – some 16 000 units per annum, that are used by the technical staff to maintain and check various electrical systems on the aircraft, such as heating, lighting, air conditioning, avionics, navigation, radar and many more applications. The Lab also tests pressure, hydraulics, GPS, altitude, temperature, and always to the highest specification, as tolerances/variances for aircraft are understandably very small. Every measurement made here, is traceable back to the Lab. The Lab is accredited by South African National Accreditation System (SANAS) and NLA's (National Laboratory Association) MetCert.

**Enquiries: Comtest. Tel. 010 595 1821 or email [sales@comtest.co.za](mailto:sales@comtest.co.za)**



*Kobus Venter, SAA Lab technician, at SAA's Avionics Laboratory, OR Tambo Airport.*

## Full range of approved miniature circuit breakers

A full range of approved miniature circuit breakers, offering protection against overload and short circuit in electric conductors, is available from Zest WEG Group. The WEG MDW and WEG MDWH miniature circuit-breaker line comply with the tripping characteristic curves B and C, according to standards IEC 60898 and IEC 60947-2. These miniature circuit breakers have been developed to be used in low voltage circuits with direct or alternating current from 2 to 125 A and short circuit breaking capacity up to 10 kA. The full range includes all accessories in both 5 kA and 10 kA, making it possible for the ZestWEG Group to supply customers with complete solutions for specific projects. All the WEG MDW and WEG MDWH miniature circuit breakers can be used in both commercial and domestic applications.

**Enquiries: Kirsten Larkan. Tel. 011 723 6000 or email [kirstenl@zest.co.za](mailto:kirstenl@zest.co.za)**



*WEG miniature circuit breaker accessories.*



## Wireless tower light

RET Automation Controls has introduced the TL70 wireless tower light. Combining the company's industry-recognised tower light family with its field-proven Sure Cross wireless technology, the TL70 wireless tower light provides superior monitoring and visual status indication for remote applications, general and machine status, mobile call for parts, mobile work stations, threshold sensing and other applications where wired solutions are not cost-effective, practical or possible.

With a Banner Sure Cross wireless node built into the tower base, the TL70 offers two-way wireless communication to eliminate costly and time-consuming wiring requirements. The TL70 is available in 900 MHz or 2,4 GHz configurations, allowing them to be used with



matching, standard Banner wireless gateways. Offering superior flexibility and customisation, the bright 70 mm light tower can display up to five colours—plus an audible alarm module in one tower. The loud 92 dB adjustable alarm features four user-selectable tones, including pulsed, chirp, siren or continuous. Each light segment can be selected solid ON or flashing, and appear grey when off to eliminate false indication from ambient light.

"By combining the versatility of our modular tower lights with the reliability of our Sure Cross wireless technology, the TL70 wireless provides a unique lighting solution," said Matt Hahn, Technical Marketing Engineer for Lighting, Banner Engineering. "With high-visibility indication and remote, two-way operation, users can achieve real-time communication to enhance monitoring applications."

Banner's TL70 wireless tower light is available in pre-assembled or modular segments, allowing users to build a custom device. Light and audible segments are easily configured using DIP switches on each segment.

For use in harsh environments, the TL70 wireless tower light features rugged, water-resistant IP65 housing with UV stabilised material. Housing is available in black or grey, which allows users to match the device to their application. Recently, the demand for reliable data transmission between the harsh industrial environment and the office communication network has been increasing.

**Enquiries: Brandon Topham.**  
Email [brandon.topham@retautomation.com](mailto:brandon.topham@retautomation.com)

## Identify every cable & component

with the BBP™12 Label Printer!



Brady's new BBP™12 Label Printer prints durable self-laminating labels, wrap-around labels, sleeves, cable flags & tags, terminal block, breaker box and patch panel labels.

12 reasons to choose the BBP12 label printer

▶ Watch the Video & Request the Flyer



# Large manufacturer saves big with energy efficient lighting

By G Burley, QDM

*A Port-Elizabeth-based Energy Saving Company, known for their roll-out of Eskom's lighting and sensor retrofit projects, conducted an on-site audit of the plant of a Nelson Mandela Bay-based manufacturer and discovered that sustainable energy savings opportunities existed.*

In 2014 a Nelson Mandela Bay-based manufacturer approached a local energy saving company, to assist in reducing its monthly energy account. Energy saving has become a fundamental component of South Africa's energy and environmental policies as it reduces greenhouse gas emissions in a more cost effective way than any other energy or climate policy.

Despite a major drive to switch off lights when not needed, lighting and air-cons are often found left on in unoccupied offices and warehouses as was the case in this project.

## Financial investment

After consultation, an investment of R2,3 M was made towards energy saving lights and motion sensors. A first point of call for all energy saving projects is to upgrade the lighting fixtures according to the premises' exact needs as well as installing updated technology which can significantly optimise power usage. The company decided to move away from the old technology and quality energy saving lights were installed.

The sensors regulate the lights and air-con in the offices and warehouse when there is no occupancy. In the office block savings of around 40% per year were forecast with lighting and air-con accounting for up to 60% of the building's running costs per year.

## Installation

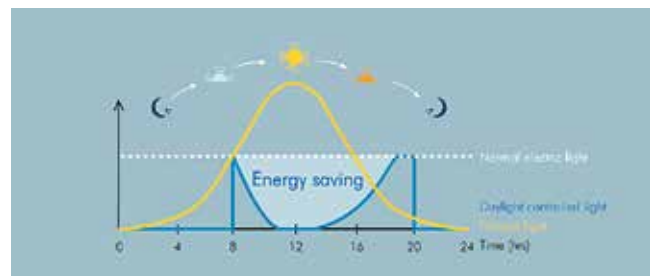
The installation took three months as 921 indoor and outdoor lights were replaced and 497 sensors were installed. Lights were selected according to their energy saving and payback advantages not according to what was the latest in the market.

This step was important as an investment of this amount needed to be justified on grounds of efficiency, quick payback and minimal disruption to the premises. While the project would have still been

attractive to the investors without installing sensors, it was the installation of these motion sensors which propelled the payback giving immediate results. The basic equation relating to lighting controls and energy usage can be described by:

$$\text{Energy} = \text{Power} \times \text{Time}$$

Until fairly recently, lighting control systems were typically designed to control either the power or the time but never both. As newer and improved methods of control have emerged (Passive Infrared (PIR), Ultrasonic, Microwave and Microphonic) the concept of energy saving through lighting has shifted away from just the mandatory upgrades of lamps and ballasts and moved towards a combined methodology where by the combination of lighting and sensors is used to yield optimum savings in any environment.



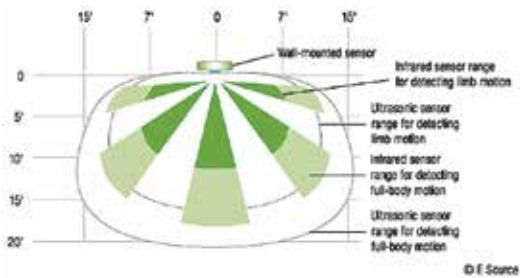
A great deal of consideration went into choosing the correct lights for each application; from this process what became clear was that 'pure savings' cannot be the only aspect considered when assessing a lighting upgrade. The need for the implementation of energy savings must be balanced with affordability of the investment required to achieve the savings in question. This is where the debate on Light Emitting Diode (LED) versus Halogen technology arose: Whilst year on year an equivalent LED light system would reduce lighting energy

consumption by 84%, the initial upgrade to the lighting infrastructure required to support the LEDs would increase the total project cost by 24% (an additional R550 000 in this case).

A middle ground was clearly needed and was reached by balancing savings and initial cost. Replacing the larger 'flood light' forms with LEDs whilst leaving other light forms as Halogen technology but still upgrading the lamps (e.g. T8 to T5 technologies with savings of 70%). A project was then implanted that still achieved remarkable savings whilst keeping the Rate of Investment (ROI) and investment at acceptable levels.

*This project saw immediate savings of 45%, peaking at 69% in January 2015 – averaging out at 52% over the year.*

As the market for LEDs grows and the development in the technology as a whole increases a future will begin to immerge where the LED will become the top choice for lighting upgrades, as a lower cost will eliminate all possible reasons not to convert to LED systems, but for now the Halogen will still hold the monopoly on the lighting sector.



**Results and ROI**

The project saw immediate savings of 45% peaking at 69% in January 2015 averaging out at 52% over the year. Savings accounted



for 476 MWh in this first year, producing an astonishing payback of 3,5 years saving over R700 000 per year in energy costs.

To put that into perspective the savings equate to around 331 metric tons of CO<sup>2</sup> or 162 000 kilograms of coal. This would be enough power for 90 homes for a year and equal the removal of 140 tons of garbage that is sent to landfill sites.

The energy saving efforts have been driven by the management at the plant with the good news story influencing the way the staff look at energy and how they use it in their own homes.


The success of the project has resulted in the manufacturer deciding that it will be rolled out to their other sites.

**Conclusion**


While the South African market has become flooded with energy saving products it is not simply the acquisition, but the implementation of these products combined with the knowledge and data collected by company like QDM spearheading the shift towards efficiency that builds and drives commercial and residential alike to implement programs like this.

As a country with a looming energy crisis there is no better time to adopt the mindset of personal accountability for energy consumption in all forms. Hopefully the success of this project will inspire many others to follow suit as this is just one step towards a 'greener' and more sustainable South Africa.

- Energy saving, as a way of life, is more effective in reducing greenhouse gases than any energy or climate policy.
- A first point of call for energy savings projects is to upgrade the lighting fixtures.
- Moving away from outdated technology significantly optimises energy savings.



take note



Gareth Burley is the Chief Executive Officer of Green Business Synergy, a company that brings business together for sustainable energy solutions and projects. Gareth consults to companies and organisations such as the SAEE, Measurement and Verification Council, Energy Saving Company QDM, Microcare Solar Manufacturers and local government. Gareth also presents the Green Hour, an award winning radio show that promotes energy saving and his voice can be heard on community stations around the country. Based in the Eastern Cape, Gareth has always had a passion for positive change and seeing a lasting legacy remain for the younger generation. Enquiries: Email [gareth@gbsynergy.co.za](mailto:gareth@gbsynergy.co.za)



# Efficient building lighting

By Engineering Council of South Africa (ECSA)

*There are two low hanging fruits that can be implemented by residential, commercial and industrial customers/consumers, namely behaviour change and use of energy efficient lighting technology.*

Load shedding has brought awareness to most of the consumers that energy is one of resources that must be utilised wisely. There are so many interventions that can be undertaken to save energy. Energy consumption improvements in medium to large existing buildings have become a significant contributor to national energy efficiency and maximum demand savings since the power restraints started in 2008 in South Africa.

With the latest advancement in Light Emitting Diode (LED) technology, power savings have improved substantially. In order to achieve the most cost effective energy retrofit of building lighting the best practice is to perform a one on one replacement of the old light fitting with the new energy efficient light fitting.

This eliminates the need for replacing of the wiring or modifications to the circuits since the new lighting will typically have a smaller electrical load than the old lighting. Following are the benefits of the lighting retrofits:

## **Energy savings**

Lighting retrofits can greatly reduce energy consumption and lower energy bills, while maintaining lighting levels and quality by upgrading lighting components to more efficient and advanced technologies. Upgrading technologies can also offer consumers greater control over lighting, allowing for additional energy savings.

## **Improved lighting quality**

Lighting retrofits can improve lighting quality by targeting problem areas with specific design considerations to overcome common lighting issues.

Newer technologies also add increased reliability to the lighting system, so fewer short-term lighting-quality issues should arise. These newer technologies often have better lighting-quality characteristics, such as improved colour, reduced flicker, greater light output, etc.

## **Reduced maintenance and labour costs**

Improvements in lighting technologies have led to increased lifetimes for components that will result in fewer failures and lengthen the time between maintenance activities.

The implementation of a routine maintenance program in addition to your lighting retrofit will greatly simplify your maintenance practices and reduce the operational costs associated with maintaining your lighting systems.

## **Pollution reduction**

By consuming less electricity, your facility will help reduce the demand and associated emissions from 'off-site' power generation. These harmful emissions include CO<sub>2</sub> and other greenhouse gases.

## **Green power systems**

For those facilities served by photovoltaic or other green-power systems, efficient lighting will help limit power demands. Using more efficient lighting will require less power to be generated, stored, and used to accomplish the same tasks, making alternative power systems more economically and technically feasible.

The introduction of occupancy sensors to the retrofit design a whole new dimension of energy efficiency is introduced not only by switching off the lighting when not required but also by optimising the required lux levels in the room.

Latest technology in occupancy sensors allow measuring of the lux level at a specific point in the lit space and then setting the sensor to control the level at the particular point by dimming or brightening all the light fittings in the space that are connected to the sensor.

This does not only allow daylight harvesting but also compensates for over design of lighting levels of the original design. The latter can contribute to quite significant savings as the input power required by LED is directly proportional to light output levels. For a typical room the original lighting designs were accomplished by using commercially available light fittings with an equal or next higher standard lumen output required to light up the room which in many cases have led to over lighting of the room.

If for the chosen example the final average maintained lighting level came to a value of 520 lux then using the dimming control of the LED technology will result in an additional 30% energy saving for a room requiring only 400 lux. If these savings are added to the savings originating from the difference in energy consumed by the existing light fittings as well as the additional savings due to occupancy then overall energy savings of between 35% - 65% or higher can be achieved.

The aforementioned savings provides typical retrofit capital payback terms of between 3-8 years when using an annual 10% escalation in electrical energy costs and 7% for labour. However when comparing the 20 year life cycle cost savings of LED technology to any other existing technology none other can provide the overall cost savings whilst the difference in energy savings as stated above is significantly higher.

The impact on the environment due to the reduced energy savings is also quite significant and has not been included in the above cost savings calculations effectively making LED currently the best technical lighting solution compared to all technologies except for high pressure sodium.

Direct verification of the energy savings remains a challenge since it is normally not feasible to install energy meters on all lighting circuits due to their wide distribution. Indirect measurements using an energy allocation for lighting as a percentage of the building total power consumption is flawed for the reason that significant load variations from other power users such as HVAC will over/understate lighting energy consumption.

For a more realistic energy savings quantification the difference in power consumption between the old and new technology for normal operating conditions can be accurately calculated from

technical datasheets and together with determination of the operating hours of the building this can be used to state the annual energy savings resulting from the retrofit.

For quantification of energy savings due to daylight harvesting and occupancy it is better to physically measure the energy consumed in a sample space over a period of time to empirically estimate the contribution of these factors to the savings as they are dependent on behavioural patterns. Provided that the sample space is representative of the entire building these measurements can be used to verify the calculated daylight an occupancy savings for the entire building. For verification of the energy savings from optimum light level control the percentage dimming per sensor can be recorded or a lighting level design calculation can be performed for each standard lighting design to determine the level of overdesign.

### Conclusion

Challenges faced with the implementation of LED technology is the higher capital cost requirements compared to other technologies however latest indication from role players in Europe is that financing options might very soon become available for developing countries where CAPEX is paid back to the supplier using cost savings resulting from energy savings. General energy savings that can be achieved by introducing energy efficient technology is up to 60% and by behaviour change, savings can be up to 30%. It should be noted that behaviour change has less capital because it is a matter of providing awareness or trainings on how we can use energy effectively like switching all equipment/appliances/light fittings when they are not required.

Enquiries:  
Email [engineer@ecsa.co.za](mailto:engineer@ecsa.co.za)

## Moving to energy efficient lighting

In a drive to use less energy and reduce costs, various industries are moving to LED-based lighting and selecting lighting products that have a longer lifespan and are less prone to damage. LED lighting uses 60% - 90% less energy than incandescent lighting and is more durable. Although LED products are more expensive, they will last about a hundred times longer than an equivalent halogen light.

"As one of the most energy-efficient light bulbs on the market, LED is the most environmentally friendly because it has a lower carbon footprint, and when discarded, does not leach poisonous mercury into the ground," said Leonard Chester, product manager - Vehicle Accessories, Torre Automotive, the sole **VisionX** distributor.

Although energy efficient, CFLs contain mercury, a toxin associated with birth defects, brain damage and other disorders. That is why CFLs must be safely discarded. LEDs on the other hand contain no mercury or hazardous materials. In addition, LEDs last 35 to 50 times longer than incandescent lighting and about four to 10 times longer than fluorescent lighting.

Reducing usage by just one light bulb keeps a half ton of carbon dioxide out of the atmosphere through the LED's life cycle. LEDs are also 98% recyclable," he said. In addition, LEDs have no off-state power draw, meaning that the fixture does not use power when turned off, with the exception of external controls, where power should not exceed 0,5 W in the off-state.

Enquiries: Charles Smith. Tel. 011 781 6190 or email [charles@csa.co.za](mailto:charles@csa.co.za)

**NEW**



### NF616-LED

Circuit watts 100W / 150W / 200W  
50000hr. Rated Life (L70/B10)  
Ambient temperature -20°C ; 45° C



### NGBLED

Circuit watt 45W  
50000hr. Rated Life (L70/b10)  
Ambient temperature 30°C

## November Special



### JBLED-T Vapour proof fitting IP65

Circuit watts 2x18W (1200mm) 2x24W (1500mm)  
35000hr. Rated Life

**Special Prices for November Only**

1200mm (4ft) Light fitting including LED tubes - R 549.90 (Ex. VAT)

1500mm (5ft) Light fitting including LED tubes - R 688.55 (Ex. VAT)

**Standard T&C apply**



## Nordland (Pty)Ltd.

- Tel. No. 011 662 4300 Fax. No. 011 662 4319
- E-mail [www.sales@nordland.co.za](mailto:www.sales@nordland.co.za) [www.nordland-lighting.com](http://www.nordland-lighting.com)
- Members of IESSA and SAFA



# Design and construction management technology for complex engineering facilities

*Information provided by Rosatom*

*Foreign engineering companies view the management approach in life cycle logics as part of their 'best practices', and the basis of innovation growth.*

**T**he introduction of life cycle management ensures a higher capacity and economic efficiency of facilities during their operating life, optimises the loading modes and enhances their safety due to prior process modeling and monitoring during the whole period of operation.

Several factors gave an impetus to the development of Multi-D technology, namely the industry requirements and the growth of ROSATOM's Engineering Division NIAEP-ASE. The company provides services such as Nuclear Power Plant (NPP) design, construction and decommissioning in Russia and abroad. The company has 20 NPPs under construction and design across the globe.

Multi-D model technology was developed as a result of clients requesting a comprehensive approach to NPP designs, including not only the organisation and the activities at all the stages of the life cycle, but also a digital model of all the processes and facilities. It

was decided to unify all the stages of NPP construction into a single digital model in which all the business-processes would be clearly described. After two years of multi-dimensional work the Multi-D model technology was developed.

Multi-D technology makes it possible to model in detail the construction and installation processes on the basis of a 3-D model, this allows for the optimisation of numerous aspects of NPP construction at the early stage of preparation for production. It enables the review of various scenarios of resources management and, when necessary, to introduce changes into the 3D model for its optimisation. A Multi-D model comprises a facility spatial smart model including drawings and 3D imaging, the schedule of work performance based of the production rates and the physical volumes which are given in the specifications as well as the cost of the facilities construction. The Multi-D model corresponds with level 4 calendar and network



3D	– Three Dimension
I&C	– Instrumentation and Control
Multi-D	– Multi Dimension
NPP	– Nuclear Power Plant
RFID	– Radio Frequency Identification

### Abbreviations/Acronyms

schedules and the technology of planning construction and installation works based on these schedules which are applied stage-wise to elevations, rooms and installation areas.

### Main components of the technology

The construction of a complex engineering facility starts at the preliminary design survey stage and passes over into process engineering stage at which point a process engineer or a group of engineers develop the process diagram with the help of a specialised software tool reflecting the process equipment (e.g. pipelines, tanks, etc.) and the actuating mechanisms (valves, electric equipment, etc.). An Instrumentation and Control (I&C) engineer adds sensors to the diagram on the basis of the process description. The final diagram is downloaded into a unified storage of technical information after which the process engineers fill in all the necessary parameters of every sensor. It should be noted that not only the process parameters but also the geometrical dimensions are specified for the equipment. Furthermore all the main work is performed in the 3D engineering environment. The unified information model splits the main tasks of 3D designing into designing and modeling of the process and the construction parts:

- o Development of models of buildings and rooms
- o Development of spaces for each room
- o Layout of process equipment and elements necessary for pipelines routing
- o Designing of process pipelines
- o Designing and/or arrangement of supports, hangers and bearing structures
- o Designing of steel structures providing access to elements which require maintenance
- o Arrangement of electrical equipment, development of cable routes and cable layouts

The development of 3D rooms and equipment models is followed by layout of process equipment for these rooms. The layout engineers arrange the equipment strictly within the allocated space and jointly with the task planners create the correct sequence of the equipment installation. This work results in the development of an optimised calendar network schedule of work performance. As the schedule of work performance in Multi-D model is related to the 3D model, another practical application is the development of weekly-daily tasks for the contractors. The purpose of these tasks is to ensure that the works are performed according to the schedule. The Multi-D technol-

*The Multi-D model has demonstrated its advantages in projects implemented in Russia, with plans to implement the improved technology in foreign projects.*

ogy has made it possible to generate such tasks in automatic mode breaking down the works for a specific room or the whole building. A weekly-daily task is provided in a picture of an area of the 3D model highlighting the process element to be installed and the works sheet showing the specification of the process element, the skills of the workers and the number of workers required on the site.

The performance of weekly-daily tasks requires not only prior understanding of the sequence of works in a specific area but optimal organisation of all the construction and installation works. For this purpose it was decided to use a specialised software tool which visualises the NPP general plan with all the machines, mechanisms and human resources for a specific area of works. For example, to model the installation of the reactor containment it is necessary to model the whole sequence of the installation works: preparation of the containment segment on the site, its hoisting with a special crane and installation on the containment plate. It is important that all the parameters of machines and mechanisms are set for modeling purposes with all the necessary calculations of loads and movement patterns on the general layout. Such a comprehensive set of modeling measures enhances the safety level on the site, reduces the number of human errors, minimises the idle time of equipment and shortens the duration of the construction.

### Impact of the technology application on the main design parameters

The Multi-D model has demonstrated its advantages in projects implemented in Russia, with plans to now implement the improved technology in foreign projects. All the technological novelties were successfully used during the design and construction of unit 3 of Rostov NPP. One of the numerous examples of the successful application of Multi-D modeling was the reactor vessel modeling after the installation of all the other process equipment of the reactor compartment, which made it possible to comply with the approved construction schedule. Due to the application of Multi-D technology the construction of unit 3 of Rostov NPP was completed ahead of schedule.

### Experience of developing a Multi-D model for an existing engineering facility

An operator of a complex engineering facility often faces a situation when no informational models have been created for such a facility. This causes certain difficulties during maintenance and decommissioning. The problem was resolved by means of reconstruction of a facility digital model on the basis of a room of unit 3 of Rostov NPP with all the technological properties, using the room as an example. Laser scanning technology helped develop a 3D model and design documentation.

Decommissioning projects should be mentioned separately. It is planned that Multi-D technology will be applied in decommissioning

projects for the purpose of reverse engineering when the sequence of dismantling works is developed on the basis of the facility reconstructed model.

### Field engineering mechanisms based on the technology

The practical application of the technology is not limited to its use by designers and layout engineers. This technology helps to train installation companies' personnel by practicing installation technology on virtual models which increases the quality and safety during installation and reduces its duration. The schedules actuality is ensured during preliminary modeling, when among other things the work schedules are optimised.

Nowadays the technology has gone beyond the 'computer' limits and has become a field engineering tool implemented on site. The main tasks of field engineering are optimisation of human resources on the site and prompt changes of work schedules ensuring that they are duly updated. The following field engineering tools have been developed:

- Informational vandal-proof kiosk
- Personnel monitoring system on the site
- Virtual modeling studio with the possibility to model weekly-daily tasks
- Spherical panorama, updated regularly, corresponding to the 3D model
- System of video-conference communication with the site

An informational vandal-proof kiosk is a protected stand equipped with a large screen provides continuous access to shared storage of working documentation. Any employee in need of actual information or his personal task can receive such information and download it to his working tablet computer. During the day the employee enters actual data in his tablet computer and then downloads them from his computer to the info-kiosk.

To optimise the number of personnel on the construction site the personnel monitoring system is used which is based on high-frequency information transfer. For this purpose there is an RFID transmitter built into the hardhat of every employee. The transmitter informs the construction manager of the location of his personnel at any particular moment. This technology helps ensure a better control over the execution of the planned construction and installation works.

Any task for installation activities in a specific area of a room requires not only appropriate skills to perform the works but coordination with other departments. For this purpose virtual rooms have been created at construction facilities where it is possible to choose a 3D model of a facility/unit/equipment, to reconstruct the sequence of the installation, to discuss possible options with the management and the colleagues and to make prompt changes in the pre-defined sequence optimising the whole construction schedule.

The manager of a construction project cannot always trace a facility construction process with his own eyes. The main informa-

tion is usually obtained from the comparison of the constructed facility condition with the plan. The Multi-D technology provides a tool which removes such a limitation – the spherical picture of a facility made from various angles ensuring 100% coverage of all the construction areas and a 3D model corresponding to the camera angles. The manager can select any camera position and determine whether there are any deviations from the design solution. The 3D model can also provide information to the construction manager about the equipment/item which has been installed or has not been installed according to the schedule enabling him to discuss it with the specialists on the site. This process can be synchronised with a video-conference meeting of the constructors on the site, controlling bodies and other concerned parties.

### Conclusion

The Multi-D technology is being permanently improved and upgraded. Among the advanced improvements is the creation of the system of designing and construction requirements control and the introduction of this system into the general Multi-D model. In accordance with the forecast, the application of a systematic approach to the requirements system will enable a reduction of the duration of an NPP project implementation by almost 10%.

- Multi-D model technology was developed as a result of clients requesting a comprehensive approach to NPP designs.
- Multi-D technology makes it possible to model in detail the NPP construction and installation processes on the basis of a 3-D model.
- This allows for the optimisation of numerous aspects of NPP construction at the early stage of preparation for production.



South Africa is the third country where the marketing office of the State Corporation ROSATOM is registered. Among the objectives of the new office is the development of ROSATOM's businesses in the Republic of South Africa, including marketing and promotion of the Russian nuclear technologies on the South African market, as well as developing relationships with potential customers, partners, and regulators. Another important activity of the office is establishing mutually beneficial relations with the country's business community, scientific community, as well as with industrial and financial groups of South Africa.

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

# Driven by a challenge

The atom is more than just energy. It is a unique tool that is able to deal with the most fundamental challenges facing humanity. ROSATOM Corporation with its 350 enterprises has 70 years of continuous experience in taking up such challenges all around the globe.

## FOOD SUPPLY

25% of the global food supply is harmed by bacteria and insects. ROSATOM offers irradiation solutions that help preserve foods and improve crop.



## WATER SUPPLY

1 out of 5 people in the world have no access to potable water. ROSATOM is a pioneer in nuclear desalination, offering integrated solutions in this sphere.



## EMPLOYMENT

One NPP construction project can create about 70 000 new jobs in related industries. ROSATOM is committed to local personnel development in the countries of its operations.



## DEMOGRAPHICAL CHALLENGES

The Earth's population is expected to rise to an estimated 8 billion people by 2030. Nuclear technologies can contribute greatly to the well-being of the coming generations.



## TRADE & TRANSPORT

Nuclear energy powers icebreakers and paves the way for more cost-efficient maritime travels. ROSATOM's nuclear icebreakers fleet makes possible the year-round Arctic navigation.



## HEALTHCARE

90% of all cancer-detection procedures are performed with the use of radioisotopes. ROSATOM is one of the world's major radioisotope suppliers.



## ECONOMIC CHALLENGES

A national nuclear build programme is a powerful driver for a country's socio-economic development. Based on ROSATOM's research, one dollar invested in nuclear energy may create a multiplier effect of seven dollars in related industries.



## INNOVATIVE DEVELOPMENT

Nuclear energy is a high-tech segment, which boosts R&D activities in many areas. ROSATOM spends about 4.5% of its revenue on R&D activities.



## ENERGY SUPPLY

Nuclear energy provides about 11% of the world's electricity. ROSATOM today implements projects to construct 38 nuclear power units worldwide, which will provide stable electricity supply at affordable prices.



## ENVIRONMENTAL PROTECTION

Nuclear generation provides 25-30 times less GHG emissions than coal- or oil-fired power plants. NPPs constructed worldwide by ROSATOM over the past 60 years have helped to avoid more than 15 thousand million tonnes of CO<sub>2</sub> emissions.



ROSATOM International Network  
(a ROSATOM Corporation subsidiary)



## SUSTAINABLE DEVELOPMENT



ROSATOM

ROSATOM Africa PTY LTD (a ROSATOM Corporation Subsidiary)  
13th Floor Sandton City Office Towers, Johannesburg, South Africa  
• Phone: 011 784 2554 • Email: info@rosatom.co.za • www.rosatom.co.za





## CESA alarmed by the continuing water and sanitation challenges

Consulting Engineers South Africa (CESA) is alarmed by the continuing water and sanitation challenges at Madibeng Local Municipality, in North West. The challenges were witnessed during a recent site visit by the Portfolio Committee on Water and Sanitation, who considered them to be symptomatic of the challenges across the country.

### Negative impact

While these challenges need urgent action, the Committee noted the negative impact caused by the high rates of vandalism and theft to water infrastructure that is adding to the already critical challenges. The continuing vandalism and theft of valves, copper and transformers is a direct contributor to water shortages in many instances and has a negative effect service delivery by the financial resources of the municipality as money budgeted for other purposes, is diverted towards the replacement of these missing components.

### Infrastructure projects underway

Within Madibeng, the Committee noted and appreciated various infrastructure projects underway such as the R63,7 M Wastewater Infrastructure Refurbishment Project as well as refurbishment of water supply pumps at various areas, but there remain a few challenges that require urgent action.

"Maintenance of the infrastructure will prolong the lifespan of water supply infrastructure and there is an urgent need for a collaborative effort by all government departments from national to local level to remedy this situation," said Mlungisi Johnson, the Chairperson of the Committee.

### Vandalism indefensible

CESA abhors the neglect and damage to infrastructure especially owing to vandalism and theft. The tendency to destroy what is meant to improve the quality of life of our people as a basic human right is indefensible and our communities need to be informed that they are shooting themselves in the foot, since the money that should have been used to improve infrastructure delivery has to be rerouted to replace the damage caused by vandalism and theft.

### Finding solutions

"We are appealing to the people to look after the infrastructure provided so that we can assist the government in accelerating service delivery throughout the country. With the backing of over 537 member firms, CESA is willing and able to partner with government and other key role players in finding lasting and practical solutions to these water challenges, especially in relation to infrastructure development," says CESA Acting CEO Wally Mayne.

### Strengthening oversight role

CESA lauds the Committee's resolve to strengthen its oversight role not only in this municipality but with municipalities across the country to ensure that similar challenges are addressed and that the people of this great country receive quality services.

**Enquiries: Wally Mayne. Tel. 011 463 2022 or email wally@cesa.co.za or Dennis Ndaba Tel. 011 463 2022 or email dennis@cesa.co.za**

## USB interface takes multi-functional counter to next level

Ease of use has been taken to another level with Hengstler multifunctional counters which are now available with a USB interface. This allows the user to programme the versatile counter via PC or tablet using the company's free downloadable programming assistant. It not only provides a clear, user friendly display but will also recognise and alert the user should conflicting entries be attempted. The programme settings can be printed or saved as a file for record keeping purposes and programming is done via a USB interface cable or USB flash drive connection. The USB interface on the Hengstler Tico 773 allows both the import and export of numerous values and settings including count value, presets, subtotals, totaliser and batch counter. It also facilitates output monitoring with a notification of any changes in the outputs. The Hengstler Tico 773 offers reliable and accurate operation in a wide range of applications including position indication, rotation speed controlling, time controlling and batch counting. The easy to read display with large digits (9,3 mm x 7,2 mm) make it simple to use, while the installation of the device is easy due to plug and play style terminals.

**Enquiries: Gerry Bryant.  
Tel. 011 615 7556 or email  
bryant@countapulse.co.za**



## Photoelectric sensor

In applications where space is limited and high precision is required, the new generation of compact O7 photoelectric sensors from ifm electronic come into play. The precise background



suppression is particularly reliable, even in the case of highly reflective objects. The visible light spot, without scattered light, enables easy alignment of the sensor to the object. The powerful photoelectric sensors with small design now come with NPN output, ideally suitable for position detection in feeding and handling.

The sensors serve as through-beam, retro-reflective and diffuse reflection sensors with fixed setting. The diffuse reflection sensor comes with precise background suppression and a small light spot to detect small objects. The small photoelectric sensors of the O7 series provide an ideal solution for confined spaces or for detection of small parts. Users are free to choose between units with PNP or NPN output. The sensor with a small light spot and the narrow light cone ensures detection of small objects even over long distances. The sensors with fixed settings are ready for operation immediately post plug and play installation. The diffuse reflection sensors are available with background suppression of 30, 50 or 100 mm range.

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



## Infrastructure Indaba Working Towards Improved Delivery of Infrastructure and Engineering Services

Consulting Engineers South Africa (CESA) has rebranded its annual conference and exhibition to the CESA Infrastructure Indaba. CESA recognises that the conference is a tripartite alliance between the 3Cs (Consulting Engineers, Contractors and Clients), working together to improve the quality of life of South Africa. The CESA Infrastructure Indaba will be held from 9-10 November 2015 at Emperors Palace, to stimulate debate on key issues. The Theme is 'Working Towards Improved Delivery of Infrastructure & Engineering Services'.

The Transport Minister Dipuo Peters, the Public Works Minister Thulas Nxesi and the Executive Mayor of the City of Ekurhuleni, Councillor Mondli Gungubele will give keynote addresses at the Infrastructure Indaba. Topics to be covered at the conference include: - Procurement or 'misprocurement'; Service delivery through Engineering Infrastructure; Human Capital development (Recognition of the engineering profession and Succession Planning & leadership development); Infrastructure Funding – Collaborations and Corruption (values or ethics).

Enquiries: Visit [www.cesa.co.za/node/553](http://www.cesa.co.za/node/553)

## Intelligent incremental encoder

ifm's intelligent PerformanceLine encoders are extremely versatile due to their programmable resolution, selectable output signal and IO-Link compatibility. The encoders use magnetic technology, providing the accuracy of traditional optical glass encoders with the robustness of magnetic encoders.

The PerformanceLine encoder provides a dual colour (red/green) digital display for at-a-glance monitoring and allows for easy programming via pushbuttons. With ifm's encoders, there is no need to stock multiple units.

As the PerformanceLine encoders are programmable, the user can program the resolution needed for each application from 1 to 9999, based on his application's needs. They are also versatile, offering a choice of HTL or TTL output.

ifm's PerformanceLine also features multifunctional capabilities. The encoders can be configured to perform in three different capacities; as an encoder, a counter and a speed/direction monitor.

Ready for the future, the PerformanceLine encoder is equipped with an IO-Link interface for Digital Factory 4.0 operations. The IO-Link interface enables direct access to process and diagnostic data, allowing the user to parametrize during operations, reducing downtime.

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



## Bizz Buzz

### WearCheck now part of Torre

Condition monitoring specialists **WearCheck** and its Set Point Group sister companies have been acquired by Torre Industries, a dynamic JSE-listed industrial entity underpinned by strong brands and strong products. Torre is an integral business in sectors such as mining, automotive, construction and industrial. The integration with **Torre Industries** will have no negative impact on WearCheck customers, and the company will continue with normal operations. The integration process will be phased in over several months, and we will continue to keep customers informed of any changes or improvements.

Enquiries: [Sharon@sharonfaypr.co.za](mailto:Sharon@sharonfaypr.co.za)

### Aurora Power awarded R250 M solar projects in DoE's small RE programme

The South African Minister of Energy has awarded 5,8 MW Adams and 5,8 MW Bellatrix solar projects which are the first Independent Power Producer projects in the DoE's program that will be locally developed, designed, funded, constructed and operated. The projects are being sponsored by the **Aurora Power** group, founded in Cape Town in 2009 by engineering brothers Simon and Chris Haw. The company has no relationship with the embattled mining company of similar name. **SOLA Future Energy**, a locally owned solar PV engineering and construction firm, will design, construct and operate the plant. The Industrial Development Corporation of South African (IDC) and local black owned company Mergence Investment Managers have signed a term sheet to provide debt to the project company.

Enquiries: [Chris.Haw. Tel. 076 612 4221](mailto:Chris.Haw@aurorapower.com)

### Yokogawa SA's training courses accredited

**Yokogawa South Africa's** training courses have been accredited by the Society for Automation Instrumentation Measurement and Control (SAIMC), for Continuous Professional Development (CPD) points for registered professionals of the Engineering Council of South Africa (ECSA). For the first time in Yokogawa's 100 year history, field instrumentation and control systems training courses offered by Yokogawa South Africa have been evaluated and accredited by a professional body. It has been a lengthy process of six years to reach this important milestone which was spearheaded by Yokogawa's Service Training Manager, Nico Marnebeck.

Enquiries: [Email info@za.yokogawa.com](mailto:info@za.yokogawa.com)





## Eskom Expo ISF 2015 for Young Scientists

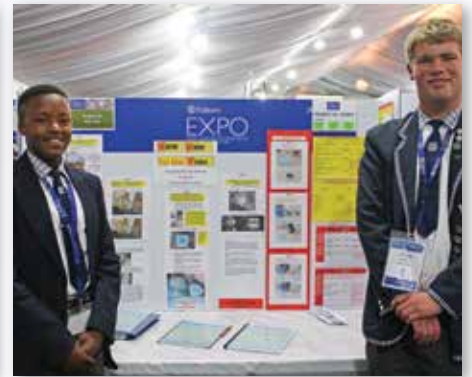
Visiting the annual 'Eskom Expo for Young Scientists' is always inspiring. This year it took place at the Birchwood Hotel and Conference Centre from 6 – 9 October 2015. In addition to Eskom's significant sponsorship, it is supported by the Departments of Public Enterprises, Science and Technology and Basic Education. This event is the culmination of hard work, learning, planning and creating practical solutions to the many problems that are experienced in this country – very often by the learners themselves. We enjoyed meeting many of the participants.



**Banana bio plastic:**  
Farida Cajee, Roshunville Primary, North-West Province, Schweizer Reneke.



**Eco-brick:**  
Sela-Emre Karabulut, Nizamiye Primary & Boys High, Midrand Complex.



**Warm water for Winter:**  
Sisa Madya and Johan Hattingh, Hoërskool De Aar, Northern Cape.



**Does technology assist children with learning disabilities:**  
Caroline Boshoff, Cape Recife High School.



**Electro school bag:**  
Khumo Ramatlo and Ma-Afrika Setole, Selly Park Convent Primary School, Bojanala, Rustenburg.



**Tap water electric power:**  
Ezekiel Mokaedi, Setlopo Secondary, Mafikeng.



**Gutter turbines:** Danielle Pretorius and Jeanne Peens, Afrikaanse Hoër Meisieskool, Northern Gauteng.



**Hello light, goodbye darkness:** Jumanah Al-hazba, Potchefstroom Girls High.



**Running tap water has the kinetic ability to provide energy:** Kirsten Bester, Lorraine Primary School, Port Elizabeth.





**Rocket stove:** Phinda Runeli, St George's College, Port Elizabeth.



**Heating up the freezer:** Joshua Atkinson, Grey Boys Junior School, Port Elizabeth.



**Cool shack using evaporative cooling:** Jade Kaplan, Herzlia House, Cape Town.



**Diagnosis app:** Thendo Magoma, Mbilwi Secondary, Vhembe.



**R-Trac Rhino tracking and monitoring system:** Noeline Viljoen, Hoërskool Waterkloof, Northern Gauteng.



**Rotte:** Charné Potgieter, Hoërskool Hoogenhout, Highveld.



**Kudu's time zone:** Nontutuzelo Fuleni, Tiger Kloof Secondary, Bophirima Central.



**How water affects spinach growth in window farms:** Michael Wilson-Trollip and Nicholas Peile, Bishops, Cape Town.



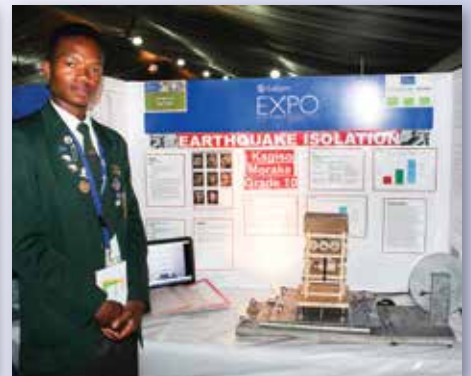
**Increasing the lifespan of organic Grätzel photovoltaic cells:** Tyrique Byroo, Star College, KwaZulu Natal (central).



**Water purification:** Nhlawuleko Homu: Matlhari High, Mopani.



**Wind cellphone charger:** Amina Mushimiyimana, Dannhauser Secondary School, KwaZulu Natal (Northern).



**Earthquake isolation:** Kagiso Morake, Hoër Tegniese Skool, Klerksdorp.

Worley Parsons - Advisian



Advisian, an independent advisory arm of WorleyParsons, has appointed Mohamed Madhi as its principal of Energy Advisory for the Sub-Saharan Africa region.

ABB.....OFC, 11	Eskom.....29	Nordland.....35	Weidmuller.....20
ACDC Dynamics.....IFC	Eskom Power Series.....1	Phoenix Contact.....18	WIKA.....23
Actom.....9	HB Systems.....21	Rosatom.....39	Woodbeam.....19
Brady.....31	Helukabel.....17	SEW-EURODRIVE.....IBC	
Engen.....5	ifm electronic.....OBC	Voltex.....7	

INDEX TO ADVERTISERS

**10<sup>th</sup> Southern African Energy Efficiency Convention (2015SAEEEC)**

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 (2015SAEEEC), as an event serving the energy management, environmental, facilities building upgrades, energy engineering, cogeneration, power generation, and efficiency improvement industries.

**Enquiries: Erika Kruger. Tel. 018 290 5130**

**Tech Expo Innovators**

26 November 2015, KwaZulu-Natal

24 November 2015, Western Cape

1 December 2015, Gauteng

Present original ideas and projects, tickets R30.

**Enquiries: Email [innovation@techexpo-africa.com](mailto:innovation@techexpo-africa.com) or info@youniqueconcepts.co.za**

**6<sup>th</sup> Annual Women in Engineering Convention**

25, 26 & 27 November 2015 at the Indaba Hotel, Fourways, Johannesburg

Hosted by ITC, this convention is being staged in an attempt to recognise, uplift, teach and share challenges among women in engineering. This year the confer-

ence will be focusing on how women can excel within their respective engineering disciplines by delivering high levels of performance and elevate their status within engineering. In addition a wider global perspective will be provided with this year's edition providing you with four unique international case studies.

**Enquiries: Email [bookings@intelligencetransferc.co.za](mailto:bookings@intelligencetransferc.co.za) or [zuerita@mediainfrica.co.za](mailto:zuerita@mediainfrica.co.za)**

**2016 Africa Energy Indaba**

16 – 17 February 2016, Johannesburg

2016 Africa Energy Indaba is the sister event to the Infrastructure Africa conference. Regional integration will come under the spotlight. The annual African Energy Ministers Roundtable to be hosted at the Indaba will lead with this key issue and will include the financing of Africa's critical energy infrastructure supported by skills development in Africa.

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





# Seeing the big picture

Bringing you the future



With MOVIGEAR from SEW-EURODRIVE, saving energy is possible. Independent research has proven that MOVIGEAR reduces start-up and operating costs by 20-30%. In reality, many users have experienced 50% or more.

MOVIGEAR also substantially reduces your inventory costs via its unique ability to replace numerous ratios with a single unit.

There is no need to look to the future - MOVIGEAR is already there.

SEW-EURODRIVE - Driving the world.

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

**SEW**  
**EURODRIVE**



ifm electronic



## ifm's NEW pressure-resistant position sensors

TOP  
PRODUCT

- ✓ Sensors for pressures up to 500 bar for steel detection
- ✓ Metal sensing face for heavy duty
- ✓ High burst pressure of 2,000 bar for the M12 housing
- ✓ Standard M12 and M14 housing types
- ✓ Best performance at an attractive price
- ✓ Resistant: withstands 10 million pressure cycles

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, Lydenburg, Cape Town, Northern Cape  
Namibian Subsidiary