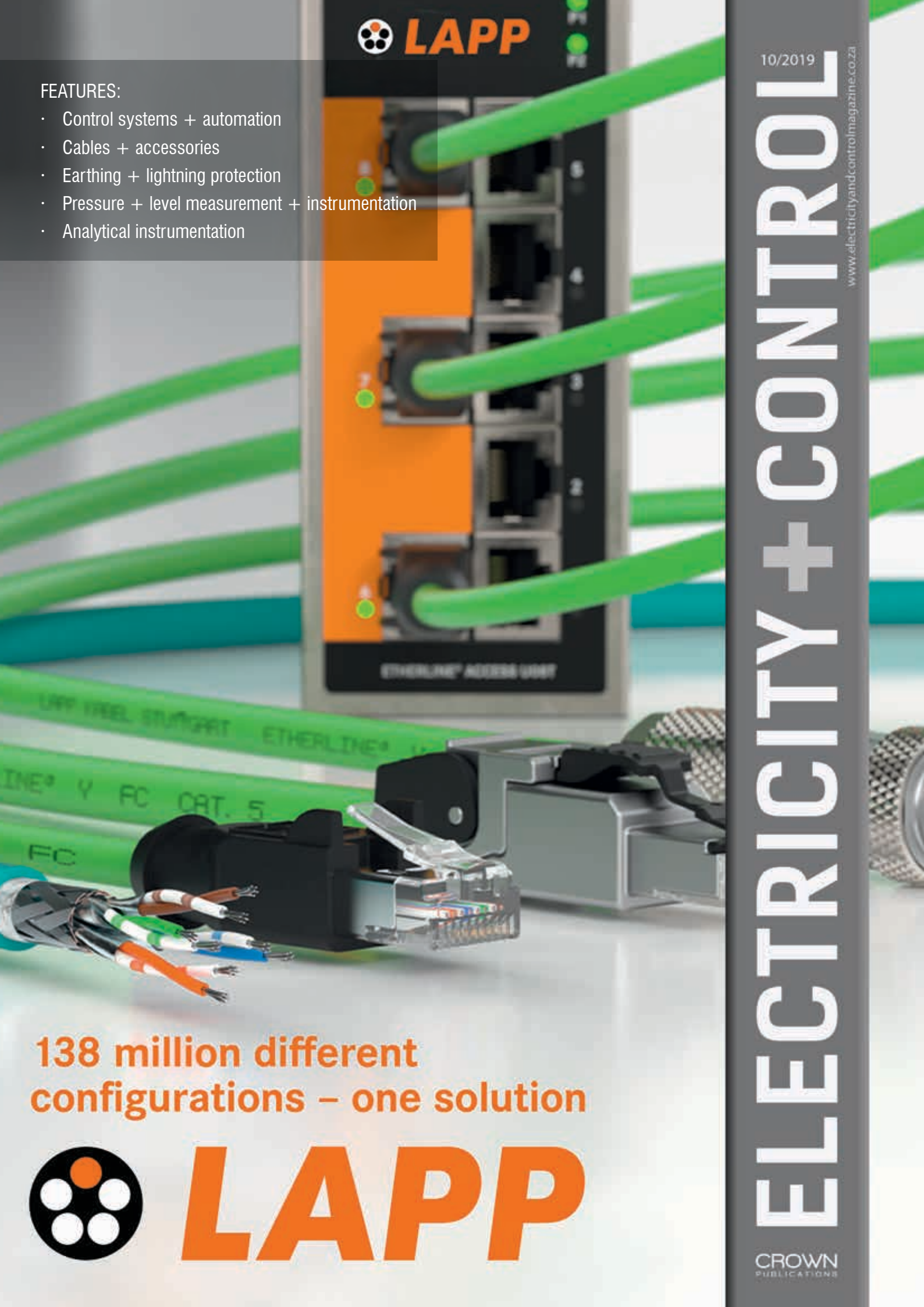


FEATURES:

- Control systems + automation
- Cables + accessories
- Earthing + lightning protection
- Pressure + level measurement + instrumentation
- Analytical instrumentation

10/2019
www.electricityandcontrolmagazine.co.za

ELECTRICITY+CONTROL

CROWN PUBLICATIONS

Customers around the world trust us when it comes to process automation. Our shared goal is plant safety, availability and efficiency. We are with you every day, everywhere.

People for Process Automation

Contact us:
Email: info.za.sc@endress.com
Tel: +27 11 262 8000
Web: www.endress.com

Endress+Hauser

LAPP has developed a predictive maintenance solution for Ethernet cables.
(Read more on page 17).

Editor: *Leigh Darroll*
Design & Layout: *Adél JvR Bothma*
Advertising Managers: *Helen Couvaras*
Heidi Jandrell
Circulation: *Karen Smith*
Editorial Technical Director: *Ian Jandrell*
Publisher: *Karen Grant*
Deputy Publisher: *Wilhelm du Plessis*

Circulation

Circulation: Quarter 2 (Apr – Jun) 2019
Total print circulation: 4 852

CESA
Publisher of the year 2018
(Trade Publications)

Contact

Published monthly by: *Crown Publications (Pty) Ltd*
Cnr Theunis and Sovereign Sts,
Bedford Gardens
PO Box 140, Bedfordview 2008
Printed by: *Tandym Print*

Telephone: *+27 (0) 11 622 4770*
E-mail: *e-mail: ec@crown.co.za*
admin@crown.co.za
Website: *www.crown.co.za*
www.electricityandcontrolmagazine.co.za

Electricity+Control is supported by

CESA
Copper Development Association Africa
SAAEs

We need to value what we have

I have just returned from my very first visit to Russia – where I spent an intense week of training at the Joint Institute for Nuclear Research (JINR) in Dubna. South Africa (like Germany) has been a partial member and affiliated with the JINR for 25 years, and should probably be seriously considering full membership.

What a wonderful experience – and an opportunity to engage with around fifteen colleagues from countries that have ongoing nuclear research activities. South Africa has some remarkable researchers working in this field.

Now, of course, nuclear research is about researching the atom, its nucleus, and all the other components – many, many more, I'll bet, than you ever heard of at school (or university, for that matter!). Some by-products of this research over the years have included, for instance, the discovery of nuclear energy and, of course, the nuclear physics leading to the construction of nuclear weapons.

But so much of what we research has good and bad applications.

It is all about one's perspective – and probably that is based on what we hear most – whether intentionally or not. Perspective is an important factor. And there is no doubt that one's perspective defines one's reality.

Often I have used the phrase that 'perception is the truth' – and so it is.

I continue to be amazed at how easily people believe anything they read or see, especially in the context of social media, which has really become the graffiti wall of modern society. It seems one can say what one likes without any fear of being called out. And if you are called out, it is not a thoughtful or measured engagement; it is frequently pure vitriol, suited to the stage on which it plays out.

So, the national situation is verging on disaster – or is it?

It is true that the current state of the nation leaves much to be desired; it is true (and I have commented on this) that little in the way of policy seems to support our industry; and it is true that we seem to be living in an age of populism, where real leadership and hard decisions are tossed aside in favour of short-term appeasement of specific interest groups.

Well, that seems to be the perception. And perception is the truth.

But what emerged from my visit to the JINR is that collaboration is the name of the game – where science brings nations together (no matter the view of their presidents), and where there is a shared view of humanity. This is refreshing indeed.

The other aspect that really intrigues me is how relatively well off South Africa is in relation to many of the countries that I have been engaging with. We miss that point quite often I think.

A further observation is that, notwithstanding that some of the kit that I saw is the very, very latest, and sparkling and new (or being built), a lot of the most useful kit is decades old. But it has been cared for, respected, upgraded, and fruitfully used by people who care.

That, to me, is the key.

We need to care more, and we need our teams to care more – from the very top, to the very bottom. We need to develop renewed pride, and think less about what we are 'owed' – and carve out our own way forward – as individuals, as industries, and as a country and a continent.

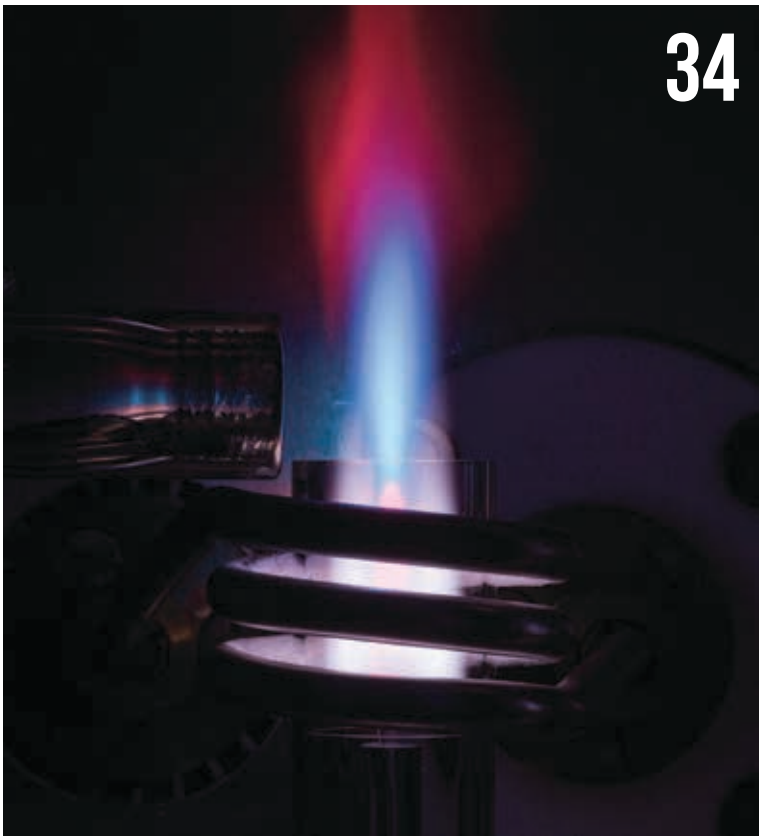
Ian

Ian Jandrell
PrEng IntPE(SA)
BSc(Eng) GDE PhD,
FSAAE FSAIEE SMIEEE

CROSS PLATFORM CONTENT INTEGRATION

CONTENTS

FEATURES



REGULARS

UNI-T

UT200+ SERIES

400-600A DIGITAL CLAMP METERS

UT201+/202+/202A+
(AC current only)

UT203+/204+
(AC/DC current)

True RMS
True RMS

Larger screen and display digits

60mF large capacitance measurement (UT202+/204+)

Live
Neutral/live wire test (UT202A+/204+)

30kVA
600V (30kVA) energy surge protection

High voltage (600V) frequency measurement

NCV multi-segment display and audio/visual alarm

600V protection across all range

Low battery replacement cost

JOHANNESBURG
T: 011 392 3804
F: 011 392 3812

DURBAN
T: 031 263 7800
F: 031 263 2458

CAPE TOWN
T: 021 552 5242
F: 021 552 5245

Website: www.three-d.co.za Email: sales@three-d.co.za

THREE-D AGENCIES
THE CABLE ACCESSORY COMPANY
a member of the Hudaco group

Preparing for job disruption and **new IoT skillsets**

Henry Craukamp, Managing Director, Rockwell Automation Sub-Saharan Africa

AT A GLANCE

1. It is estimated that 85% of the jobs that will drive the world economy in 2030 have yet to be created.
2. We need to develop as a core skill the very ability to acquire new skills efficiently and to adapt to ongoing changes in the workplace.

Henry Craukamp, MD, Rockwell Automation Sub-Saharan Africa.

People will need to be able to learn new knowledge more quickly, to constantly redefine their technical and critical skills and adapt to new intellectual viewpoints.

In preparing current and future generations for the information revolution, the most valuable educational commodity will be adaptability.

There's a general anxiety among many people when thinking about what the future of their industry might look like in light of our transition to an internet of things-based society: How will the era of artificial intelligence, automation and robots impact on our jobs? And more extremely, what will the role of humanity be when many of the core jobs of the industrial society are replaced by machines?

But there's a flipside to this coin of the human-machine relationship. Reconsidering our anxiety and focusing on the solution will help increase our chances of prosperity over the coming decades.

Already faced with more than a quarter of the population being unemployed, the projection that over 75% of current jobs in South Africa will be either rendered obsolete or changed beyond recognition by the Fourth Industrial Revolution seems like an ominous challenge on our horizon.

But this doesn't automatically translate to job losses. While highly repetitive tasks are indeed being modernised by digital technologies, making an employee twice as productive does not mean halving the availability of jobs: it is estimated that 85% of the jobs that will drive the world economy in 2030 have yet to be created.

This also means that beyond generalised estimations about the types of skills people will need to participate in this new economy, we do not know the precise skillsets these new jobs will require, and therefore do not know how to structure our education system definitively to prepare workers accordingly.

In our own international Rockwell Automation research and development laboratories, new technologies are constantly being introduced, researched and integrated into our operations. The only way to keep up with these quickly evolving technological changes and build sustainable workforce availability to use and master these innovations, is to ensure we develop the necessary systems and culture to acquire new knowledge rapidly, on the shop floor.

It seems then that our most pressing challenges in developing the skills base for the future are two-fold.

First, we need to develop workers who are not just 'adequately skilled' as such, but have as a core skill the very ability to acquire new skills efficiently and to adapt to ongoing transformation of their workplace. A focus on STEM (science, technology, engineering and mathematics) skills, the development of new curricula based around IT/OT convergence and IIoT technology, the integration of tools like wearables (virtual and augmented reality), and a focus on micro certifications will help build essential foundational skills for the employees of the Fourth Industrial Revolution.

Second, using digital technologies we need to ensure that access to new skills and knowledge can be acquired faster and more efficiently. The use of digital media such as augmented reality in production and training environments is receiving growing attention, with several innovative companies introducing it in their training material to centralise their production methodologies, improving consistency and quality. These technologies can also be a useful medium in the challenge we face in retaining the essential 'tribal knowledge' of an organisation and industry, as experienced workers retire and younger workers take their place.

For the moment, these two critical points seem to be prerequisites in ensuring a future workforce that is ready for the jobs of the Fourth Industrial Revolution.

While we contemplate the inevitable disruption of our work environments, we shouldn't see the role of machines as replacing human capabilities. Instead, we need to focus on a path that will ensure they extend and augment human achievements. We live in fascinating times.

Digitalisation: impact and opportunities for Africa

At the end of August 2019, Siemens South Africa launched its report on the status of digitalisation in industry in Africa, and a call for fast and decisive action from African countries so that they can compete on the global economic stage.

AT A GLANCE

1. We have a first-time opportunity to use smart technology to transform economies at an unprecedented rate.
2. Collaborative efforts are vital to creating an environment that enables businesses to develop sustainably and encourages technology upskilling, innovation and implementation.

In Siemens' view, digitalisation is providing the continent the opportunity to accelerate growth and rapidly expand struggling economies – but it's a small window and decision-makers need to put strategies in place now in order to succeed.

The company, together with Frost & Sullivan, put together a comprehensive research project looking at the current state of key industries across the continent and identifying challenges and opportunities.

Titled *The dawn of digitalization and its impact on Africa*, the research report considers growth predictions and where the adoption of smart technology would be most beneficial in expanding industries to drive sustainable growth. It focuses on four key sectors: Water, Manufacturing, Mining and Minerals, and Food and Beverages.

Some of the key findings

- The adoption of digital technologies, innovation and a range of digital customer offerings is expected to remain varied across industries, markets and geographies. The impact of digital technologies is also expected to vary, favouring businesses and industries that seek relevance and aim to increase their contribution in international markets as well existing domestic markets.
- While advanced analytics and digitalisation are witnessing growing adoption across certain industry sectors, such as the automotive sector, there is a real opportunity for these technologies to be adopted across industry sectors such as the mining and food and beverage industries, which are significant contributors to major African economies.
- Manufacturing, while the most mature in its transformation and adoption of digital technologies in Africa, remains a marginal player, struggling to make a bigger impact on country GDPs. The question governments need to ask themselves is how they align a 'here-and-now' emphasis on job creation with the necessary focus on digitalisation. This will enable Africa to create a niche within the global economy. If we fail to pro-actively select our place in the global manufacturing industry, we run the risk of continuing on the path of non-industrialisation.
- In the water industry, expenditure in water infrastructure has been low, compared to the global average. Inadequate investment in infrastructure coupled with poor water utility management has resulted in a greater need for development of the water sector.
- In the mining industry, which has over the past several years seen subdued investment, rising cost pressures and increasing labour issues, a combination of mechanisation, efficient extraction of resources and better use of data can make it easier for mine operators to cut costs and create leaner and more efficient mining operations. Collaboration among technology providers, industry, research institutes and organisations would enable the successful incorporation of technology to benefit the industry.
- A stable supply of electricity is critical for digitalisation to flourish. By providing high levels of infrastructure and power supply, Africa will be able to attract the necessary investment across various industry sectors.

The urban population in Africa is expected to grow to 56% of the total population by 2050, from 35% in 2010. This rapid urbanisation will require robust infrastructure to ensure the expanding cities are hubs of growth and commerce and not still trying to catch up with basic necessities.

Commenting on the release of the Frost & Sullivan report and its findings, Ralf Leinen, Senior Vice President for Southern and Eastern Africa, Siemens Digital Industries, said: "For the first time in history we have an incredible opportunity to use smart technology to transform entire economies at

an unprecedented rate. Africa needs to put efficient strategies in place now in order to succeed."

In the thrust of changing business dynamics, rapidly evolving technology and increasing competition, collaborative efforts among governments, industry, businesses (local and international), labour and academia are vital to creating an environment that enables local businesses to develop sustainably and that encourages technology upskilling, innovation, knowledge sharing and implementation.

Siemens notes that the findings from the study are just a starting point. The hope is that it will begin a dialogue and provide a framework for entrepreneurs, industry and governments to respond to the unique opportunities that exist.

Ralf Leinen, Senior VP, Southern and Eastern Africa, Siemens Digital Industries.

WEF Africa – inclusive growth in the Fourth Industrial Revolution

Within the context of the call for decisive action now on digitalisation and automation, and the recognised need to educate and upskill the future workforce to adapt to the ongoing revolution in technologies, South Africa hosted the 28th World Economic Forum (WEF) on Africa in Cape Town at the beginning of September.

Addressing the first plenary session at the forum on behalf of President Cyril Ramaphosa, Finance Minister Tito Mboweni said that while Africa needs to craft a roadmap to navigate new and disruptive technologies, at the same time it needs to protect the continent's citizens against the adverse consequences of automation like downsizing and work redundancies.

As Africa moves towards greater broadband connectivity, there is a need to ensure broadband access for all, in order to overcome social, economic and spatial inequality, Mboweni said.

"We all know that economic growth, job creation and entrepreneurial activity are inextricably linked to broadband access. We therefore need to ensure that broadband access – like healthcare and education – is available to all."

If we do not ensure such universal access, Mboweni said, "… we will simply perpetuate the economic exclusion of the majority of the continent's people. In the development of our policy and in the implementation of our programmes, we need to ensure that technology promotes greater equity and broader social and economic participation. As countries of Africa, we share a common determination to be part of this new age of disruption and to join the economy of the future."

The continent must respond with agility to the disruptive trends and technologies that are changing our way of life, the way we do business and our systems of governance, Mboweni said.

"We must ensure that our citizens are prepared and, if necessary, shielded from adverse consequences. As African countries, we must take advantage of the opportunities presented by technological change to enhance our competitiveness in the global landscape. This rests on the ability to adapt and evolve," he said.

"The growth of mobile money systems on the continent is an example of just how much technology can broaden access to markets, connect companies and support the growth of start-ups and small businesses."

Regarding the need to prepare young people for jobs that have yet to be created, Mboweni said, while there is much we do not know, we need to adopt incentive programmes for industries that may experience significant structural disruption in the near future.

He said workforces in every industry will be impacted by automation, possibly resulting in downsizing and redundancies. "According to McKinsey, up to 375 million workers globally may have to change their occupational category and acquire new skills by 2030. Employers will need to make substantial financial commitments to ongoing upskilling and reskilling in response to labour market needs," he said.

The minister further highlighted that there is a need to stimulate entrepreneurial activity as conglomerates – which are the lifeblood of many economies on the continent – will be displaced by leaner and more adaptable small and medium-sized businesses.

"Our response must be collaborative, multi-sectoral and inclusive. As South Africa, we are working with our neighbours to develop a continental strategy led by the African Telecommunications Union." The collaboration must extend to the private sector, academia, policy makers and other stakeholders," the minister said.

Mboweni also highlighted that new technologies can be put to use to improve service delivery. "We have seen for instance, the way in which India has leveraged technology to broaden access to banking in its rural areas. This type of innovation presents tremendous opportunities for tasks like social grant distribution, electrification and internet access."

In closing Mboweni urged the continent to embrace new ways of thinking. "We must be prepared to take risks or risk being left behind," he said.

New 11 kV WEG vsds

The latest addition to WEG's range of medium voltage (MV) variable speed drives (VSDs) is the 11 kV MVW3000 solution. Two of these units have already been commissioned by WEG Automation Africa in demanding underground conditions.

As part of WEG's ongoing technological developments, the WEG MVW3000 MV VSD is a valuable addition to the group's portfolio. It complements the existing MV VSD range and is widely suitable for those industries where large 11 kV motors are used: the water treatment, mining, and oil and gas industries, among others.

For Zest WEG group company WEG Automation Africa, the first application was in a gold mine in Ghana, where the VSDs are each running an 850 kW, 11 kV fan motor.

Commenting on the newly commissioned units, Kirk Moss, Senior Manager: Projects and Engineering at WEG Automation Africa, says, "We were able to develop, supply and commission a tailored solution for this customer by leveraging our in-house technical expertise."

Moss highlights the system's complete panel integration, which provides the customer with quick and reliable commissioning and start-up. The system delivers high quality input power using low harmonic multi-pulse transformers.

"The motor-friendly, near-sinusoidal output is a valuable feature for standard motors with no special insulation as well as for retrofit to existing motors," he says. "Motor losses are reduced, as are vibrations, torque pulses and over-heating."

The WEG MVW3000 VSD boasts a high efficiency of over 96.5% throughout the load range, and a power factor of more than 0.95 throughout the speed range. The design is based on the well-known cascaded H-bridge (CHB) topology, using multiple low voltage power cells in combination to achieve the required voltage output. The input switch, phase-shifting transformer and VSD can all be fully integrated in a single MV panel.

Moss also highlights the inclusion of power cells with long-life plastic film capacitors as another benefit, "as these are more reliable and last longer than dry type capacitors," he says. "They also have the advantage of not needing to be reformed after long periods of storage."

A number of options on the WEG MVW3000 VSD further enhance its uptime and cost effectiveness. Important among these is the automatic cell bypass solution. Here, the VSD diagnostics can pinpoint and automatically bypass a faulty cell. To deal with the imbalance in voltage created by the bypassing of a power cell, there are options available to minimise the reduction in output torque. This allows operations to continue until maintenance can be conducted at a convenient time.

A redundancy option is also available for applications where customers require output torque to remain at 100%, even in the case of a faulty cell. Redundant power cells can be added to the design to enhance availability.

Developed by WEG in Brazil, the MVW3000 VSDs were fully load-tested in a state-of-the-art test facility before delivery. The dynamometer testing facility allows full load operation of up to 4 MVA. In cases of larger ratings where WEG provides both motor and VSD, up to 10 MVA load tests can be accommodated.

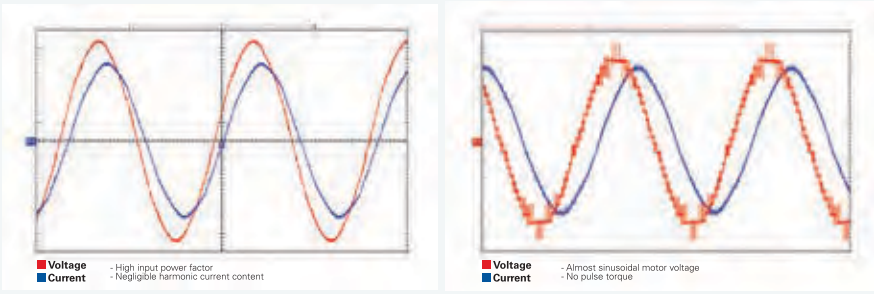
"As part of our service to customers, we usually invite them to be present at these tests," says Moss.

He emphasises the WEG group's capability to innovate technologically and develop practical solutions to meet industry's requirements. As a global group, WEG re-invests close to 3% of its annual revenue in research and development. Another indicator of our innovation abilities is that about 45% of WEG products sold last year were developed in the past five years," he says.

WEG's medium voltage VSDs are available in 3.3 kV, 4.16 kV, 6.6 kV and 11 kV options. In standard configuration, the 11 kV VSD is available from 40 A to 400 A – or 640 kW to 6 500 kW. Larger sizes are available if required.

"The WEG MVW3000 VSD gives WEG Automation Africa greater flexibility in its market offering, enhancing our capability to provide customised solutions," Moss says.

For more information visit Zest WEG Group: www.zestweg.com



The graphs show: high input power factor with negligible harmonic current content (left) and almost sinusoidal motor voltage and no pulse torque (right).

The 11kV MVW3000 variable speed drive is the latest addition to WEG's MV VSDs.

An open view of the new WEG 11kV MVW3000 VSD.

ifm electronic celebrates its 50th anniversary

In October this year, 2019, ifm electronic celebrates its 50th anniversary. After many years of working with its customers the company has established itself as service-oriented sensor specialist and today is represented worldwide by more than 7 000 employees in over 85 countries. Even as it has grown into an international company, ifm has sought to maintain the virtues of the founding years – the flexibility and individuality of a small enterprise – together with the quality and professionalism of a group. And its customers are still at the centre of its work.

The ifm group of companies was founded as ifm electronic geräte gmbh+co kg on 29 October 1969. In its foundation year, success started with the development of inductive proximity switches for 220 V supply voltage for direct triggering of a contactor.

Some years before that, the two founders, salesman Gerd Marhofer and electrical engineer Robert Buck, had set up rolling mills and steel plants for a plant manufacturer in Alsace. But they were not satisfied with the work.

Consequently, Robert Buck started to build his own sensors and circuitry in the bedroom of his flat in Tettnang. That was in 1967. Based on Marhofer's idea, Buck designed an inductive sensor for 220 V supply. At that time, no other company had mastered this kind of detection without contact, "but Robert Buck was a fantastic developer. You almost had the impression that he could reduce his size and go through the circuitry," Marhofer remembers. Buck himself once said, "I wanted to solve problems with electronic means that other people did not deal with."

From its initial portfolio of inductive sensors with a sensing range of 10 and 20 mm, the company today produces a range of position and process sensors for motion control and safety technology as well as industrial imaging and communication products, identification systems and systems for mobile machines, and increasingly, innovative Industry 4.0 solutions.

ifm's product portfolio covers all relevant standard solutions as well as the special requirements of different industries.

For ifm, quality goes beyond the product to incorporate all processes and customer service. It supports its customers internationally and uses customers' feedback to improve its product quality on a continual basis. In its product testing procedures it stresses its sensors beyond their limits to ensure that they will meet the performance standards promised for customers' processes. In addition, each product is submitted to a final inspection before it leaves the company's premises. These quality control checks enable ifm to provide a five-year warranty on each catalogue product.

70% of its products are developed and manufactured in Germany, but the company also has manufacturing and development locations in the USA, Singapore, Poland and Romania, set up according to the quality standards of its German headquarters. In South Africa, the company operates as ifm electronic and is based in Centurion, Gauteng.

For more information contact ifm electronic ZA.
Tel: +27 (0)12 450 0400, email: info.za@ifm.com

Plug-and-produce with Smart Press Kit

With its innovative, modular Smart Press Kit, Bosch Rexroth is setting new standards for fast and efficient pressing and joining applications. Designed to provide a complete mechatronic package for use across a wide range of pressing and joining applications, the kit functions on the plug-and-produce principle. It will be supplied in sub-Saharan Africa through Tectra Automation.

Industry requirements and processes are shifting away from individual products to complete system kits. In the Factory of the Future, it is envisaged that machines, production lines and storage systems will collaborate in a cyber-physical network capable of autonomously exchanging information, triggering actions and controlling one another. The Smart Press Kit is an innovative solution on the road to the Smart Factory. It delivers swift, easy commissioning with automatic configuration.

The modular kit consists of synchronised hardware and software components: electromechanical cylinder and power sensor, servo motor, drive controller, industrial PC and browser-based HMI software. Pre-selected mechanical, electrical and software components are combined in various kits for forces from 2 to 30 kN.

Incorporating automatic parameterisation of the servo drive, pre-installed operating software and a minimal number of interfaces, the kit simplifies configuration and commissioning, maximises transparency, reduces downtime and increases productivity, saving up to 95% of engineering time. The new software is Industry 4.0 capable with OPC-UA connection and no programming knowledge is required.

Tectra Automation Product Manager, Julie van den Berg, says, "The Smart Press Kit can be used as a standalone or integrated solution." It is ideal for applications where simplicity and rapid commissioning are important, in assembly, joining, forming and testing applications.

Tectra Automation is a Bosch Rexroth South Africa Group company and an African leader in pneumatic, electric and mechanical drive technology. The Smart Press Kit adds to the company's offerings for industrial and factory automation applications in sub-Saharan Africa.

For more information contact Julie van den Berg at Tectra Automation.
Tel: +27 (0)11 971 9400, email: julie.vandenberg@tectra.co.za

The new Smart Press Kit combines mechanical and electrical components with software.

3D sensors to automate robot grippers

ifm's 3D sensors, available from ifm electronic ZA, are designed for use in automated and robot-assisted systems, to detect the position of an object, even when the object is moving, and transmit it to the robot control, which controls the gripper. The sensor system can detect rectangular, round and irregular shapes and transmit the position of their centre of gravity as well as their number and dimensions to the controller. It can be used for a range of objects, typically, boxes, cardboard packages, buckets, kegs, cans, bags, wheels or luggage.

Automated gripper systems can increase the productivity of many applications as they can carry out monotonous manufacturing steps more quickly and consistently than people.

In addition, monotonous movements with heavy objects can be bad for workers' health and lead to frequent absences. When robots take over heavy physical work, this increases machine uptime and releases human workers for tasks for which they are better suited.

For more information contact ifm electronic ZA. Tel: + 27 (0)12 450 0400, email: info.za@ifm.com

ifm's 3D sensors enable automation of robot grippers.

CC-Link IE network switches in smart manufacturing

As businesses move towards the Factory of the Future, Phoenix Contact is committed to helping its customers with reliable, futureproof components, systems and solutions to enable interconnectivity. In this regard, two key aspects of its strategy are ensuring CC-Link Partner Association (CLPA) conformance for its CC-Link IE compatible network devices and understanding the potential of innovations such as time-sensitive networking (TSN) technology.

According to John Browett, General Manager CLPA-Europe, addressing the communications and connectivity needs of Industry 4.0, such as openness and interconnectivity, is a key consideration for Phoenix Contact, a global market leader and innovator in the field of electrical engineering and automation. This is why the company chooses to rely on the widely adopted open Industrial Ethernet technology CC-Link IE.

Jan Aulenberg, Product Manager – Industrial Network Technology at Phoenix Contact, comments further: "The biggest advantage of CC-Link IE is that it is based on the Industrial Ethernet technology standard that is accepted worldwide, so this solution can be used universally. In addition, the CLPA offers detailed information about CC-Link IE networks and certified products on its website."

Leveraging this opportunity, Phoenix Contact is developing CC-Link IE compatible devices and submitting its CC-link IE products for CLPA conformance testing. "Since CC-Link IE products can be tested and certified, we can ensure that these will fulfil the requirements of any CC-Link IE system," says Aulenberg.

Network switches are particularly important to ensure connectivity for automation components, so it is advantageous for Phoenix Contact to ensure CLPA conformance for its CC-Link IE network switches. The recently certified FL SWITCH 2000 family of managed switches is a range of intelligent systems designed to maximise flexibility, robustness and stability in industrial automation networks. Aulenberg says, "First, we certified three FL SWITCH 2000 switches with up to eight ports according to CLPA specifications. Now we are planning for our switches with up to 16 ports and fibre ports to undergo CLPA conformance testing."

Looking to future developments and innovative technologies for its products, Phoenix Contact believes TSN will be one of them. Aulenberg notes, "TSN is so important because – together with other big digital communications innovations, like 5G or 2-wire Ethernet – it will have a big impact on the automation systems of the future. With them, it will be possible to set up a system that will outperform today's systems.

"TSN is intended to bring real-time capabilities into standard Ethernet. The main advantages are time synchronisation opportunities and the prioritisation of time-critical data traffic."

These two elements are the foundation of CLPA's latest open Industrial Ethernet technology, CC-Link IE TSN. This implements the IEEE 802.1 TSN standards on precision clock synchronisation and scheduled traffic to deliver a key tool for smart manufacturing.

For Phoenix Contact, as a technology leader with more than 30 years' experience in the field of industrial communications technology, TSN will also be an important future technology. "We are involved in all the relevant working groups and standardisation committees to develop TSN solutions to continue benefitting our customers," Aulenberg adds.

For more information contact CLPA-Europe, email: john.browett@eu.cc-link.org or visit: eu.cc-link.org

Phoenix Contact is developing and delivering CC-Link IE compatible network devices, systems and solutions to support the smart factory.

AGVs navigate safely with safety laser scanner

Automated guided vehicles (AGVs) are often equipped with two different scanners – one for safety and one for navigation. Now there is a more cost effective alternative – the new Leuze RSL 400 safety laser scanner.

This innovative safety laser scanner provides protective and warning fields to ensure that AGVs are operated safely, and simultaneously captures the required measurement values for the navigation software. This means that only one scanner is needed for both safety and navigation.

Available from leading sensor specialist, Countapulse Controls, the Leuze RSL 400 safety laser scanner makes use of the latest technology to achieve measurement values with a high angular resolution and accuracy. The measurement value output of the device is optimised for navigation software which functions in accordance with SLAM (Simultaneous Localisation and Mapping). These characteristics allow the Leuze RSL 400 to determine the position of the AGV precisely.

The navigation software contains an image of the operating area including all fixed boundaries. The current position of the AGV is calculated by comparing the measurement values to this map. This concept is referred to as natural navigation.

With each revolution of its deflection unit, lasting 40 milliseconds, the safety laser scanner emits 2 700 light pulses. These are scattered in all directions and parts of the scattered light are transmitted back to the scanner. These are used to calculate the distance to an obstacle.

The more detailed and exact the measurement values of the scanner, the more precisely the AGV can navigate. With an angular resolution of 0.1, the Leuze RSL 400 can capture the environment in detail over the entire measurement range up to 50 metres. This is achieved through a narrow laser spot that maintains its perpendicular shape over the entire scanning angle. It also reduces incorrect measurements which can occur on edges.

In addition to the angular resolution, distance values are important. The Leuze RSL 400 offers an error accuracy of less than 30 mm, resulting in high precision. The technology incorporated into the device ensures that the values are not affected by the reflectance of an object, whether it is a reflector or a black wall.

The additional output of the received signal strength value for each beam allows autonomous detection of reflectors by the navigation software. When beams strike a reflector, the values differ greatly from any other environment. This makes simple and reliable detection possible.

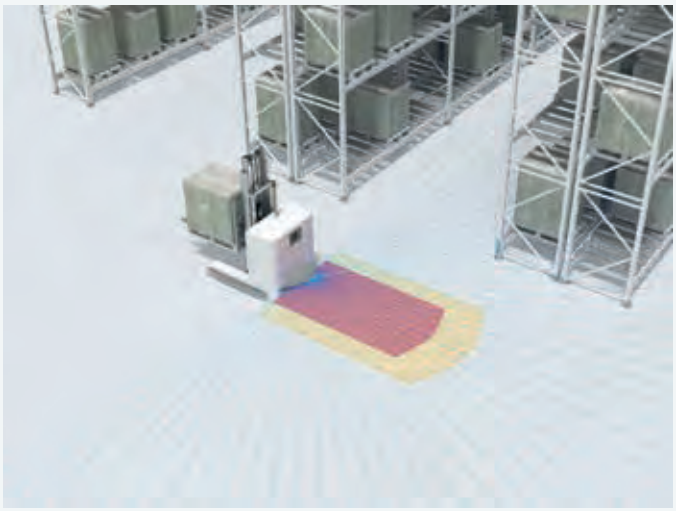
The scanner also provides for optimised safety, with up to 100 switchable protective and warning field pairs. The protective fields can be adapted to the respective movement and load conditions of the AGVs.

For example, in 4-field mode with 50 switchable field sets, the Leuze RSL 400 device can monitor up to four protective fields simultaneously. This enables safe and reliable reduction of the speed of the AGV. With its scanning angle of 270°, the device can also cover the front and side areas of an AGV at the same time – it can see around the corner.

Available in various models with nine functional variants, three of which have data output for AGV navigation, the Leuze RSL 400 safety laser scanner offers four operating ranges: up to 3.0, 4.5, 6.25 and 8.25 metres. Models available with PROFIsafe/ PROFINET interfaces make it easier to integrate the devices, particularly when many different protective field configurations are used.

For more information contact Countapulse Controls.
Visit: www.countapulse.co.za

The Leuze RSL 400 laser scanner provides for safe navigation of AGVs.



50th ifmniversary

experience in automation

On 29 October 1969 with the development of the inductive proximity switches for 220 V supply voltage for direct triggering of a contactor, ifm electronic geräte gmbh+co kg was born. At first, ifm's product portfolio consisted of inductive sensors with a sensing range of 10 and 20 mm. The motivation was to do it in a different way than all the others – and better: with quality, reliability and customer service.

Today, half a century later, ifm's exceptionally wide product portfolio does not only cover all relevant standard solutions but also the special requirements of individual industries. In addition to position and process sensors, sensors for motion control and safety technology are part of the product range.

Furthermore ifm offers products for industrial imaging and communication as well as identification systems and systems for mobile machines. Besides, ifm has been developing more and more innovative Industry 4.0 solutions.

First development of the inductive sensor 220 V.

First datasheet

Go ifmonline! Follow us on Contact us for 50 years of experience

ifm – close to you! www.ifm.com

Stable DIN rail power supply for automation applications

Automated production systems require power supplies with high stability and safety protection. For such demanding applications Delta Electronics DIN rail power supply series is available locally from ElectroMechanica (EM).

The CliQ DIN rail power supply series offers state-of-the-art design to withstand harsh industrial environments. EM Product Manager William Cameron points out that the rugged metal or plastic case is shock- and vibration-resistant, in accordance with IEC 60068-2.

The Delta CliQ II DIN rail power supply series has an IP20 protection level. The Delta CliQ III series is designed with high power density and smart overload protection features. All the models in the series are encased in rugged yet lightweight, corrosion-resistant aluminium casings.

Delta's Chrome DIN rail power supply series is designed for use in compact cabinets, which are widely used in the food and beverage industry. Units with 5 V, 12 V and 24 V output voltage, for power ratings from 10 W to 100 W, are available.

The series offers double-isolated input. This means that no earth connection is required and ensures low leakage current. The Chrome series features universal ac input range and is certified in accordance with IEC/EN/UL 60950-1 for information technology equipment (ITE) and UL 508 for industrial control equipment (ICE). The series is also fully compliant with RoHS Directive 2011/65/EU for environmental protection. NEC Class 2 and limited power source (LPS) approvals are available for selected models.

The Delta DRS Series Sync DIN rail power supply series is compact and designed for industrial applications requiring highly reliable power supply that, in addition, must fit in a small space. The Sync series operates with universal ac input range, offering full power from -10°C to +55°C. The output is adjustable, with up to 89% efficiency.

The Delta DRL Series Lyte DIN rail power supply series is convection-cooled and operates between -20°C and 70°C, with full-rated power available from -10°C to +50°C at 230 V ac. The overcurrent protection feature is designed to operate in constant current mode, which makes the series ideal for inductive and capacitive load applications. Electromagnetic radiated and conducted emissions are compliant with EN 55022, Class B.

ElectroMechanica is a specialist importer and wholesale distributor of high-end industrial electrical products, motor control switchgear and electronic automation products. A wholly-owned South African company, ElectroMechanica offers its clients products sourced from leading local and international brands, all complying with recognised international safety standards and performance specifications.

For more information contact Karen Zotter at ElectroMechanica. Tel: +27 (0)11 249 5000, email: karenz@em.co.za

The Delta Chrome DIN rail power supply series is ideal for compact cabinets.

Tough enclosures for remote I/O control networks

Intertec is introducing a range of tough field enclosures, with compact passive cooling, to house remote I/O and other control and instrumentation electronics. The enclosures have been developed to help EPC and processing plant engineers eliminate the need for costly plant buildings such as satellite instrument houses or remote instrument enclosures – which often need to be air-conditioned and blast- and fire-resistant.

Fabricated from GRP (glassfibre reinforced polyester) materials, the enclosures provide rugged dust- and water-proof environments to protect remote control equipment located deep inside processing areas. The concept responds to requests from clients – making it easier to roll out more versatile, distributed control architectures containing field equipment such as software-configured I/O, IIoT networking and PLCs. It also provides for field control equipment enclosures to be assembled and sealed in the factory – an efficient and cost-effective process – avoiding the need for opening and exposure to dangerous conditions at site during installation and operation.

Intertec's GRP enclosures can be fabricated with embedded insulation (a monolithic sandwich with layers of GRP sheet enclosing insulation). This is a major benefit in respect of remote I/O applications using sensitive electronic devices with lifetimes and reliabilities that are reduced by overheating. Efficient insulation helps protect against temperature extremes and it is one reason why the simple steel cabinets, widely used for cabling-related field junction boxes, are not adequate for some of the more sophisticated remote I/O applications now being deployed.

Because of the electronic devices housed in the enclosures, some form of cooling may also be required. If power is available on the site, conventional fan cooling can be used. However, the temperature stability of highly insulated GRP boxes also makes it possible to exploit passive cooling systems, which do not require electricity and have no moving parts (an advantage that supports their use in hazardous areas too). A tank of water and a heat exchanger use the cool night-time temperatures to moderate the interior temperature during the day.

As many advanced remote I/O applications will, by their nature, be small and compact, Intertec has designed new passive cooling systems for smaller-sized cabinets and enclosures. These include a passive cooling system with a heat exchanger that doubles as a sunshade. The performance of the passive cooler can also be boosted by a small active element – such as a water cooler. Intertec can fabricate passively cooled field protection systems like this in enclosures and box sizes down to about 40 litres in volume.

For more information visit: www.intertec.info

Automation technologies advance automotive manufacture

VinFast, Vietnam's first volume car manufacturer, has produced its first cars ahead of schedule – including e-scooters, compact cars, sedans and SUVs. Battery-powered electric passenger cars and electric buses are also on the production schedule.

With the support of Siemens' portfolio of integrated software and hardware, VinFast achieved its production timeline – for the building of the factory, car design and start of the production – in only 21 months, well ahead of an already ambitious schedule. This is half the average time it takes to build such a manufacturing plant. The VinFast plant in Hai Phong went live in June 2019. It has a total design capacity to produce 250 000 cars per year.

The entire value chain of the manufacturing facility has been integrated and digitalised with Siemens' Digital Enterprise portfolio, which includes Xcelerator software and Totally Integrated Automation (TIA). Xcelerator enables the creation of the most accurate digital twin, melding model-based simulations with test data and real performance analytics with intelligent edge control. VinFast is using Teamcenter software as the backbone of collaboration for product lifecycle management and NX software, a leading integrated solution for computer-aided design, manufacturing and engineering (CAD/CAM/CAE), to develop the digital twin of cars and production. Teamcenter connects the digital twin with a consistent digital thread, which is helping the company increase speed and flexibility in development, optimise manufacturing processes and use the insights gained from product and plant operations to improve future performance.

The automotive manufacturer has also implemented Siemens Opcenter software (formerly Simatic IT Unified Architecture) to increase production speed and quality. This MES (manufacturing execution system) solution supports closed-loop manufacturing by driving real-time production data to the digital twin of the product and enables innovation in product design and production operations.

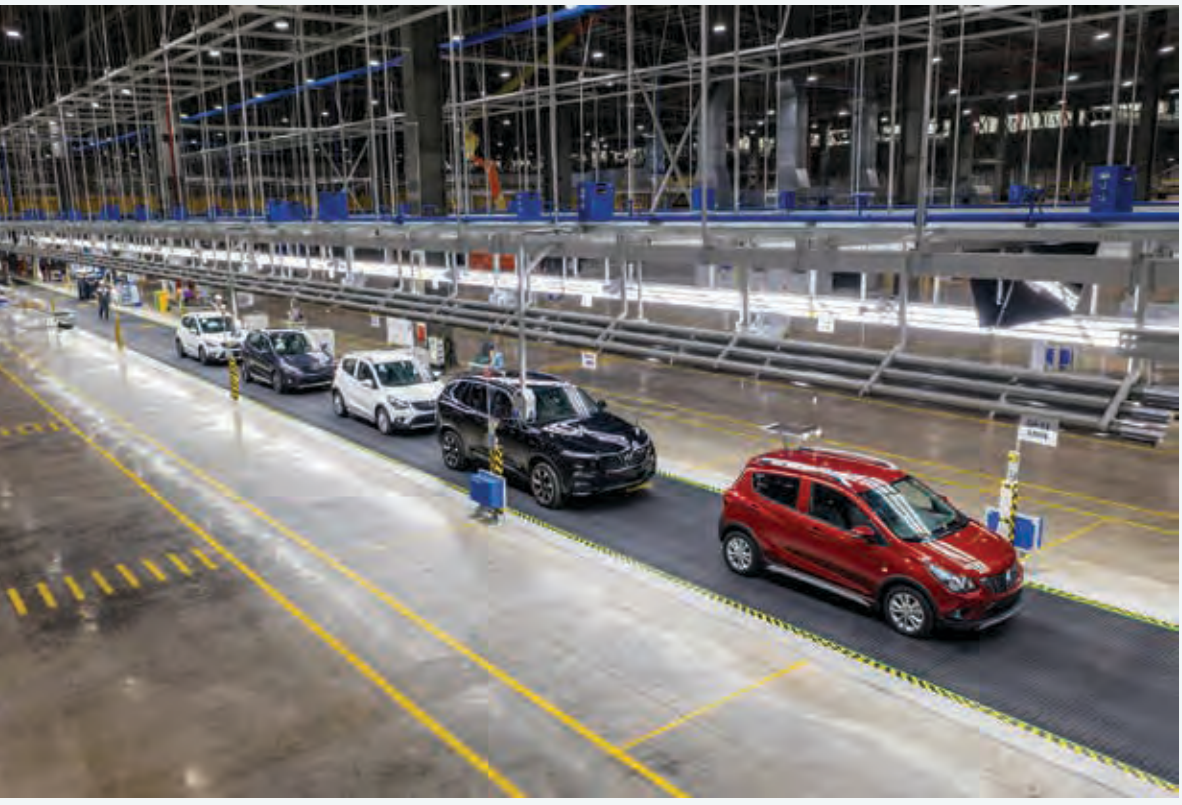
The modular and flexible Totally Integrated Automation controls and drives all production. VinFast has deployed Siemens' automation equipment for its manufacturing lines in all shops: the press shop, paint shop, body shop, assembly shop, sub-assembly- and engine shop. Simatic controllers enable the automation of factory operations such as robots or conveyor lines, with safety functionality. VinFast uses the engineering framework TIA Portal to program automation tasks from the press shop through to final assembly. Simatic HMIs are also widely used in the factory, enabling production staff to operate and observe the status of machines and entire systems.

In addition, using Siemens' industrial identification products, VinFast can track and trace parts and optimise the flow of materials. Sinumerik controls guarantee highest efficiency and quality in the powertrain machinery. Further Siemens products in use include network components, power supplies, control products, low voltage distribution and switchgears, an energy distribution system as well as motors and drives. Siemens' comprehensive range of automation components enabled VinFast to build its factory to high quality global standards.

Bernd Mangler, Senior Vice President Automotive Solutions at Siemens Digital Industries, says, "VinFast and its new production site are a great example of how the automotive industry is driving the digital transformation of manufacturing. We are proud that we contributed to creating the virtual and real production lines as well as the technology for continuous optimisation along the entire lifecycle of the equipment – and of course, it all had to happen at record speed."

VinFast is part of the Vingroup – the largest private enterprise and one of the leading technology, industry and service groups in Vietnam.

For more information visit Siemens Digital Industries: www.siemens.com/automotive



VinFast, in Vietnam, has produced its first cars ahead of schedule using Siemens' portfolio of integrated digitalisation and automation software and hardware. (Photo: VinFast)

New LM sensor for precise applications

The LM series of precision measurement sensors from Turck Banner is now available in a more precise model that features a 0.002 mm analogue resolution at a range of 40 to 80 mm. The new LM80 model also features a smaller spot size (less than 1 mm at all measurement ranges) to detect smaller features and take more measurements over the face of the target for more precise profiling.

LM sensors provide reliable quality control and repeatable measurements of real-world targets with varying colours and reflectivity. In addition, LM sensors feature a thermally stable design that resists temperature changes as well as enhanced mounting stability for high accuracy in the toughest environments. The new LM80 has a temperature effect of +/- 0.006 mm/°C. This is important for high precision applications as even a few degrees of temperature change can cause measurement errors to double on some sensors.

With IO-Link communication, users can monitor sensor performance remotely, identify and analyse trends in inspection results easily, and predict when maintenance is needed so that problems like a dirty lens can be resolved before sensor failure.

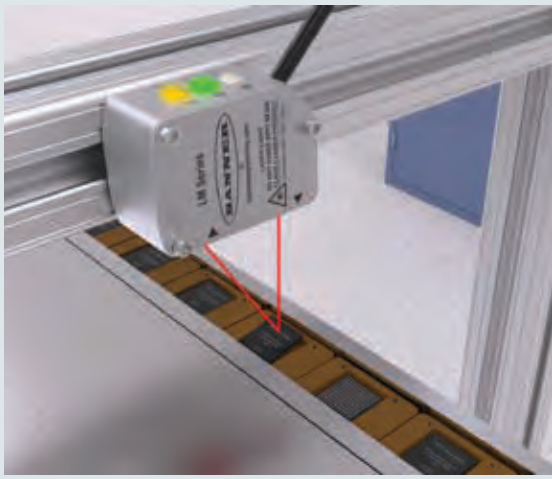
Featuring a fast 0.5 ms response speed and 0.25 ms sampling rate, LM sensors reliably solve high-speed applications with fast-moving targets.

The sensors provide discrete, analogue and IO-Link capabilities all in one device, which makes for flexibility and reduces inventory requirements.

They also offer the advantage of quick setup and replacement. LM sensors can be programmed via IO-Link or an optional remote sensor display (RSD). The RSD enables remote setup and monitoring and stores up to six configurations to facilitate product changeover and simplify device replacement. The RSD can remain in-line so that sensors in difficult-to-reach locations can be monitored easily, or it can be removed after configuration.

For more information contact Brandon Topham at Turck Banner. Tel: +27 (0)11 453 2468, email: brandon.topham@turckbanner.co.za

The new LM80 sensors provide for high precision measurement on the production line.



Innovating Africa's Industries

Endress+Hauser South Africa and its sponsorship partners launched the Innovating Africa's Industries (IAI) conference at the end of August 2019, at Emperors Palace in Johannesburg. This new industry forum was created by Endress+Hauser in partnership with other key industry players to collaborate on addressing the challenges faced by the process automation industry with regard to new technologies and innovation. Other key players that sponsored the event and participated in it included, among others, Andritz, DRA Global, GEA, Krones, PSA Global, Rockwell Automation and WEC Projects.

Among the challenges identified are:

- Rapidly changing trends in the industry
- IIoT and digitalisation
- The need for new skills and knowledge
- Increasing production in demanding conditions
- Access to real-time plant information
- Ensuring safety and environmental compliance.

The IAI conference was the first of its kind to be hosted in Johannesburg and sought to present current and future technologies to prepare today's industry managers for the changing industrial environment.

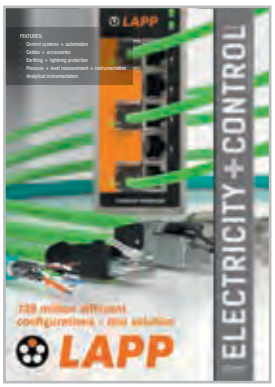
The conference was organised in three parallel streams addressing different industry sectors – food and beverages, water and wastewater, and primaries and metals. Different speakers in each session shared their expertise on various topics related to the industry. Key issues addressed included: smart mining with big data, digital transformation and the evolution of digital automation in the mining industry, digitalisation and smart cloud solutions in the food and beverage industry, the journey to digital water, biological wastewater treatment technology and the preservation of water quality, among others. Exhibition stands presented a further opportunity for delegates to learn more from the participating companies.

The Endress + Hauser team at the IAI Conference and Expo.

In addition, some case studies were presented as examples of how innovative solutions can empower the process industries. Francois Theron from Clover, for example, shared a presentation on engineering management challenges and Saziso Ngida from ABInBev unpacked end-user expectations for seamless integration.

For more information contact Endress + Hauser.
Tel: +27 (0)11 262 8000,
email: info@za.endress.com

Predicting cable breaks ahead of time



Replace parts before they fail, avoid unplanned downtime – these are the promises of predictive maintenance. But how do we determine the aging of a cable and predict when it will fail? LAPP has developed a solution for Ethernet cables that does not require any changes to the cable.

Predictive maintenance is one of the most promising benefits of digitalisation in factories. It is based on sensor data that is supposed to enable conclusions to be drawn about the aging and required replacement of the monitored parts.

Predictive maintenance also concerns connection systems. Even if cables usually last for many years, failure cannot be ruled out, and cable failure can paralyse an entire production line – causing unplanned downtime with its associated high costs. "That's why we wanted to develop a solution that will sound the alarm before a cable fails," says Guido Ege, Head of Product Development and Management at LAPP.

Focus on Ethernet cables

Ethernet cables, particularly when laid in energy chains, are more prone to failure than current-carrying cables due to their complex structure and the necessary high-frequency characteristics. For instance, broken shielding leads to increased EMC interference. If strands of wire break, attenuation increases and the data rate drops. If a strand breaks, communication fails completely.

Ege's team therefore focused on developing a predictive maintenance solution for Ethernet cables. The aim was to be able to predict the remaining lifetime of a cable and plan replacement in a way that would guarantee minimum disruption to machine operation. For this purpose, the transmission characteristics of data cables are monitored and changes in those characteristics are used to calculate the expected service life.

One of the requirements was to develop a measuring principle that works without changing the cable – without additional 'sacrificial wires' in the cable. (Additional wires mean additional installation work.) The solution was to be based only on a protocol and a special algorithm. This means it can be used with standard Ethernet cables and standard connectors such as RJ45 or M12. The installer connects the cables as usual and does not have to connect any additional sacrificial wires. This approach also has the advantage that it allows for retrofitting to existing systems.

LAPP's Predictive Monitoring Box, the PMBX, has two Ethernet ports and is simply inserted at the start of the Ethernet cable to be monitored. The data packets are transmitted transparently from one Ethernet port to the other, almost instantly. For a connected PLC, the PMBX is not visible and it has no influence on the data transmission. It can therefore be used on existing systems without necessitating any changes to the PLC software.

The failure prognosis is based on up to four transmission-relevant parameters which are used to calculate the LAPP Predictive Indicator. Plausibility checks can also be done to minimise potential misinterpretations of measured values.

The predictive maintenance system uses a deep learning approach. For LAPP drag chain cables, for example, millions of measured values have been collected in-house and analysed using mathematical algorithms. The more data available, the more accurate the prediction. The system is self-learning. After just a few weeks of data collection at LAPP's own test centre, cable failure was predicted with notice from a few hours to several days. Such predictability means replacement can be planned and carried out at a suitable time.

For more information visit: www.lappgroup.co.za

The LAPP Predictive Maintenance Box is being further developed and refined in the LAPP Test Centre.

The ETHERLINE® TORSION Cat.7 is a high-performance cable for industrial Ethernet.

Automated cable identification supports production efficiencies

For engineers and technicians working with large volumes of cables where cable traceability and identification are essential, Brady's complete and automated cable identification solutions can help increase production efficiency.

Cable sleeves and wraparound labels can be applied up to 10 seconds faster using Brady's automated cable identification solutions. The Wraptor A6500 can print and wrap a label around a cable in five seconds, saving time in cable production when traceability and identification are required.

Where sleeves are used to identify cables, Brady offers the BSP45 Automated Sleeve Applicator, which is activated by a foot pedal to remove sleeves from their liners and apply them onto cables. Sleeves can be printed with accuracy and precision using the BradyPrinter i7100 or the BBP72 Sleeve Printer which can print both sides of the sleeve simultaneously.

Dedicated wraparound labels and sleeves are available for use with Brady's automated identification solutions to deliver maximum reliability. The labels and sleeves are of high quality and can withstand challenging industrial environments. The B-427 self-laminating vinyl label, for example, is resistant to abrasion, fuel, oil and outdoor environments and is available in a range of colours. The B-499 nylon cloth wraparound label offers additional resistance to dirt, heat, cold and chemicals. Both these labels work seamlessly with the Wraptor A6500.

For the BSP45 Sleeve Applicator, Brady recommends its B-342, B-7646 and B-7641 sleeves, which include diesel-resistant or low-smoke zero-halogen properties.

All identification materials are tested using standard ASTM test methods for optimum reliability. Technical data sheets are available from Brady's website.

As a leading supplier of cable labels and labelling equipment, Brady also offers a support app for easy label and sleeve design. The Brady Workstation app is supplied with a 30-day free trial period. Users can then select the apps they need after trying them.

For more information contact Brady South Africa.
Tel: +27 (0)11 704 3295,
email: info_africa@bradycorp.com

The Wraptor A6500 can print and wrap a label around a cable in five seconds.

New cable glands for industrial and explosive environments

Leading cable gland and cable cleat manufacturer, CMP Products, which is based in the UK and operates internationally, has released its new product range TruSeal to the market. This follows the company's significant investment in the latest machinery and tooling at its UK headquarters.

The TruSeal range of polymer and metallic cable glands complies with the latest product safety standards for installations in industrial environments (IEC/EN 62444) and explosive atmospheres (IEC/EN 60079-0, 7, 31). All materials are UV resistant, zero-halogen and phosphorus-free as standard. In addition, the products are certified to perform across an extensive range of hot and cold temperatures and have the highest available impact ratings.

CMP's research and development (R&D) team has designed TruSeal so that each cable gland size can be supplied with three different polymer sealing rings, ensuring that each size of TruSeal gland has the largest cable acceptance range on the market. This assists with reducing onsite inventory levels and costs.

Engineers from R&D, manufacturing and automation all played key roles in bringing TruSeal to market while the company has invested in certification for the new glands, along with new plant and equipment, including new pad printing facilities and state-of-the-art injection moulding.

Lee Frizzell, Technical Director at CMP said: "From extensive research into the global market and informed insights from our customers, we have created what we believe to be the safest, best quality cable gland of its kind and, as a result, we expect demand to be high.

"The development of TruSeal entailed a collaborative approach between our customers and our technical experts in the UK and around the world. Launching a new product range is challenging but we are excited to see demand accelerate now that the range is available."

Expanded Africa operations

CMP Products has recently strengthened its presence in South Africa, also serving the sub-Saharan market. The company has established a new 516 m² warehouse and office facility in Johannesburg and appointed a new management team. The new premises, close to OR Tambo Airport, provide customers access to a greater range of cable glands and cable cleats than before and with shorter lead times.

Recently appointed Regional Sales Manager, Clinton Vieira heads up the new operation. Vieira has a strong background in CMP's core target markets of power and renewable energy. He is supported by Office Manager, Chanelle Visagie, a customer services specialist tasked with running the sub-Saharan operation from the warehouse and responsible for linking up regularly with CMP's UK headquarters.

Vieira said: "The new warehouse underpins our investment in the African market and provides our customers with unprecedented access to our products. With the direct link to the UK, we also ensure that customers have rapid access to the new products that we will be launching.

"The company's reputation for quality and service is second to none in this market and we will be spreading this message throughout the sub-Saharan region," Vieira added.

CMP Products designs and manufactures cable glands, cleats and associated products for installation in marine, industrial and explosive environments.

It produces cable glands to suit a variety of applications and its products cover multiple international installation codes – from IEC to NEC. A selection of approvals is available on request. The company uses selected materials to ensure that it can supply the right cable gland for the right environment, within a short lead time.

CMP also manufactures a range of cable cleats for standard and bespoke applications and in various materials, so that it can offer customers the right product for different applications. The company's cable cleats are designed in accordance with IEC 61914 to ensure that safety always comes first.

For thread conversions and accessories, CMP offers a further diverse range of products delivering quality and longevity.

For more information contact CMP Products.
Tel: +27 (0)11 266 8880, visit: www.cmp-products.com

The new TruSeal range of polymer and metallic cable glands for industrial applications is available internationally.

SOMETIMES THE CHOICE IS DIFFICULT …

… THE CHOICE FOR LEVEL 80 GHZ RADAR!

One radar sensor
for liquids.

MEASUREMENT IS EASY:

One sensor for bulk solids.
Sounds simple, is simple!

VEGA WE ♥ RADAR

RADAR LEVEL MEASUREMENT WITH 80 GHZ

Industrial processes are becoming increasingly customized and complex. Now it's even easier to select the right level transmitter for your needs. For a reliable non-contact level measurement solution, just choose VEGAPULS 64 for liquids or VEGAPULS 69 for bulk solids.

DYNAMIC RANGE 120 dB

Poorly reflecting media? Dust, condensation, or buildup? Radars with best-in-class dynamic range deliver constant visibility of your process levels.

FOCUSING 3°

No interfering signals from internal installations. A radar beam angle from 3° for liquids and 4° for bulk solids.

PROCESS FITTINGS FROM ¾"

With small connections and a compact design, VEGAPULS 64 is the perfect fit in the smallest liquid containers.

ACCURACY +/-1 mm

Every drop counts with VEGAPULS 64. It really scores points for accuracy, especially with high value liquids.

ADJUSTMENT Bluetooth®

80 GHz radar sensors can be adjusted wirelessly with a smartphone or tablet. Did you know? All VEGA level sensors since 2002 can also get Bluetooth. Just click-in a new PLICSCOM display and adjustment module and it's done!

VEGA WE ♥ RADAR

More information: **www.vega.com/radar**

Phone +27 11 795 3249 | E-mail info.za@vega.com

Hybrid cable for Ethernet and power transmission

Hradil, the specialist cable engineering company based in Bietigheim-Bissingen/Stuttgart, in Germany, has introduced a high-performance hybrid cable for rugged outdoor environments, suitable for use in energy chains and designed for data transmission via Ethernet as well as power transmission.

The high-performance hybrid cable is a Cat5e Ethernet cable that transmits power up to an operating voltage of 125 V as well as transmitting data in real time. It enables, for example, the transmission of live images via Ethernet (1 000 Base-T) and supplies monitoring cameras or servo motors with power.

The high-performance hybrid cable is designed for rugged outdoor tasks and to withstand temperatures from -10 up to 70°C for mobile applications and from -40 up to 120°C for permanent installations.

The innovative cable design and materials used for its construction lend the Hradil hybrid cable some exceptional mechanical capabilities: it can withstand tensile strengths of up to 100 N and is designed to survive at least 100 000 cycles in the drag chain. It is intended primarily for use in offshore and maritime environments as well as aerospace applications, to monitor ship engines, gensets or turbines, for example. The Hradil hybrid cable complies with standards according to EN50288-2-2, EN 50173, ISO/EC 11801 2nd edition, IEC 61156-6, EN 60332-1 and IEC 60754-2.

Alfred Hradil, Managing Director at Hradil Spezialkabel, says, "Today, more industry users are demanding cables that are very versatile." Whether for reasons of cost or maintenance, or to save space, tasks that in the past were performed by several cables, are combined today in a single hybrid cable. This can only be accomplished where the technical design and materials used permit the combination of several functions in a single cable.

For the first time, Hradil now offers a hybrid cable that brings together four capabilities: Ethernet according to Cat5e to transmit real-time data up to 1 000 Base-T, power transmission up to 125 V, rugged outdoor characteristics to survive many years of use in extreme climatic conditions, and highly-developed energy chain capabilities designed to withstand extreme tensile and torsional loads.

Robust materials

In preparing the high-performance hybrid cable for the mechanical loads that come with deployment in power chains on the one hand, and the thermal and physical demands of outdoor use on the other, the Hradil engineers selected the best materials: the robust cable jacket is made of a special flame retardant non-corrosive (FRNC) compound. The cable is halogen-free in accordance with 11801.2, resistant against oil and petroleum, against cooling fluids, lubricants, cold cleaners and against ozone and UV radiation. As a result, the Hradil hybrid cable copes easily with any kind of environment – Arctic or tropical temperatures, aggressive dust or environmental toxins, seawater, and a high level of exposure to UV and solar radiation or ozone.

Another frequently underestimated challenge is in the considerable tensile and torsional loads that cables are subjected to as part of the rolling action of the energy chain. For this reason, the engineers at Hradil designed the high-performance hybrid cable for at least 100 000 bending cycles at a maximum tensile strength of up to 100 N. The permitted bending radius is five times the diameter for fixed and ten times the diameter for flexible installations.

Another plus point of the cable is its outer diameter of only 6.9 mm, combining six 2 x 2 x 0.14 mm² (AWG26/7) and 2 x 0.34 mm² (AWG22/7) cores within and separated from each other by a specially designed star-shaped component that also provides enhanced stability for the entire cable construction.

Electrical characteristics

As noted, the electrical characteristics of the integrated data cable support data transmission speeds of up to 1 000 Base-T according to Cat5e. The wave impedance is 100 ohms at 100 MHz. Potential interferences are eliminated by state-of-the-art EMC measures, such as the use of aluminium composite foil and braid screens. The tested transmission properties across all frequency bandwidths for attenuation, near end crosstalk (NEXT), attenuation-to-crosstalk ratio (ACR) and equal level far end crosstalk (ELFEXT) have proven to be well above average.

For more information contact Hradil Spezialkabel.
Visit: www.hradil.de or email: lea.green@hradil.de

The Hradil high-performance hybrid cable for Ethernet and power transmission.

Cross-section of the high-performance hybrid cable.

AIUE

AFRICA'S INTERNATIONAL USE OF ENERGY

AFRICAN AND INTERNATIONAL USE OF ENERGY
17th ICUE CONFERENCE

CAPE TOWN SOUTH AFRICA 25 - 27 November 2019

Energy solutions for the cities of the 4th Industrial Revolution

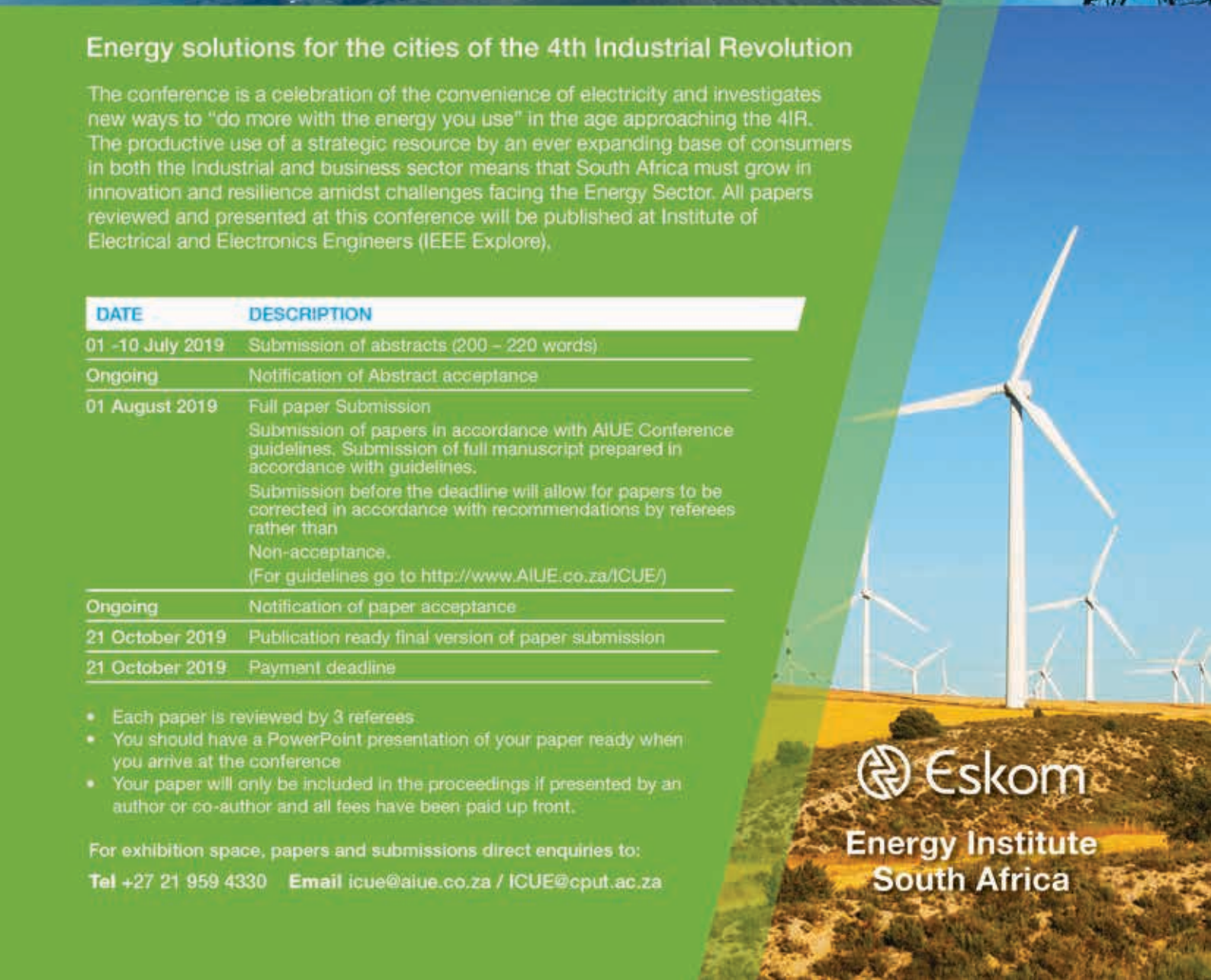
The conference is a celebration of the convenience of electricity and investigates new ways to "do more with the energy you use" in the age approaching the 4IR. The productive use of a strategic resource by an ever expanding base of consumers in both the Industrial and business sector means that South Africa must grow in innovation and resilience amidst challenges facing the Energy Sector. All papers reviewed and presented at this conference will be published at Institute of Electrical and Electronics Engineers (IEEE Explore).

DATE	DESCRIPTION
01 -10 July 2019	Submission of abstracts (200 – 220 words)
Ongoing	Notification of Abstract acceptance
01 August 2019	Full paper Submission Submission of papers in accordance with AIUE Conference guidelines. Submission of full manuscript prepared in accordance with guidelines. Submission before the deadline will allow for papers to be corrected in accordance with recommendations by referees rather than Non-acceptance. (For guidelines go to http://www.AIUE.co.za/ICUE/)
Ongoing	Notification of paper acceptance
21 October 2019	Publication ready final version of paper submission
21 October 2019	Payment deadline

- Each paper is reviewed by 3 referees
- You should have a PowerPoint presentation of your paper ready when you arrive at the conference
- Your paper will only be included in the proceedings if presented by an author or co-author and all fees have been paid up front.

For exhibition space, papers and submissions direct enquiries to:

Tel +27 21 959 4330 **Email** icue@aiue.co.za / ICUE@cput.ac.za



Eskom

Energy Institute
South Africa

Lightning protection systems for rooftop solar PV installations

Trevor Manas, Director, Lightning Protection Concepts

AT A GLANCE

1. Lightning discharges cause field-based and conducted electrical interference and this effect increases in relation to cable lengths or conductor loops.
2. Whether or not a structural lightning protection system is required, the installation of a coordinated surge protection system for the PV installation is imperative.

Solar photovoltaic energy supply systems are being used increasingly throughout South Africa. Based on the facts that owner-generated electricity is cheaper and provides a high degree of independence from the national electrical grid, PV systems are fast becoming an integral part of localised electrical installations.

Many of these systems are installed in exposed places such as on roof tops and will therefore be subjected to all weather conditions (including lightning) for decades. The cables of photovoltaic (PV) systems often enter the building and extend over long distances before they reach the electrical connection point. Lightning discharges cause field-based and conducted electrical interference and this effect increases in relation to cable lengths or conductor loops. Surges not only damage PV systems but can also damage the other devices inside the building. Most importantly, production facilities can easily be damaged, disrupting or halting production.

Lightning protection for rooftop installations

The energy released by a lightning discharge is one of the most frequent causes of fire. Therefore the protection of personnel and the prevention of fire are paramount in the case of a direct lightning strike to a building.

At the stage of designing a PV system, the building should be assessed to determine whether or not there is a lightning protection system in place, or, for new structures, whether or not lightning protection is required. The need for lightning protection for the PV system will relate to this assessment and will differ for a building without lightning protection and a building or structure that is or has to be equipped with a permanently effective lightning protection system.

Solar PV systems are often installed on rooftops and are therefore exposed to all weather conditions – including lightning – over decades.

The installation of PV modules on a building does not increase the risk of a lightning strike. The need for lightning protection does not derive directly from the existence of a PV system. There may however be an increased danger for the electric facilities of the building in the event of a lightning strike. This is based on the fact that, due to the wiring of the PV lines inside the building in existing risers and cable runs, strong conducted and radiated interferences may result from lightning currents.

It is therefore necessary to estimate the risk of lightning strikes according to SANS/IEC 62305 Part 2, and to take the results from this into account in designing the lightning protection system (LPS).

Surge protection for PV systems

Surges in PV systems are caused by inductive or capacitive voltages from lightning discharges and switching operations in the upstream ac system. Lightning surges in the PV system can damage PV modules and inverters. This can have serious consequences for the operation of the system: high repair costs of the inverter, for example, or system failure which will reduce power availability considerably.

Surge protection devices (SPDs) installed to protect the ac, dc and data systems have proven to be effective in protecting the electrical systems from destructive over-voltages and surge currents.

Whether the structure and PV system require a structural lightning protection system or not, the installation of a coordinated surge protection system for the PV installation is imperative. The type and placement of the coordinated surge protection system is dependent on whether or not the structure has an existing lightning protection system. According to Supplement 5 of IEC 62305-3, even if a building is not equipped with a structural lightning protection system, surge protection devices must be installed to rooftop PV systems.

Cable routing of PV systems

Cables must be routed in such a way that large conductor loops are avoided. This precaution must be observed when combining dc circuits to form a string and when interconnecting several strings. Care should also be taken with the routing of data and sensor lines, and the same precaution must be observed when connecting the inverters to the electrical grid. In order to prevent the creation of large conductor loops, all power cables (ac and dc) and data lines must be routed together with the equipotential bonding conductors along their entire route.

Earthing and equipotential bonding of PV systems

PV modules are typically mounted on metallic mounting systems. The earthing or equipotential bonding of the metal frames into the lightning protection system, or the electrical earthing system (in the case of a structure without a LPS), will ensure the correct bonding and earthing of the PV modules. The way in which the equipotential bonding is implemented is dependent on whether or not the structure has an existing lightning protection system and whether or not the required separation distances can be maintained.

Separation distance(s)

In terms of SANS 62305-3, a certain separation distance(s) must be maintained between a lightning protection system and a PV system. The separation distance is the minimum distance required to avoid uncontrolled flashovers to adjacent conductive elements as a result of a direct lightning strike to the lightning protection system. In a worst case, the uncontrolled flashover can cause a fire and the separation distance(s) should therefore be implemented wherever possible.

The separation distances required between the PV panels together with their conductive elements and the structural LPS should be calculated in accordance with SANS 62305-3 and must be maintained. The use of HVI conductors is an acceptable method of ensuring separation distances in cases where physical separation is not possible.

Core shadows on PV panels

The distance between the PV panels and the external lightning protection system is essential to prevent excessive shading. Diffuse shadows cast by, for example, overhead lines, do not significantly affect the PV panels or their yield. Core shadows that cast a dark, clearly defined shadow will negatively affect the PV panels in such a way that they influence the current flowing through the panels.

For this reason, lightning protection air termination masts should be installed as far as possible to the south side of the PV panels (southern hemisphere) and the distance of the north side air termination masts should be calculated and maintained so as not to affect the performance of the PV system negatively. For example, for a 10 mm diameter air termination mast, the minimum distance away from a PV panel should be 1.08 m so that only a diffuse shadow is cast onto the panel.

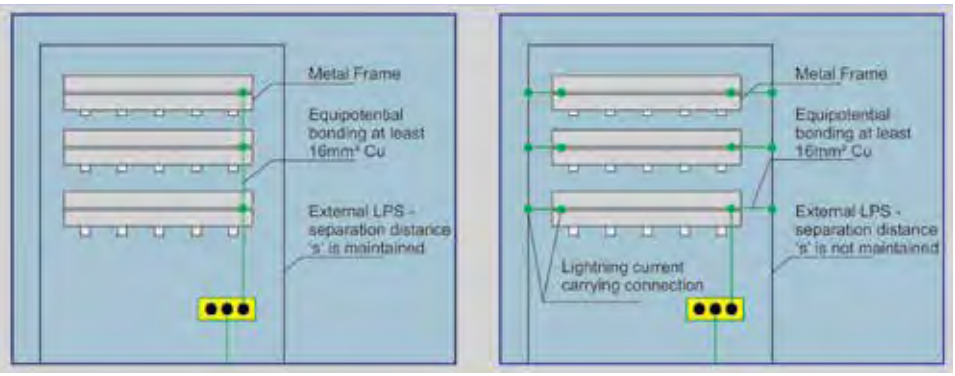


Figure 1.1 Functional earthing of the PV mounting system.

Figure 1.2 Equipotential bonding of the PV mounting system.

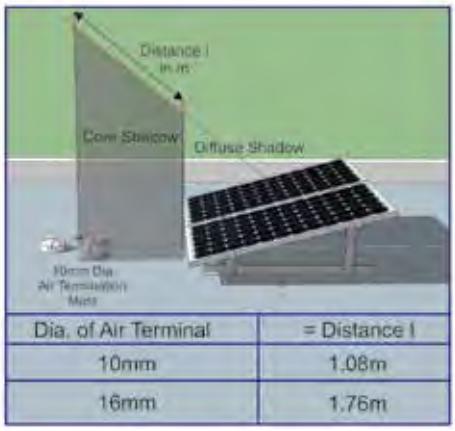


Figure 2. Separation distances must be maintained between the LPS and the PV panels.

Application examples

Acknowledging that the protection of rooftop PV systems against lightning is imperative, the type of lightning protection system to be used differs for new and existing structures.

For new structures, it is mandatory to carry out a lightning protection risk assessment in accordance with SANS 62305-2. Once the assessment has been conducted, the appropriate lightning protection level will be selected and the lightning protection system can be designed and installed to meet this, to protect both the structure and the rooftop PV system.

For existing structures, the design and installation of an appropriate lightning protection system for the rooftop PV system will vary for:

- Structures without an existing lightning protection system
- Structures with an existing lightning protection system where adequate separation distances can be maintained
- Structures with an existing lightning protection system where separation distances are inadequate.

Structures without external lightning protection

Once the required risk assessment has been carried out, if it indicates that a structural LPS is not required the following protection measures should be implemented:

- Surge protection to PV system by means of Class 2 and 3 surge arresters
- Equipotential bonding to electrical earthing system by means of 16 mm² copper conductors.

Surge protection recommendations apply for:

- dc input of the inverter / for 2 MPPTs
- ac output of the inverter / TN-S system
- LV input / TT/TNS system
- Data interface / two pairs of data cables.

Structures with external lightning protection

If the assessment confirms that there is an existing structural lightning protection system in place, the level of protection provided should be verified by an inspection of the system. This should also serve to verify that the lightning protection system is intact, fully functional and in accordance with SANS 62305 Part 3. Any defects should be rectified to ensure that the LPS for the rooftop PV system will work properly.

The inspection and verification of the existing LPS and the design of the LPS for the rooftop PV system should be performed by a lightning protection specialist. The lightning protection system should be installed in such a way that the PV panels are not vulnerable to direct lightning strikes.

The method of protecting the rooftop PV installation is via the air termination system, with the preferred protection methods being either the angle of protection method or the rolling sphere method of protection. The size of the sphere and the size of the angle of protection are both dependent on the applicable lightning protection level. The designer of the lightning protection system should also consider which method of protection will be more economically viable.

If possible, where the calculated separation distances are maintained, an isolated lightning protection system should be installed. Isolated lightning protection systems are far more effective than non-isolated systems.

If the installation of an isolated lightning protection system is not possible then the installation of additional Class 1 lightning current arresters is required on both the ac and dc sides at the inverter boxes.

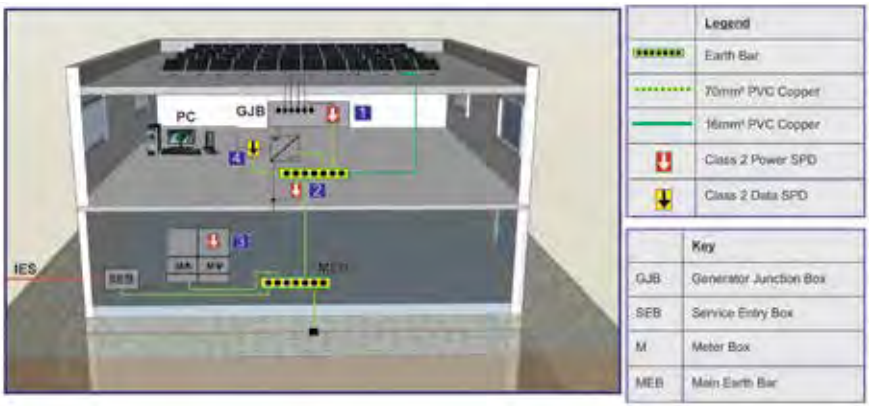


Figure 3. On buildings where a structural LPS is not required, surge protection measures must be applied on the solar PV system and it must be bonded to the building's electrical earthing system.

Figure 4. Equipotential bonding]

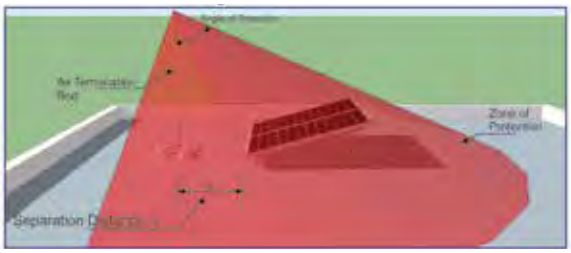


Figure 5. Using the angle of protection method to protect a rooftop PV installation.

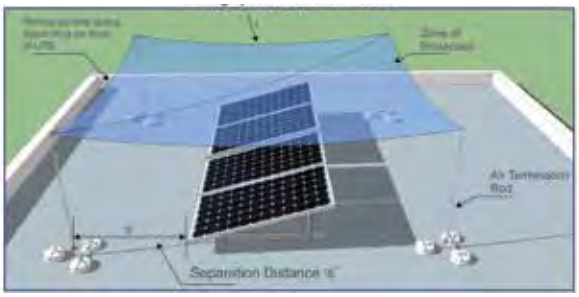


Figure 6. Using the rolling sphere protection method to protect a rooftop PV installation.

Structures with external lightning protection and adequate separation distances

Where adequate separation distances can be maintained between the LPS and the PV system, the PV system should be protected as follows:

- LPS in accordance with the required lightning protection level (as assessed)
- Surge protection by means of Class 1 lightning arresters and Class 2 and 3 surge arresters
- Equipotential bonding by means of 16 mm² copper conductors to earth bar only – there should be no bonding to air terminals.

In order to protect the PV system from direct lightning strikes, the system must be installed within the protected volume formed by the external lightning protection system. The protected volume is created by the installation of air termination rods and the rolling sphere or angle of protection methods are used to calculate the height and placement of the air terminals.

Establishing the correct separation distances prevents partial lightning currents from entering the building and electronic equipment via the PV system's cabling. Inverters and data systems are protected by means of Class 2 surge arresters, not Class 1 lightning arresters. The overall cost of the lightning protection system is therefore reduced and the installation is in line with the preferred method of protection.

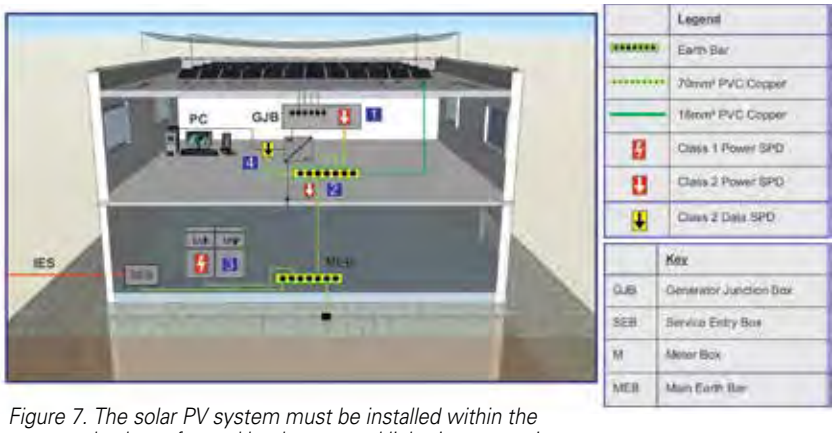


Figure 7. The solar PV system must be installed within the protected volume formed by the external lightning protection system.

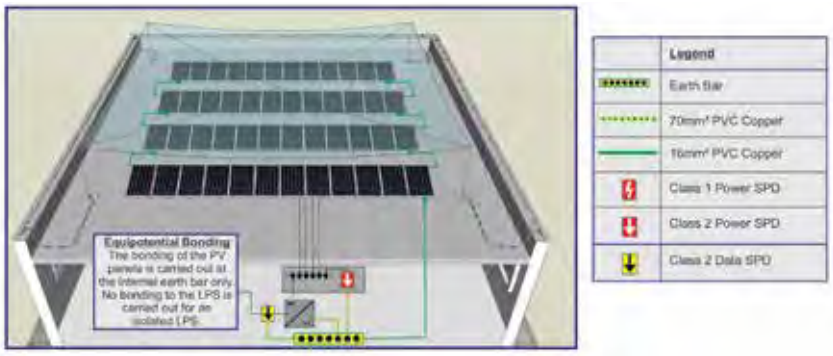


Figure 8. Equipotential bonding.

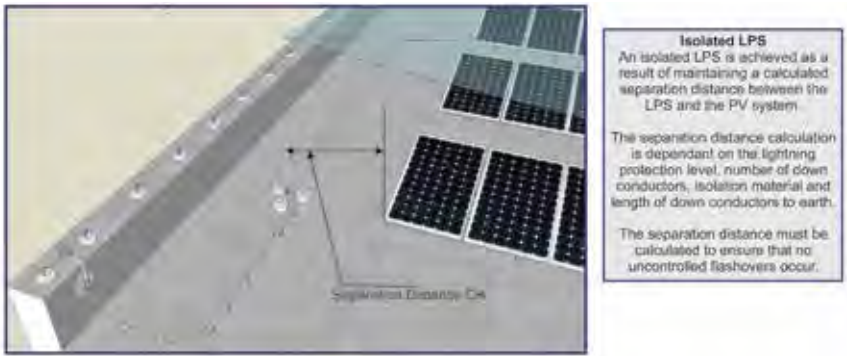


Figure 9. Air termination system.

Figure 10. Earth termination system.

Surge protection recommendations apply for:
- dc input on the inverter / per MPPT
- ac output of the inverter / TN-S system
- LV input / TT/TNS system
- Data interface / two pairs of data cables.

Structures with external lightning protection and insufficient separation distances

For lightning protection systems where adequate separation distances cannot be maintained, the following measures should be put in place:
- LPS in accordance with required lightning protection level
- Surge protection by means of Class 1 lightning arresters and Class 2 and 3 surge arresters
- Equipotential bonding by means of 16 mm² copper conductors or 50 mm² aluminium conductors.

When the correct separation distances cannot be established the PV system is vulnerable to partial lightning currents. The inverters and data systems are therefore protected by means of Class 1 lightning arresters, not Class 2 surge arresters. In accordance with Supplement 5 of IEC 62305-3 all the PV lines entering the building from outside (that is, from the roof) must be protected by means of Class 1 lightning current arresters.

In many cases, rooftop PV systems are installed on top of steel roofs. Here the separation distances cannot be maintained due to the type of structure. In all cases where the separation distance cannot be maintained, all the metal components of the PV system must be bonded directly to the external lightning protection system. An air termination system still needs to be installed to protect the PV system from direct lightning strikes and provide controlled interception and dissipation of lightning current.

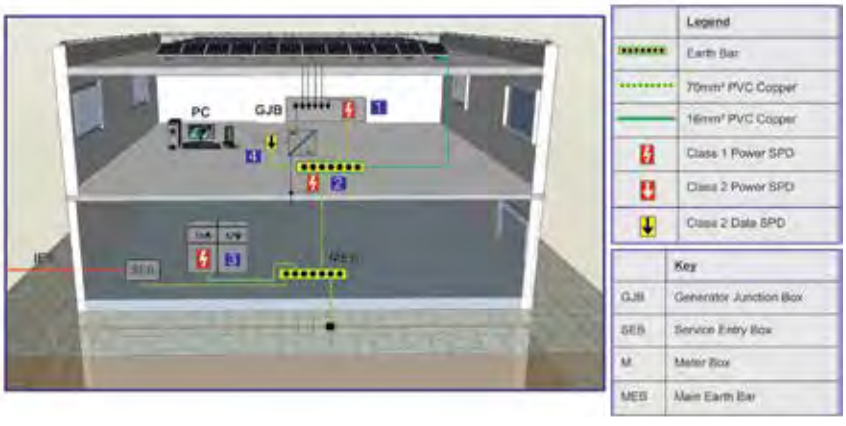


Figure 11. Where separation distances cannot be maintained, all the metal components of the solar PV installation must be bonded directly to the external lightning protection system.

Surge protection recommendations apply for:
- dc input of the inverter / per MPPT
- ac output of the inverter / TN-S system
- LV input / TT/TNS system
- Data interface / two pairs of cables.

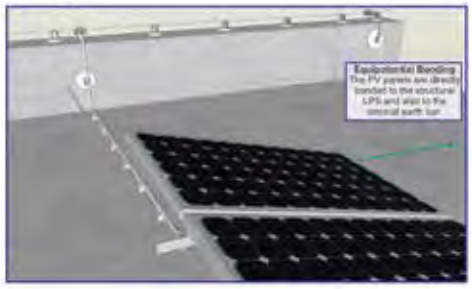


Figure 12. Equipotential bonding.

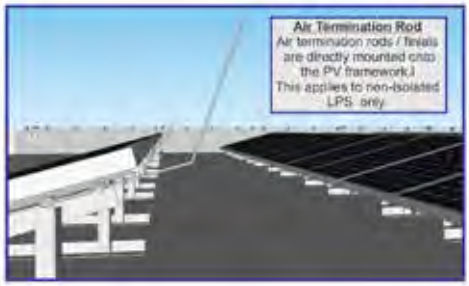


Figure 13. Air termination finial.

Figure 14. Rolling sphere zone of protection.

Figure 15. Rolling sphere zone of protection.

Conclusion

Solar power generation systems are an integral part of today's electrical systems. They should be equipped with adequate structural lightning protection systems, lightning current arresters and surge arresters, to ensure faultless long-term operation as sources of electricity.

Identifying lightning damage in wind turbines

Lightning damage in wind turbines frequently remains undetected as it often does not lead to the immediate failure of the system. Upward lightning – or ground-to-cloud lightning – with an initial long stroke current of only a few hundred Amps is the main cause of damage such as melting on the receptors of the rotor blades. In the long term, this damage can lead to turbine failure.

Florian Vögerl, Head of Sales and Operations at DEHN Africa, says, "Due to the low current flow of upward lightning, standard measuring systems often fail to detect this form of lightning. DEHNdetect is a lightning current measuring system for detecting lightning events. It is designed to register these long stroke currents on wind turbines, as well as impulse currents, in order to prevent the need for expensive maintenance work and long downtime. DEHNdetect can also be equipped with optional rotor blade detection."

The system can be integrated into the IT infrastructure of the wind turbine via existing interfaces. The data can then be read out and managed using the available SCADA system. If direct integration is not possible, the data can be transmitted to a cloud system and evaluated via a web application. This makes it possible to monitor several turbines or entire wind parks.

DEHNdetect identifies the following parameters:

- Impulse current [kA]
- Long stroke current [A]
- Load [C]
- Specific energy [MJ/Ω]
- Rise time [kA/µs].

"DEHNdetect identifies the affected rotor and notifies the user via the SCADA system or online," says Vögerl. "The benefits for users include always being up-to-date with the system, being able to prevent subsequent damage, as well as lower maintenance and repair costs, and less downtime.

"DEHNdetect keeps users informed about what is going on in the wind turbines, whether for an individual turbine or a whole wind farm, providing continual data on the condition of the components. It includes the option of setting up push messages to be sent directly to the user's smartphone or tablet. The system allows users to invest in availability and ensure the wind turbines provide a reliable source of power, now and into the future."

For more information, contact DEHN Africa.
Tel: +27 (0)11 704 1487, email: florian.voegerl@dehn-africa.com

DEHNdetect is designed to register upward lightning currents in wind turbines so that damages can be identified and repaired before they lead to turbine failure.

Groundwater level measurement

Instrotech offers Keller probes which can be used in a wide range of conditions to monitor groundwater levels and filling levels in tanks. Depending on requirements, the probes can operate autonomously or they can be used with an integrated data logger, wireless transmission (GSM), an ambient pressure-compensating capillary or a separate absolute pressure sensor. Additional options include integrated temperature measurement and other features. Depending on the sounding tube, probe diameters range from 16 mm to 18 mm up to 22 mm.

Traditionally, groundwater levels were measured using a conductivity switch on a measured steel or plastic flat cable. This device was suspended in a borehole and when the switch reached the water it emitted an acoustic signal.

Today these measurements can be made automatically with Keller's DCX22 and DCX22AA instruments. These autonomous level data loggers incorporate a level sensor, a memory with microprocessor and a battery.

They can be programmed in advance to perform measurements at preset intervals (every six hours, for example), store each measurement in the memory and return to sleep mode. The sleep mode allows for a battery lifetime of up to 10 years. Programming and readout of the data are done via a K114A USB cable and Keller's logger 5.2 Windows-based software, running on a laptop or PC.

DCX22(AA) data loggers can only measure the water column (E) above the diaphragm of the sensor (Figure 1). However, most geo-hydrologists are interested in the distance from the top of the borehole to the actual water level in the borehole. Figure 2 illustrates how this is calculated. Converting the water column to the 'depth to water' is simple.

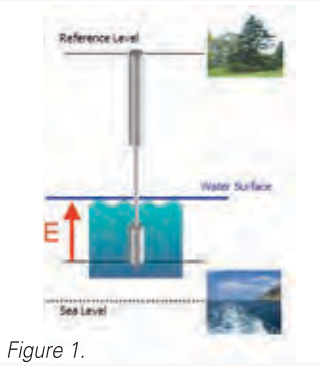


Figure 1.

In the data logger the total installation depth (B) is programmed as a passive parameter. When the measured water column is deducted from the installation depth, the depth to water value (F) remains. The calculation is therefore B - E = F.

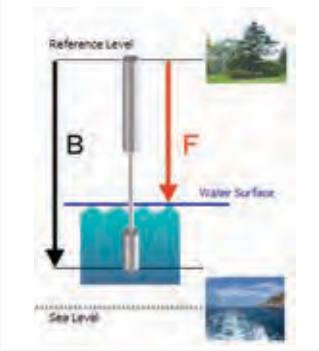


Figure 2.

Barometric compensation is an important factor to take into account. When a level sensor is placed in a fluid, it measures the fluid column plus the air column, which rests on the water. If no correction is made, the measured value would not be correct as 1 mbar equates to 1 cm of water. Therefore the barometric pressure must be deducted from the hydrostatic pressure.

There are several ways to do this. The method most often applied with conventional level sensors is to use a capillary, which is a tube in the level sensor's cable so the air pressure can 'push back' on the reverse side of the diaphragm. This mechanical method of air pressure compensation has one risk, which is the chance of condensation in the tube, causing damage to the level sensor.

Another way of compensating for the barometric pressure is to use a second pressure sensor to measure only the air pressure. When the signals of the level sensor and the air pressure sensor (that is, the barometric pressure sensor) are deducted one from the other, the true level of the water column remains.

The DCX22AA incorporates integrated barometric compensation; it has a second (barometric) pressure sensor in the battery pod which is in the head of the borehole. The DCX22AA can store hydrostatic and barometric measurements and the measurements of barometric compensated water levels.

With the DCX22 however, a separate barometric data logger is needed to collect the air pressure measurements.

A condition of use for Keller's DCX22AA probe is that the barometric pressure sensor must not be flooded. If this happens, barometric measurements cannot be made.

Keller's modular software allows use of both DCX22 and DCX22AA in a measuring network, as the DCX22AA's barometric pressure can also be used to provide barometrically compensated DCX22 measurements or those for a flooded DCX22AA.

For more information contact Instrotech.
Tel: +27 (0)10 595 1831, email: sales@instrotech.co.za

Tough pressure switch for industrial applications

The PSD-4-ECO pressure switch from WIKA is designed for harsh ambient conditions and optimised for OEM integration.

The pressure switch is designed for medium temperatures from -40 to +125°C. In addition, it withstands mechanical shocks up to 50 g and high electrical loads.

Optimised for tight mounting spaces with a diameter of just 29 mm, the PSD-4-ECO model is very slim. Through the arrangement of the electrical output, it can be installed so that it uses little space. The display head can be rotated through 335° and the display tilted electronically through 180°, so that the pressure display is always aligned towards the user.

The PSD-4-ECO pressure switch also makes it easy to determine if the system is operating within the desired pressure range. The instru-ment can be parameterised so that the digital display lights up green when the value is within the defined pressure range and red if it is not. This allows for problems to be identified early.

For more information contact WIKA Instruments. Tel: +27 (0)11 621 0000, email: sales@wika.co.za


The PSD-4-ECO pressure switch is designed to withstand a wide range of temperature, mechanical shock and high electrical loads.

Emerson acquires steam technology

Global engineering and technology company, Emerson, has acquired the Spence and Nicholson product lines from Circor International. The acquisition complements Emerson's broad portfolio of steam system solutions for process industries.

The Spence and Nicholson lines include established industry-leading products ranging from steam regulators, control valves and safety relief valves to temperature regulators, steam traps and other steam related accessories and solutions.

Lal Karsanbhai, Executive President of Emerson's Automation Solutions business said, "This addition to our Final Control business demonstrates the continued value of bolt-on acquisitions that fill strategic gaps in our portfolio and diversify our product offerings in growth markets. By adding Circor's premium steam technologies and profitable product lines, we will strengthen our position to help customers optimise their operations and enhance energy efficiencies."

"Spence and Nicholson's capabilities will play an important role in bolstering our process offerings and expanding opportunities with customers," said Ram Krishnan, Group President of Emerson's Final Control business. "Enhancing these capabilities will extend our ability to serve customers, including automation customers, as well as hospitals, universities, commercial operations and the transportation industry, with a diverse portfolio of products in the growing steam segment."

Emerson, headquartered in St. Louis, Missouri, USA, provides innovative engineering and technology solutions for customers in industrial, commercial and residential markets. The Emerson Automation Solutions business helps process, hybrid and discrete manufacturers to maximise production, protect personnel and the environment, and optimise their energy and operating costs.

For more information contact Emerson Automation Solutions, email: Devesh.Roopnarain@Emerson.com

Emerson has added new product lines to its steam system solutions.

A new approach to ICP-OES analysis for **environmental testing**

A white paper by Spectro Analytical Instruments

AT A GLANCE

1 Dual side-on interface technology offers a single solution for ICP-OES analyses in applications such as water and wastewater and soils and sludges, reducing the complexity and cost of ICP-OES instrumentation inventory.

A wide array of environmental testing operations – from contract laboratories to institutes and municipal or government authorities to academic research centres – have come to rely on inductively coupled plasma optical emission spectrometry (ICP-OES). Various ICP-OES analyser types provide critical analyses of elements and compounds in environmental samples for these organisations.

The way in which spectrometers handle optical plasma observation is an important variable. This report highlights recent developments in plasma viewing technology, driven by specific customer issues and requirements. They have led to the development of a new type of spectrometer that can offer advantages for environmental laboratories in applications handling analyses of water and wastewater, and soils and sludges, among others.

A single ICP-OES answer

Environmental laboratories take various approaches to selecting their analytical instruments inventory.

A number of larger laboratories employ three ICP technologies. A mass spectrometer (ICP-MS) is used to handle analyses demanding the highest sensitivity, such as for drinking water or other samples with trace elements at levels below those suitable for ICP-OES analysis. An axial-view OES instrument is used to handle jobs that do not necessarily require an ICP-MS but still demand high sensitivity, such as analyses of trace elements on air filters or in foodstuffs. And perhaps a dual-view OES analyser is used to provide axial-view or radial-view capabilities. It handles tasks where the accurate determination of alkali elements is important (for example, the analysis of nutritional elements in soil), or where the use of buffers to minimise existing matrix effects is undesirable due to the extra effort and cost entailed as well as the danger of contamination through reagent chemicals. Other labs may use only an MS plus a radial-view OES, and so on.

Users have long sought to reduce some of this complexity and cost – and the demands placed on

Dual side-on interface technology.

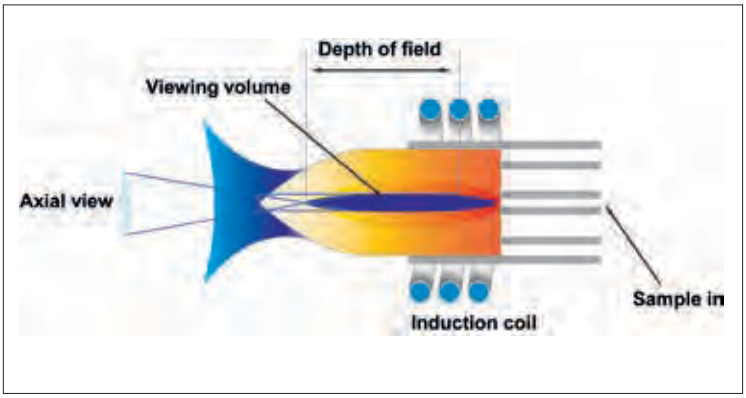


Figure 1. Axial plasma observation.


Plasma radial view.

operators who must train for, use, and maintain multiple instrument technologies in a single laboratory. The goal: to purchase one instrument that can cover all ICP-OES-based testing.

Conventional dual-view devices have traditionally been the answer. However, these multiplex instruments inherently favour one view – radial or axial – over the other, leading to compromised performance in at least some testing areas. Horizontal-torch axial views prioritise sensitivity; vertical-torch radial views prioritise matrix compatibility and precision of measurement. Dual-view systems have struggled to do both.

In recent years, some labs have tried out newer vertical-torch dual-view systems to fill the gap. These use a vertical plasma torch and a direct radial view, plus an axial view supplied via several mirrors in a periscope optic mounted just above the plasma. So users get dual observation of the plasma in a single analysis. This helps eliminate the easily ionisable element (EIE) effect, and often achieves enough sensitivity to measure fairly low levels of challenging elements such as toxic metals (lead, cadmium, mercury, chromium, and similar).

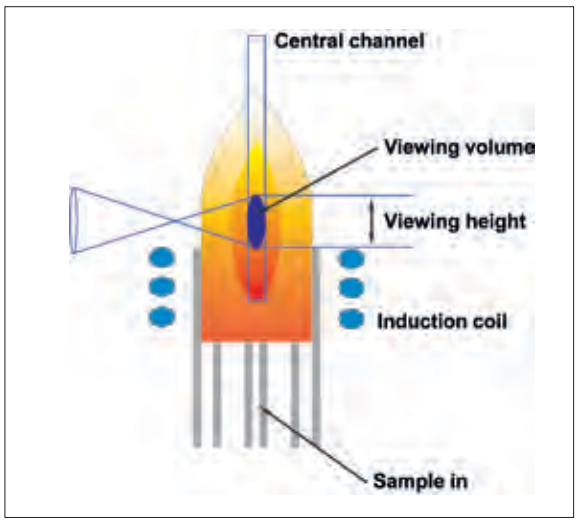


Figure 2. Radial plasma observation.

However, the periscope's three additional reflections cut light throughput significantly, with decreased light transmission in the 200 nanometre (nm) range, and even less below 185 nm. So this system cannot provide the high sensitivity of a late-model analyser with an uncompromised direct-light-path axial view. Some background emissions and interferences may further degrade analyses.

Furthermore, placing the axial optical interface just above the plasma creates several problems. In samples containing high levels of total dissolved solids or organic materials, contaminants on the interface may fall back down into the plasma, causing instabilities that can skew accurate analysis. The interface also suffers high thermal stress, contributing to increased component wear and greater requirements for maintenance and replacement. Some environmental labs may therefore find this type of instrument problematic, with fairly constant demands for user intervention.

The DSOI solution

Perhaps the simplest, most successful single ICP-OES solution is dual side-on interface (DSOI) technology. In response to specific user requirements for an optimised ICP-OES system, SPECTRO Analytical Instruments developed

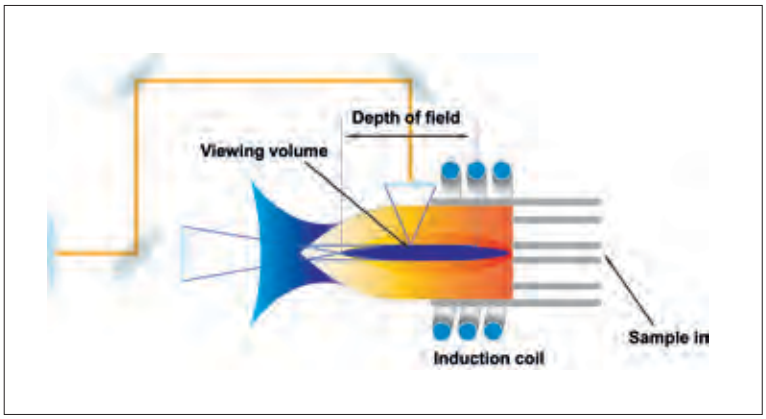


Figure 3. Dual view plasma observation.

The benefits of DSOI technology

- Vertical-torch radial interface
- Reduced matrix interferences
- Better precision and stability
- Only a single plasma view/minimal reflection
- No contaminated interfaces
- Significantly less maintenance.

SPECTRO Analytical Instruments
SPECTRO, a unit of the Materials Analysis Division of AMETEK, Inc., manufactures advanced instruments and develops solutions for elemental analysis in a broad range of applications. Its products are recognised for their technical capabilities that deliver measurable benefits to customers. From its foundation in 1979 until today, Spectro has delivered more than 50 000 analytical instruments to customers around the world. AMETEK, Inc. is a leading global manufacturer of electronic instruments and electromechanical devices.

this technique and introduced it in the new SPECTROGREEN midrange ICP-OES analyser.

DSOI uses a vertical plasma torch, observed via a unique direct-light-path radial-view technology. Two optical interfaces capture emitted light from both sides of the plasma, using only a single extra reflection. This significantly boosts sensitivity. Hence SPECTROGREEN yields twice the sensitivity of conventional radial systems – and matches that of the newer vertical-torch dual-view models.

However, DSOI avoids several troublesome issues related to the latter. It avoids placing an axial interface just above the ultra-hot plasma, so it eliminates high levels of contamination and thermal stress. Additionally, it provides high stability and freedom from matrix effects, as it 'blanks out' interference-prone sections of the plasma. It also delivers high matrix tolerance and high linear dynamic range.

With its advanced DSOI functionality, this new spectrometer delivers good performance at parts per billion (ppb) to parts per million (ppm) elemental concentration levels. Speed of analysis is also optimised.

There's no need to decide on a viewing mode, or to have to make multiple analyses of one sample; the system provides the entire relevant wavelength range with a single analysis. The readout system and on-board signal processing enable full spectrum transport in less than 100 milliseconds and boost overall processing speeds. The resulting short sample-to-sample times are particularly valuable for high-throughput labs, enabling users to process a larger number of samples per hour.

Costs may be an especially critical point for a number of laboratories in this industry sector. An instrument like SPECTROGREEN begins with a competitive price/performance ratio. More importantly, it answers users' needs with perhaps the lowest operating expenses in its class. Where the optical systems of other analysers may require three to six litres of argon per minute, its low-purge design needs only 0.5 litres a minute. (An optional no-purge design can offer further savings per year.)

The SPECTROGREEN ICP-OES model is constructed to maximise ease of use and durability. Its next-generation software aims for an intuitive experience, streamlined workflows, ultrafast processing speeds, and advanced audit trail functionality. It also includes protocols such as US EPA 200.7, CLP ILM 5.3, and CLP ISM 2.3. Air-cooled technology eliminates the need for an external chiller. And the avoidance of thermal stress and contamination via the placement of the optical interface ensures significantly less need for maintenance or repair.

The design is optimised to provide simple, high-throughput use for a wide range of routine environmental sample testing applications, such as testing of soils and sludges, water and wastewater.

For the full white paper visit: https://www.spectro.com/landingpages/environmental-testing-icp-oes

All images: Spectro Analytical Instruments.

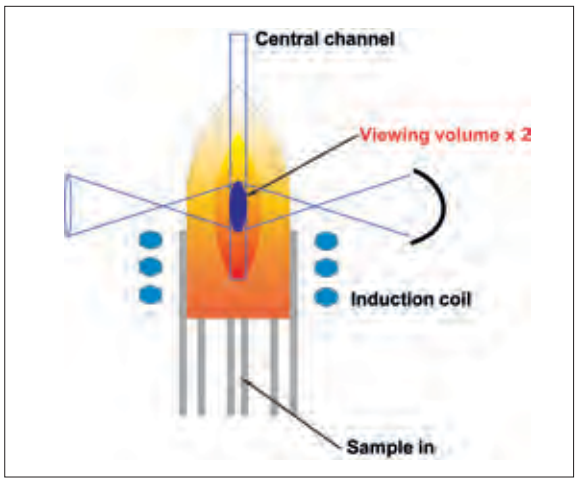
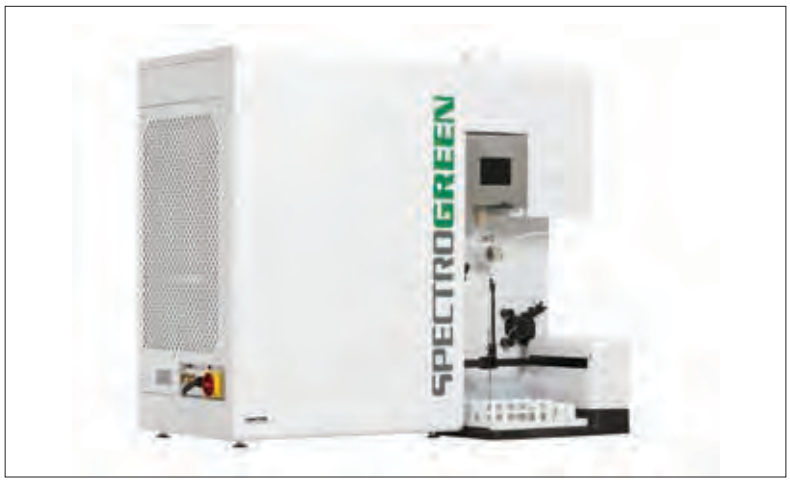


Figure 4. Plasma observation with DSOI.



The SPECTROGREEN spectrometer uses DSOI technology to deliver a single ICP-OES solution.

Monitoring carbon emissions

South Africa's new Carbon Tax Act came into effect from 1 June 2019. It marks another step in government's efforts to combat climate change, in line with the country's commitments to reduce its greenhouse gas (GHG) emissions by 34% by 2020 and 42% by 2025. The tax is expected initially to impact on the bottom line of companies that emit carbon dioxide and other GHGs. The sooner they become compliant in terms of the emissions allowances, the lower the financial burden will be.

The carbon tax will be phased in over a period of time, increasing progressively. This is intended to allow for a smooth transition enabling industries to adopt cleaner and more efficient technologies and behaviours.

SICK Automation is a leader in continuous emissions monitoring systems – used to monitor carbon and GHG emissions.

"The first phase will run from 1 June 2019 to December 2022," says Grant Joyce, Head of Sales, Process Automation at SICK Automation. "Businesses that use this window to start evolving their business practices will be better equipped in the long run."

With a proven track record in the power, energy-from-waste and biomass sectors as well as process automation applications, SICK has tried-and-tested technologies in continuous emissions monitoring around the globe.

The National Treasury says the carbon tax will not have a negative effect on trade but will help protect South African companies against punitive trade actions for failing to reduce greenhouse gas emissions. The tax is intended to cut emissions in terms of South Africa's international commitments under the Paris Agreement and to send a signal to investors to shift towards low carbon options and so help the transition to a low carbon economy.

SICK Automation is a world leading supplier of continuous emissions monitoring systems (CEMS). It delivers the latest in measurement technology to meet the demands placed on businesses and industries in terms of reducing greenhouse gas emissions.

Companies can reduce or prevent emissions by using SICK's CEMS technologies. These have been designed specifically to measure emissions at power plants, industrial facilities and on ships. CEMS solutions can be used to measure pollutants and reference quantities and to perform data processing on the results in accordance with relevant national or international legislation. "Our extensive CEMS systems range will cover most applications and provide comprehensive solutions for industries looking to reduce their greenhouse gas emissions," says Joyce.

SICK Automation was founded on concern for the environment and the company has developed in a sustainable way to minimise negative environmental impacts as far as possible. SICK Automation is committed to helping its clients globally to reduce their carbon footprint. As a leader in continuous emissions monitoring systems and with over 70 years' experience, SICK can provide a solution for the most difficult of applications.

For more information contact Grant Joyce at SICK Automation Southern Africa. Tel: +27 (0)10 060 0558, email: Grant.Joyce@sickautomation.co.za

Gas detector for multiple applications

COMTEST – the local representative for Industrial Scientific which is a global leader in gas detection – has announced a new version of the Ventis Slide-on Pump. The new pump is compatible with both Ventis MX4 and Ventis Pro Series Multi-Gas Monitors and is ideal for workers who typically wear their gas monitors for personal protection but sometimes require a pump for confined space entries or remote sampling applications. The Ventis Slide-on Pump reduces the need for workers to carry two or more gas detection instruments at one time.

Additional benefits of the slide-on pump include:

- Convenient sampling – draw air samples from up to 15 metres away
- Easy set-up – no tools are required to attach or remove the pump from the monitor
- Interchangeable batteries – monitors and pumps use the same type of battery packs and chargers making them easy to exchange.

Josh Futrell, Senior Product Manager, Instrumentation at Comtest, says, "The Ventis Slide-on Pump gives workers more flexibility in the field."

Portable bump testing cylinders

COMTEST also offers Industrial Scientific's Bump-N-Go™ portable gas cylinders, which simplify bump testing for workers who are moving around a site or do not have access to a docking station.

The slide-on gas detection pump provides an additional safety measure for workers.

When it comes to gas detection, bump testing of gas detectors is a safe and simple practice that should become a habit. A bump test is done to check for sensor and alarm functionality so users of the gas detectors know whether or not their equipment is working.

The Bump-N-Go portable gas cylinders available from Comtest are only 97 mm tall and provide up to 250 bump tests when using the corresponding pushbutton regulator. The cylinders have a one-year shelf life and are available for single-gas carbon monoxide and hydrogen sulphide instruments as well as standard 4-gas – oxygen (O_2) CO, H_2S, and lower explosive limit (LEL) instruments.

For more information contact COMTEST. Tel: +27 (0)10 595 1821, email: sales@comtest.co.za

Temperature checks on conveyor systems

The transport of materials is a key activity for most industries and, in many cases, conveyor belt systems offer a cost-effective and efficient solution. However, with such systems comes a risk of fire due to the heat generated by belt friction and fire hazards that may be associated with the material conveyed.

Belt slipping can occur when a roller or rollers seize up or when a belt gets worn and slack. Slipping causes friction that can quickly generate enough heat to cause the belt to catch fire. There are some materials, of which coal is a good example, which can self-ignite. This typically happens in pockets that start smouldering and generate an associated heat build-up.

If the conveyor is not shut down immediately, or the hot spot cooled down before a fire starts, the conveyor system may be destroyed and/or the fire conveyed from one area to the next, spreading throughout the plant. Once a fire has started on a conveyor belt, it is

Conveyor belt systems in industry need to be carefully monitored to track heat build-up and prevent fire risks.

On-line gas analysers to optimise combustion

The Tshwane-based RTS Africa Group supplies solutions for a range of industrial applications. These include, among others, spin filtration, laser-based gas detection and electrolysers for hydrogen production.

RTS Africa MD Ian Fraser says, "Industrial technology is constantly developing and with this development come challenges. To provide answers for these challenges, RTS Africa searches the globe for appropriate and effective solutions."

The company has added a new suite of solutions to its technologies division from IMR Environmental Equipment, Inc – one of the world's leading manufacturers of portable and stationary flue-gas analysers, gas leak detectors, thermometers, manometers and anemometers. For the past 35 years, IMR has been designing and manufacturing combustion analysers. It also offers engineering services and has designed complete mobile measuring laboratories which are now used internationally. Customers increasingly make use of these services because of IMR's recognised know-how and reliability.

The IMR range will extend the RTS Group's offering as RTS Africa is already active in the gas analysis market as the agent for NEO Monitors laser gas analysers and H2scan hydrogen analysers.

"IMR offers multiple channel on-line gas analysers and monitoring and recording equipment as well as manufacturing a range of effective portable instruments, all of which will add to the RTS Africa range and capabilities in gas analysis technologies," says Fraser.

The introduction of IMR into South Africa is significant for any industry using a combustion process or furnace, such as power stations, refineries, or steel or other smelter plants.

The IMR continuous emissions monitoring system (CEMS) provides simultaneous multiple gas monitoring capabilities as well as monitoring other variables such as temperature, pressure, flow and particulate analysis.

"In South Africa, the regulations regarding combustion require that heat-generating plants be operated in such a way that their emissions, related to their heating capacity, do not exceed the values required by law," Fraser explains. "With any combustion plant, if the fuel/air mix is not optimal, the owner could literally be sending their money 'up in smoke'," he adds.

The quality of combustion can be clearly established through the exact measurements given by IMR gas analysers, which measure all parameters relevant to optimising combustion. IMR products can also be customised to suit specific, challenging applications.

often difficult to extinguish. This may be due to the flammability of the product conveyed or the properties of the belt itself.

R&C Instrumentation notes that over the past decade or so, it has seen industries move towards a combined approach of fire prevention and fire detection. A heat detection system is used for early warning, and a fire detection system is installed for failsafe protection.

The conventional ways of measuring temperature with contact probes like thermocouples and resistance temperature detectors (RTDs) or platinum resistance thermometers (Pt100s) are not suitable for this type of application. The problems of drag, friction and static generation rule out contact measurement.

Furthermore, response time is critical on fast-moving conveyors. Slow response units allow hot spots to pass by the detector before an alarm condition can be detected.

Non-contact infrared thermometers, also known as pyrometers, offer a suitable solution. Pyrometers have a very fast response time (measured in milliseconds) and they do not make contact with the surface measured. This makes pyrometers ideal for conveyor belt monitoring.

A pyrometer can be installed for each roller bearing, with the alarm set to trigger if the bearing temperature rises above a pre-determined threshold. The position and layout of belt sensors is determined by the design of the conveyor and the type of material conveyed. Essentially, according to R&C Instrumentation, an overlapping scan across the belt would present the best option. If a hot spot is detected, the system can trigger an automatic spray of a cooling agent or stop the conveyor if necessary.

With many different models of infrared units available from the Raytek and Fluke Process Instruments ranges, it is easy to select the correct unit for each application. Factors to be taken into account in making the selection should include:

- the temperature range considered safe for the product/production line,
- the distance from the sensor to the product, which will determine the optical resolution, and
- the conveyor speed, which will indicate the speed of response required of the instrument.

Environmental conditions like smoke, dust and adverse weather should also be considered with regard to the required IP rating or accessories such as air purge collars for the lenses.

On large coal and coke moving conveyors, the Raytek TX and MI3 systems have been used across South Africa and internationally. The large conveyor systems integrate the detectors into their trip systems so any spike in temperature from a hot spot in the product triggers an alarm.

R&C Instrumentation has the knowledge and experience to advise customers on the right temperature tracking instruments and systems to suit different plant conditions. It includes fixed automation systems and portable infrared temperature measuring products in its product range.

For more information contact R&C Instrumentation.
Tel +27 (0)11 608 1551,
email: info@randci.co.za

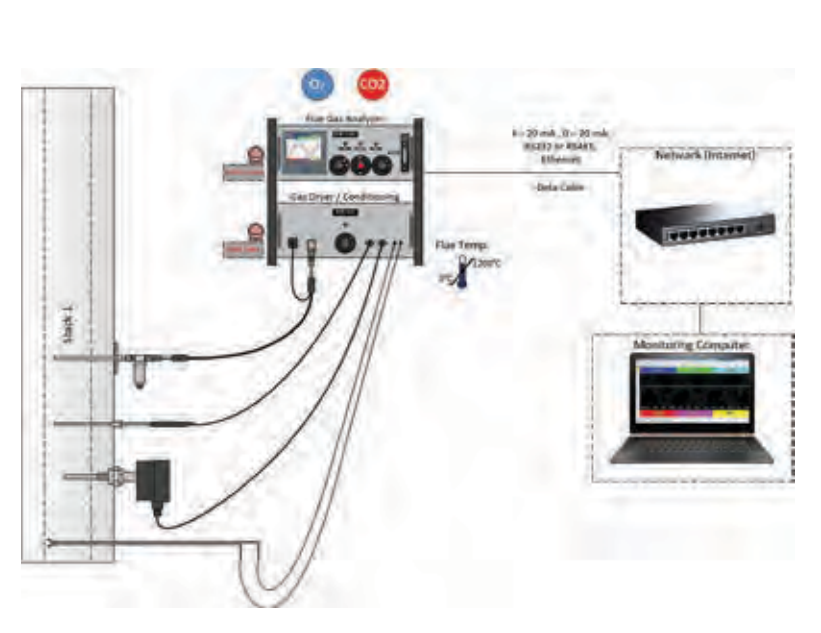
With a combustion process in a furnace, for example, too little air will result in incomplete combustion, soot formation and a high carbon monoxide ratio. In contrast, too much air will mean incomplete combustion and unnecessary emissions and heat escaping up the flue with the exhaust gas.

"As solid, liquid and gas fuels have varying calorific values, IMR analysers can store common and more unusual fuel factors in order to calculate fuel efficiencies," Fraser explains. With an IMR instrument, improvements in the fuel/air mix can be made easily.

IMR combustion gas analysers are simple to operate, flexible, have wide measuring ranges and are highly accurate. These high-technology systems for measuring emissions have gained a respected reputation among IMR customers in the US and around the world.

Fraser says RTS Africa is excited to introduce IMR Environmental Equipment to Southern Africa and he is confident that these industrial solutions will prove valuable in promoting the efficiency and profitability of a range of South African industry sectors.

For more information contact RTS Africa.
Tel: +27 (0)12 433 6335 or visit: rtsafrica.co.za



RTS Africa now offers IMR on-line gas analysers and monitoring and recording equipment in Southern Africa.

Using hydrogen for storage and distribution of **renewable energies**

AT A GLANCE

1 Hydrogen has been recognised as a valuable energy carrier and LOHC technology is seen as a viable solution for storing large volumes of hydrogen and distributing it over long distances.

A number of leading global industrial companies, Royal Vopak, Mitsubishi Corporation and Covestro have joined London-based venture capital fund AP Ventures, investing €17 million in Hydrogenious LOHC Technologies. This will enable further development of international hydrogen infrastructure and global distribution of green hydrogen.

Hydrogenious LOHC Technologies has attracted these further strong partners to extend its innovative Liquid Organic Hydrogen Carrier technology. They join AP Ventures which invested in the German-based company in 2014.

Daniel Teichmann, CEO of Hydrogenious LOHC Technologies, said, "We warmly welcome our new investors and are excited to work with them as strategic partners who share our vision of a LOHC-based worldwide hydrogen infrastructure. With these investments, our company will be strengthening its international industrial base, using the funding to bring additional projects to market."

The advantages of the partnership are not limited to financial support. The strategic international investors are committed to developing the LOHC technology as an essential component of the international hydrogen infrastructure. The operational expertise of Vopak and the other new investors will enable international distribution of renewable energies via hydrogen. Stored in the carrier oil, hydrogen can be transported as easily and efficiently as conventional liquid fuels.

"The combination of Vopak's global terminal and knowledge network with this LOHC technology represents a breakthrough in the storage and logistics of renewable energies," said Marcel van de Kar, Director New Energies at Vopak. "This strategic partnership will facilitate development of transregional

Hydrogen LOHC ReleaseBOX at the Hydrogenious LOHC Technologies site in Erlangen, Germany.

and global transport of hydrogen and contribute to the development of hydrogen-based economies."

Junya Nagase, GM for Precious Metals, Mineral Resources Trading Division, Mitsubishi Corporation, said, "Asian countries have recognised hydrogen as a valuable energy carrier and the LOHC technology is expected to provide an economically viable solution that is ideal for storing large volumes of hydrogen in densely populated urban areas as well as distributing it over long distances. We expect that LOHC will play an important role in the Asian energy market in the future."

As one of the leading suppliers of premium polymers, Covestro sees innovation and sustainability as driving forces behind the continuous development of the company's products, processes and facilities. The advantages of LOHC technology in terms of scalability and feasibility of hydrogen transportation align with this approach and these are the advantages in which Covestro is investing. Dietrich Firnhaber, Head of Strategy & Portfolio Development at Covestro, highlighted that: "Affordable and clean energy is a key issue for the chemical industry and we believe hydrogen has the potential to become an important energy vector in the future. We believe that the LOHC technology is a promising solution for its transportation and storage."

Commenting on this latest investment into Hydrogenious LOHC Technologies, Andrew Hinkly, Managing Partner at AP Ventures said, "I'm delighted to welcome these new strategic investors to Hydrogenious LOHC Technologies. Daniel and his team have made significant developments in this technology during the past five years and I look forward to the next stage in the development of the business."

For more information visit: www.hydrogenious.net

Images: Hydrogenious LOHC Technologies

The first steps towards a global LOHC hydrogen infrastructure: setting up Hydrogenious LOHC Technologies facilities in the USA.

LOHC Technology

Hydrogen will play an important role in the low-carbon energy demand of the future. Storing hydrogen, using dibenzyltoluene as the Liquid Organic Carrier enables safe and efficient handling of hydrogen within existing fuel infrastructure. Hydrogenious' LOHC technology makes it possible, for example, to store hydrogen produced in areas where there is a surplus of renewable energy and transport it efficiently using existing fuel infrastructure to locations where there is a demand for renewable energy.

Hydrogenious LOHC Technologies

Hydrogenious LOHC Technologies GmbH was established in 2013 as a spin-off of Friedrich-Alexander-Universität Erlangen-Nürnberg with the aim of developing LOHC technology. On the basis of the recent investments from Royal Vopak, Covestro and Mitsubishi Corporation and initial investments from AP Ventures as well as partnerships with companies such as Frames, Clariant, Eastman Chemicals and MAN, Hydrogenious LOHC Technologies is well positioned to make its vision of LOHC-based hydrogen infrastructure a reality. The company is based in Erlangen, Germany and employs 70 highly skilled team members. It is a global leader in the field of hydrogen storage technologies based on Liquid Organic Hydrogen Carriers (LOHC). It builds plants for the hydrogen logistics industry and hydrogen refueling stations based on the LOHC technology.

Tackling the digital skills gap

AT ITU Telecom World 2019, held in Budapest, Hungary, in September, the International Telecommunications Union (ITU) and Cisco launched the Digital Transformation Centres Initiative. Aimed at tackling the digital skills gap and bridging the digital divide, the initiative will equip people with the skills needed to participate effectively in today's digital society and economy. ITU and Cisco will engage with a network of institutions to run digital skills training programmes in specific tech areas.

Digital skills training is needed at all levels: at the basic level, to help people connect and benefit from Internet services and applications; at the intermediate level, to help students and job seekers obtain the skills required by the digital economy; and at the advanced level, to increase the pool of ICT experts and meet the demands of the industry.

The initiative will focus in communities where people need basic digital skills to use digital tools and access e-services or are seeking to enhance their basic and intermediate skills. It will also target entrepreneurs who want to develop their businesses and will assist policy-makers in the formulation and implementation of policies and programmes related to digital skills, with the overall objective of enabling a successful national digital transformation process. It will rely on a multi-stakeholder partnership for its success.

At the launch, ITU Secretary-General Houlin Zhao said, "We are proud to partner with Cisco to enhance digital literacy. We call on governments, the private sector, development agencies, local communities and other stakeholders to help us advance this initiative. Join us to boost digital skills to facilitate the digital transformation journey and accelerate the achievement of the United Nations Sustainable Development Goals."

The Digital Transformation Centres Initiative builds on the existing collaboration between the two organisations.

Laura Quintana, Vice President and General Manager of Cisco Networking Academy said, "In this partnership initiative with ITU we will leverage the Cisco Networking Academy to prepare individuals with skills in technology as well as entrepreneurial areas where project-based learning and design thinking are critical. Cisco's objective is to help countries transform digitally and accelerate economic growth, and the collaboration between Cisco and ITU will be key to providing the human capital needed to support that transformation."

As a kick-start, ITU and Cisco will identify 10 Digital Transformation Centres to participate in the first phase, which will run for 18 months starting in January 2020. The centres selected will be in Africa, the Americas, and Asia-Pacific regions.

"Today half the world is online, but raw connectivity alone will not solve development challenges," says Doreen Bogdan-Martin, Director of the ITU Telecommunication Development Bureau. "Research shows that lack of digital knowledge and skills has emerged as a major barrier to Internet uptake, digital inclusion and digital transformation, especially in developing countries. The Digital Transformation Centres Initiative is designed to strengthen the effectiveness of current activities in capacity development by providing training programmes to meet local needs and address technology trends, developments and gaps. It is also a step forward to help our membership implement their regional initiatives in this field."

The Digital Transformation Centres Initiative will complement the ILO-ITU Digital Skills for Jobs Campaign, which is part of the Global Initiative on Decent Jobs for Youth, and will contribute directly to the achievement of the 2030 Sustainable Development Agenda. It will also complement the existing work of the ITU Centres of Excellence network, which provides training to ICT professionals, and other ITU endeavours in enabling digital transformation at national and regional levels.

For more information visit: www.itu.int

Securing networks against employee error

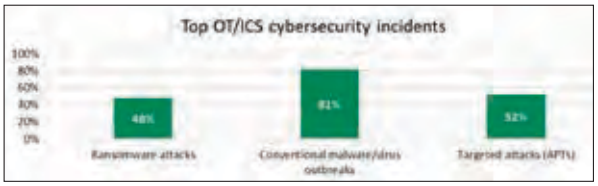
Despite automation, the human factor can still put industrial processes at risk: employee errors or unintentional actions were behind 52% of incidents affecting operational technology and industrial control system (OT/ICS) networks last year. According to the new Kaspersky report *The State of Industrial Cybersecurity 2019*, this issue is part of a wider, more complicated context.

The growing complexity of industrial infrastructures demands more advanced protection and skills. But, organisations are experiencing a shortage of professionals to handle new threats and low awareness among employees.

Digitalisation of industrial networks and the adoption of Industry 4.0 standards are in the pipeline for many industrial companies. Four out of five organisations globally (81%) see operational network digitalisation as an important or very important task for this year. However, for all the benefits that connected infrastructure brings, there are associated cyber security risks.

The good news is that OT/ICS cyber security is becoming a priority for industrial companies, as confirmed by the majority (87%) of respondents. To achieve the necessary level of protection, they need to invest in dedicated measures and highly qualified professionals to make them work effectively. Despite stating this as a priority, just over half of companies (57%) have an allocated budget for industrial cyber security.

In addition to budget constraints, there is also a question of skilled staff. There is a lack of cyber security experts with the right skills to manage protection for industrial networks and organisations are concerned that their OT/ICS network operators are not fully aware of the behaviour that can cause cyber security breaches. These challenges make up the top two concerns relating to cyber security management and go some way to explaining why employees' unintended errors cause half of all ICS incidents – such as malware infections – and more serious targeted attacks.



In almost half of companies (45%), the employees responsible for IT infrastructure security also oversee the security of OT/ ICS networks, combining this task with their core responsibilities. Such an approach can carry security risks: although operational and corporate networks are becoming increasingly connected, specialists on each side can have different approaches (37%) and goals (18%) when it comes to cyber security.

Georgy Shebuldaev, Brand Manager, Kaspersky Industrial Cybersecurity, comments: "This year's study shows that companies are seeking to improve protection for industrial networks. However, this can only be achieved if they address the risks related to the lack of qualified staff and employee errors. Taking a comprehensive, multi-layered approach, which combines technical protection with regular training of IT security specialists and industrial network operators, will enable organisations to ensure their networks remain protected from threats and skills stay up to date."

In addition to building technical skills and awareness in industrial cyber security, organisations need to consider specific protection for Industrial IoT which can become highly connected externally. Almost half of the companies surveyed (41%) are ready to connect their OT/ICS network to the cloud via digital twins or other support systems.

Dr Jesus Molina, Chair of the IIC Security Working Group and Director of Business Development, Waterfall Security Solutions suggests: "As this survey reflects, the growing interconnection between IIoT edge devices and cloud services continues to stand as a security challenge. It was a major driver for the creation of the IIC Industrial Internet of Things Security Framework and the subsequent best practices documents and recent IoT Security Maturity Model."

Kaspersky has a dedicated portfolio of solutions and services to address the challenges facing industrial organisations. Kaspersky Industrial CyberSecurity combines protection for industrial endpoints and networks to deal with threats at operator and network level in ICS environments, with advanced threat intelligence and incident response services. It also provides training and a specially designed awareness programme for cyber security experts and OT managers/ICS operators.

The Kapersky report

The ARC Advisory Group conducted this 2019 survey on behalf of Kaspersky, looking at the state of cyber security of Industrial Control Systems, as well as the priorities, concerns and challenges it brings for industrial organisations. The study helps us understand the measures and processes involved in the prevention of cyber incidents in critical infrastructures and industrial enterprises.

The survey was conducted online across 282 industrial companies and organisations around the globe and 20 industry representatives were interviewed personally. The report presents the results of the 2019 survey.

For more information visit www.kaspersky.co.za.

Industry's readiness for 5G

HMS Networks, a leading independent supplier of solutions for industrial communication and the Industrial Internet of Things, has released a white paper which presents the findings from research it conducted in industry regarding the prospect of 5G connectivity and its potential in industrial communication.

HMS Networks surveyed 50 international industry professionals in early 2019 to find out about the positioning of wireless communication in their companies and how they are preparing for the launch of 5G. The white paper titled *5G: Is the industry ready?* presents the results of the survey and provides insight into the current situation in the manufacturing industry in terms of 5G preparedness. It provides an overview of the industry's opinions towards 5G technology as an emerging trend and future standard in the manufacturing and industrial automation sectors. It also touches on the use of wireless technologies in industry today and future directions of this technology.

The research shows, among other things, that more than half of the industry professionals surveyed are positive about 5G in manufacturing and see it as a way to achieve universal connectivity.

Key findings

- More than half (54%) of those interviewed indicated that they were using wireless communication solutions for remote monitoring and remote operation of assets. One third of the respondents (34%) stated that their companies were using wireless communication for different kinds of IIoT.
- Half of the respondents (48%) were clearly positive about 5G in manufacturing: they mostly appreciated that the technology will replace cables, unreliable Wi-Fi, and the many industrial standards in use today.
- For the majority (58%) of the respondents, the reliability and robustness of wireless systems plays a decisive role in whether to adopt 5G or not, and this was voiced equally by representatives of OT and IT. Low latency was noted as important by more than a quarter (26%) of the respondents.

"The survey clearly showed that the manufacturing and automation industry is becoming increasingly aware of 5G benefits for industrial communication. What is really needed is technical information and practical examples," says Marcela Alzin, Program Manager at HMS Labs at HMS Networks, who conducted the research. "This is why I created a fictional model of a typical OT professional and his attitude towards 5G – to help us better understand the situation in the market."

HMS Networks is headquartered in Halmstad, Sweden, and operates globally as a leading supplier of industrial communication and IIoT solutions. It develops and manufactures products under the Anybus®, Ixxat® and Ewon® brands and communication solutions for building automation are offered through its subsidiary Intesis. HMS development and manufacturing operations take place at its premises in Halmstad and other facilities. The company also has local sales and support offices in a number of European countries, the UK, USA, Japan, China, Singapore, South Korea and the UAE, as well as a worldwide network of distributors and partners.

For more information visit www.hms-networks.com

HMS Networks' recent research indicates that leading players in the manufacturing and automation industry view 5G positively.

DIARY DATES

Africa Oil & Power

9-11 October 2019
Cape Town International Convention Centre, Cape Town
Africa Oil & Power is the continent's premier conference platform for energy investment and policy. With a series of energy events, AOP brings together ministers, senior government officials and top executives of private sector companies spanning the energy value chain.
Enquiries: visit: https://africaoilandpower.com/event/aop-2019/

Future Energy Nigeria

12-13 November 2019,
Eko Hotel & Suites, Lagos, Nigeria
The leading power and energy conference and trade expo in Nigeria.
Enquiries: visit www.future-energy-nigeria.com or Tel. +27 (0)21 700 3500

MESA Africa Conference

14-15 November 2019
Manufacturing Enterprise Solutions Association (MESA) Africa will hold its 11th annual conference this year, themed: 2020 Vision and focusing on The digital enterprise: people, productivity & profitability.
Enquiries: visit http://www.mesa-africa.org/ or email marketing@mesa-africa.org

SAEEC Conference

14-15 November 2019,
Farm Inn, Silver Lakes, Pretoria
The 14th annual conference of the SAEEC (South African Energy Efficiency Confederation) will focus on five key themes: Strategies for environmental change, Energy nexus links, Sustainable generation and distribution, the 4th Industrial Revolution and energy, and the business of energy.
Enquiries: Franki McKechnie, Tel. +27 (0)63 235 8031, or email: admin@saee.org.za

17th ICUE Conference

25-27 November 2019
UCT Graduate School Conference Centre, Cape Town
The African and International Use of Energy Conference will look at the productive use of energy as a strategic resource by an ever- expanding market in the industrial and business sectors and explore energy solutions for the cities of the 4th Industrial Revolution.
Enquiries: Tel. +27 (0)21 959 4330, or email: icue@aiue.co.za or ICUE@cput.ac.za

1st SAIEE National Conference

27-29 November 2019
Sandton Convention Centre, Johannesburg
The 1st SAIEE (South African Institute of Electrical Engineers) national conference, themed Engineering an Africa for the Future, will focus on Connectivity and Communication in Africa.
Enquiries: visit http://saiee-conference.co.za

Beckhoff Product Training 2019

TwinCAT 3 and TwinCAT 2 training courses, monthly, to November 2019
Beckhoff Automation offers training for its system components such as TwinCAT 2, TwinCAT 3, IPCs, Embedded PCs, I/O and Motion products. The 3-day training courses are run at Beckhoff Training Centres in Johannesburg, Cape Town, Port Elizabeth and Durban.
Enquiries: Visit www.beckhoff.co.za or email training@beckhoff.co.za

DURABILITY AND PRECISION MEASUREMENT

Bright LED status indicators
Push-button programming
Two-line, eight-character display

User-configurable discrete NPN/PNP output
Analog output is 4-20 mA or 0-10 V depending on model

Class 2 laser emitter
Small, highly visible spot
IP67-rated zinc housing

www.turckbanner.co.za

LTF Series Time of Flight Laser Distance Sensors are designed to accurately measure targets at distances up to 12 meters. They provide reliable detection regardless of colour or material, even at an angle, providing a reliable solution for challenging targets. They solve a broad range of industrial measurement applications, including part-in-place, part profiling and positioning, and roll diameter and web tension control.

Turck Banner (Pty) Ltd
sales@turckbanner.co.za | Phone: +2711 453 2468

TURCK | BANNER

SMART [3]
Excellent performance.

reddot award 2017
winner lighting design

Smart [3] is the new range of watertight LED luminaires. Ideal for installations in low ceilings (of less than 4 metres in height), these new lighting devices are patented by GEWISS and are entirely designed, developed and manufactured in Italy. Characterised by an elegant design, extremely low energy consumption, high resistance to impact and a protection rating of IP 66/69, these devices are quick and easy to install.

Three dimensions

Lifetime 100,000 h (L70)

IP66/IP69 - IK08

ACDC DYNAMICS
www.acdc.co.za

NATIONAL	
Sales	**010 202 3400**
Technical	**010 202 3500**
Germiston	011 418 9600
Cape Town	021 510 0710
Pinetown	031 700 4215
Riverhorse	031 492 4800

GEWISS
LIGHT UP THE FUTURE