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THE OFFICIAL MOUTHPIECE OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | MAY 2012



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contents

LETTERS

- 6** Letter from the SAIEE President
- Mr Mike Cary.
- 50** You said....
Letters received from our members.

REGULARS

- 8** **wattshot**
Gadgets and gizmo's - what is new on the market.
- 12** **wattsup**
Social events - were you there?
- 52** CPD Courses
- 56** Mentorship
- 60** Membership
- 62** SAIEE Calendar of Events
- 63** Crossword - win R1000!
- 64** SAIEE Council
- 66** SAIEE Contact Centres
- 67** Subscribe to **wattnow**

FEATURE

- 18** In the Core of the Cloud
Understanding what cloud computing is all about?

POWER

- 26** Monitoring Power Quality Beyond EN 50160 and IEC 61000-4-30
A case study on Karpri, which is one of Israel's largest refrigeration and cooling companies.

ENERGY

- 32** Free Energy, Perpetual Motion and all that stuff...
Prof. Ivan Hofsjager shares with us his take on Free Energy.

LIGHTNING

- 34** Matching Lightning Detection Network Data
Lightning is a phenomenon that is studied using many different methods and techniques.

TECHNOLOGY

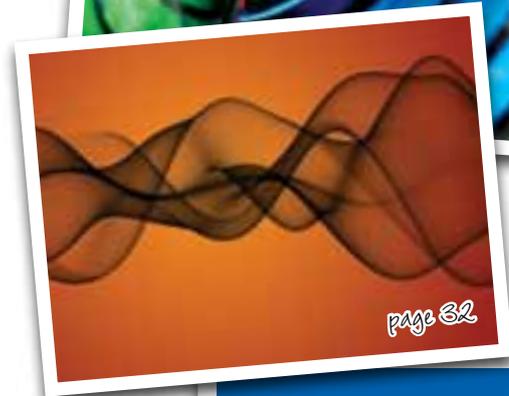
- 40** Beyond The Highspeed Drive
Topological Insulators Open a Path to Room-Temperature Spintronics

MEMBER PROFILE

- 42** Jane-Buisson Street
- 58** SAIEE Vital Statistics

MEMORIES

- 46** The Birth Pangs of the Rand Easter Show



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ISSN: 1991-0452

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Wow, it's May already and winter is well on its way.

This issue features the Internet and we share with you more about Cloud Computing and what it really means- on page 18.

I had a fabulous opportunity to visit the Mother City with the WACS Submarine Cable launch. Spent two days in Cape Town, rubbed shoulders with delegates from across the African Continent and visited the Yzerfontein Cable Station - read more about this on page 22.

On page 32, Prof Ivan Hofsajer gives us a tongue-in-cheek overview on Free Energy. A must read.

The SAIEE is hosting a Woman in Electrical Engineering breakfast, which will take place on the 11th of July at the Sunnyside Park Hotel in Johannesburg. Please see the official invitation on page 51. Space is limited, so book now!!

On page 58 you will find the Vital Statistics of the SAIEE Members as they were in May 2012. This makes for an interesting read.

Please write and send your articles for publishing in **wattnow** to me, in order to stand a chance to win an iPad - see the advert on page 5.

I would like to thank each and every member who has contributed to the success of the **wattnow** thus far. Your input is greatly appreciated. I've had compliments from readers, advertisers and contributors from across the world on the fresh **wattnow**.

On this note, keep warm, keep your head high and enjoy the read!

Visit www.wattnow.co.za to answer the questions related to these articles to earn your CPD points.



ALL SAIEE MEMBERS!

Write a winning Engineering article for **wattnow** and win an iPad!

wattnow prizes will be awarded for articles written by SAIEE members that are published in the **wattnow** magazine and that are adjudged 'excellent' by a panel of experienced engineers and academics. Articles of between 1500 and 2000 words in the Engineering categories of Communications, Control, Computers & Software and Power as well as General Interest and Science, written by SAIEE members, in good standing, and published in **wattnow** will be eligible.

SAIEE members have broad and expert experience and knowledge about many Engineering projects topics in which they have been involved. **wattnow** wants to access and record the experience and knowledge of the SAIEE member community and publish this to a wider professional audience.

Write about your (or others') experience and help to spread knowledge, interest in and history of our great engineering capabilities and achievements.

ARTICLES WILL BE JUDGED ON THE FOLLOWING CRITERIA:

- General technical professional interest
- Accuracy and Reliability, Technical Correctness
- Currency and relevance
- Coverage and Objectivity
- Style, language, illustrations, article structure, etc.

Awards will be made at the Annual SAIEE Banquet for the best article in each category, published between September and August of the past year. Note that a prize for each category is available but will only be awarded if articles are judged to be of a sufficient standard. The prizes for 2012 will be Apple iPads. The judging panel will be made up of experienced members of the Engineering fraternity, including academics and industrialists and their decision is final. Detailed rules are available on the SAIEE website - visit www.saiee.org.za



The image of the iPad is not necessarily the model to be awarded.

Hello All,

This is my first letter since becoming President at the AGM on the 29th of March. The AGM was held for the first time in the Council Chamber of our new SAIEE House, and was attended by 120 people. I presented my inaugural address – “Energy Efficiency, and Renewable Resources”, which is the theme I have chosen for my Presidential year.

On the 19th of April, I presented the address to the Southern Cape Centre in George. The meeting was well attended with 30 people attending. It is interesting to note that many Engineers have retired to that area, and I was able to renew old acquaintances and friendships. Judging from the amount of questions asked, the subject held much interest and the Chairman had to call a halt to the proceedings after one and a half hours. Thanks to Robbie Evans, the Centre Chair for his organization and hospitality.

The following day I presented to the Eastern Cape Centre at the Nelson Mandela Bay University. This meeting was ably organized and hosted by the Centre Chair, Sarel Schoombie. There were 52 people present, 20 of whom were students. Once again, the Chairman had to call a halt to the question session after 90 minutes. I was impressed with the interest shown by the Students, an encouraging sign for the future of Engineering. Thanks again to Sarel.

During May I shall be presenting at Bloemfontein, and at the Western Cape Centre in Cape Town. In June I shall be visiting Durban, Pietermaritzburg, and Secunda with the presentation.

There have been some projects identified for the year:

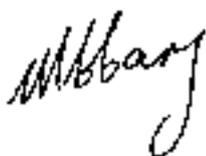
Firstly, the Historical Section has requested that we restore Innes House and to use it for a Museum, Library and reading & meeting rooms. The estimates have been obtained, and the Facilities Committee is busy preparing a project plan for approval of the Council.

Secondly, we are looking at a membership drive. There are estimated to be at least 3000 Electrical Engineers who are registered as Professional Engineers, who are not members of our Institute. On the subject of membership, I personally think that it is unfortunate that our industry is fragmented by the fact that there are a number of different Institutes and Societies that represent qualified personnel in the electrical industry. We will also investigate a way to incorporate commercial enterprises into the Institute.

This edition of the **wattnow** is the sixth since the SAIEE Publications Company took over the publishing responsibility in November last year. I am sure that you will all agree that the publication is first class, and that the Managing Editor, Minx Avrabos is to be congratulated. In this regard, every member of the Institute can contribute towards the success of **wattnow**, either by submitting articles to Minx, or by assisting with the procurement of advertising revenue. Another SAIEE publication is the African Research Journal, which is ably produced by its Managing Editor, Saurabh Sinha. The Publications Committee is currently working on a new SAIEE website, and hopefully this publication will be up and running in the near future.

In conclusion, I wish to thank Stan and all the staff of SAIEE for their contributions in running our 103 year-old Institute.

Kind regards,



Mike Cary | SAIEE President 2012



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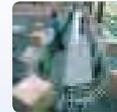
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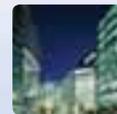
Data centres

From the rack to the row to the room to the building, energy use and availability of these interconnected environments are closely monitored and adjusted in real time.



Industrial plants

Open standard protocols allow for system-wide management of automated processes with minimised downtime, increased throughput, and maximised energy efficiency.



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WATTS HOT

17 June 2012 spells Father's Day - spoil the special 'father' in your life with something unique.

50" VIRTUAL CINEMA DIGITAL VIDEO GLASSES

These ingenious virtual cinema glasses enable you to watch all of your favourite movies, listen to mp3's, read ebooks, view photos and much more. They're ideally suited for techno junkies who are always on the go. The technology behind these virtual cinema glasses means that can enjoy crisp video equivalent to watching on a 50" screen from 2m away. All video devices with an A/V out are supported.

You can use your cinema glasses with following devices: iPod® / iPhone® / iPod touch® (additional accessories may be required), Portable DVD players, Cellular phones with video out, Video game systems, Media players, Digital cameras & camcorders and more. R3,000 (incl)



SHIRT SHUTTLE (TRAVELLING SHIRT PROTECTOR)

You've gone to all the trouble of ironing your shirt, but as soon as it goes in your suitcase it's doomed. All that hard work (ironing is hard) and it will come out looking like a crumpled up crisp packet. Well we have a solution. It may look like a bit of high tech kit for a car's roofrack, but the Shirt Shuttle has been designed to carry a single shirt. What's more, it'll hold it in place and prevent it from being creased, whether it's in your bag as you're cycling to work, thrown into your hold luggage, or buried under your gym kit.

Just wrap your (perfectly ironed) shirt around the folding board. With soft rounded edges it supports your shirt without applying too much pressure to any one spot – the cause of dreaded creases. The folding board even has a fold-out handle so that when you reach your destination you can hang it up out of harm's way.

Sells for R600 (incl.)



MOVITRAC® LTP B FREQUENCY INVERTERS UP TO 160 KW NOMINAL POWER

SEW-EURODRIVE recently launched the new MOVITRAC® LTP B frequency inverter. This new unit series is extremely versatile and can be used with a variety of different motors: asynchronous motors, synchronous motors without encoder feedback, and servomotors. With their IP 55 degree of protection, these inverters do not even need a space in the control cabinet.

For more information, visit www.sew.co.za



VEHO™ SAEM BLUETOOTH CAR KIT (WITH MOTION SENSOR)

We can't all afford a handsfree kit in our car; and Bluetooth earpieces are about as classy as driving gloves. But what's the alternative? Risk life, limb and the long arm of the law by using your mobile while you drive? Not on our watch! That's why we've tracked down the SAEM Bluetooth Car Kit. The SAEM comes with a mounting clip for conveniently locating on the sun visor.

Veho SAEM Bluetooth Car Kit Designed to attach quickly and easily to your sun visor, this handy gadget activates when it detects movement in the car – so it won't waste valuable battery power when parked. Pairing with the phone in your pocket (or two devices simultaneously) it'll effortlessly divert calls to the built-in speaker. With talk time up to 32 hours and standby time up to 66 days it's the easy way to take calls on the go. Retail at R950 (incl.)



ACER DEBUTS THE ASPIRE TIMELINE ULTRA M3

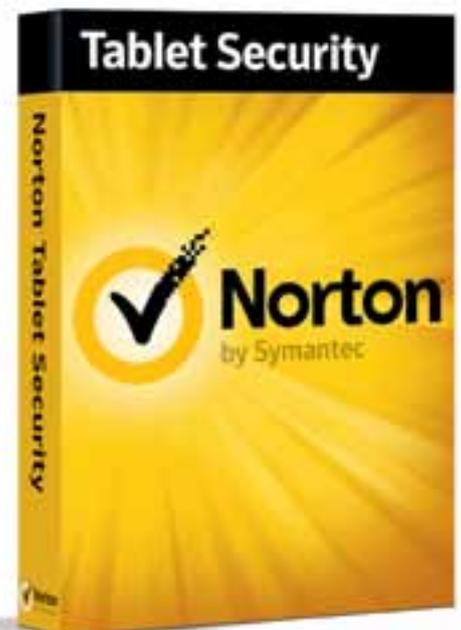
The industry's first 15", 2-spindle Ultrabook™ with dedicated graphics and an optical drive. The new Aspire Timeline Ultra was first unveiled at the Consumer Electronics Show (CES) in Las Vegas last January; today Acer showcases the new Aspire M3 of the Timeline Ultra family. The Aspire Timeline Ultra M3 is available in Incredible Connection stores RRP from R7 999.

NEW NORTON TABLET SECURITY PROTECTS AGAINST LOSS, THEFT AND ONLINE THREATS - NORTON MOBILE SECURITY UPDATE INCLUDES NEW "SCREAM" FEATURE AND WEB-BASED ANTITHEFT CAPABILITIES

Norton by Symantec announced the availability of Norton Tablet Security, including a new "Scream" feature that helps users find a lost or stolen phone quickly. This offering for the Android platform further support the Norton Everywhere initiative, which extends Norton's security expertise and technologies to protect consumers everywhere they go, regardless of device or platform.

"With today's tablets, people stand to risk losing much more than contact information when a device is lost or stolen – it's access to their email, social networking sites, financial institutions or even exposing personal photos or videos, as many celebrities have," said Kara Rawden, Senior Marketing Manager Middle East & Africa, Consumer Business Unit, Symantec. "Given these risks, consumers are increasingly motivated to protect their mobile lives. Norton Tablet Security provides protection from physical and online threats from one of the most trusted brand in security."

Norton Tablet Security is available from the Norton Online Store for R299.00, which provides one year of protection. For more information, visit www.norton.co.za



WATTSHOT

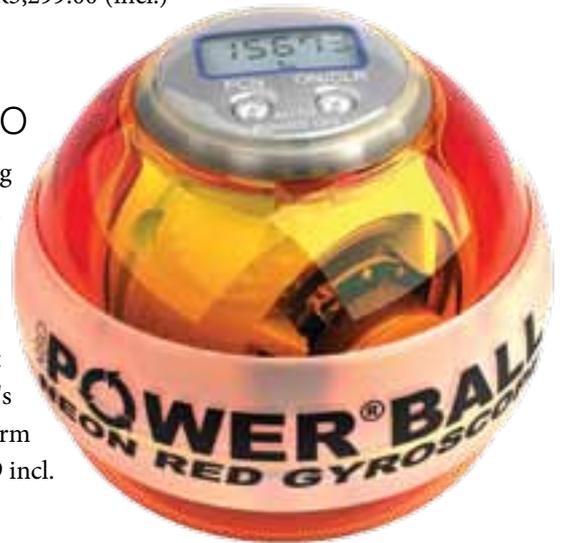


TREKSTOR I.GEAR LUMIO PROJECTOR FOR IPHONE® 4/4S

The i.Gear Lumio Projector for iPhone® is an ingenious little piece of hardware that allows you to project data (videos, pictures, slideshows etc) from your iPhone® 4/4S onto a wall or projector screen (diagonal from approx. 30 - 130 cm). With its built-in battery, the mini-projector can be used as a power charger for your iPhone® 4/4S as well, but when used as a projector this will mean that the precious battery life of your iPhone® won't be depleted. i.Gear Lumio Projector for iPhone® is not only handy but powerful too. The i.Gear Lumio Projector for iPhone® is powered by 3 LED's which have a lifespan of up to 20,000 hours, and will project vibrant, crisp data and video to just about any surface. Your presentations (and iPhone® projections) are now truly mobile! (and without sacrificing image quality either). R3,299.00 (incl.)

NSD POWERBALL NEON PRO

One of the fastest non-motorised machines in the world! This latest 250Hz glowing computer-monitored version of Power Ball is meant to be a sports training tool, basically because it's amazingly good at strengthening your forearms, wrists, fingers and grip. The gizmo works by a combination of an internal gyroscope, centrifugal force and inertia. Once you get the central ball spinning, you rotate your wrists to build up speed. The top speed possible is 15,000 rpm and it exerts the most remarkable forces on your wrist - you really feel like you've had an arm workout! It's dead clever, needs no batteries or motor, just pure gyroscopic power and a strong arm at 15000 rpm it's exerting almost 40lbs of pressure on your arm! R499 incl.



HOPSIDOWN™ BEER GLASS

Viva la longneck! - Fred likes to glug his beer right from the bottle, but Mrs. Fred is appalled. So Fred went out and did something about it - he created this bottle-in-a-glass as an homage to real men like him. Hopside Down is hand-blown, precisely crafted, and unexpectedly deluxe. Individually gift boxed. R329.00 (incl.)

The products in the wattshot section can be purchased online on www.mantality.co.za unless otherwise specified.

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WATTSUP



WACS LAUNCH

I had the privilege to be a part in creating history, when I was invited to the launch of The West Africa Cable System (WACS) in Cape Town earlier this month. The 17,200kms of submarine cable system inaugurates a new wave of broadband capacity on the African continent, linking 14 countries - South Africa, Namibia, Angola, the Democratic Republic of Congo (DRC), the Republic of Congo, Cameroon, Nigeria, Togo, Ghana, Ivory Coast, Cape Verde, the Canary Islands, Portugal, and the UK.

The investors in the the \$650m WACS project are Angola Cables, Broadband Infracore, Cable and Wireless Worldwide, Cabo Verde Telecom, Congo Telecom, MTN Group, Portugal Telecom, SCPT (DRC), Tata Communications / Neotel, Telecom Namibia, Telkom SA, Togo Telecom, Vodacom Group and Vodafone Spain.

Designed to support present and future Internet, e-commerce, data, video and voice services, the capacity of the system is 5.12 terabits per second (Tbps). The system makes use of dense wavelength division multiplexing (DWDM) technology, which enables the transport of multiple wavelengths over a single fibre pair, as well as multiplication of capacity.

During the evening, we watched a 3-D presentation streamed live over the internet from London, with no time delay. We were treated to a tour of the Yzerfontein Cable Station the following day, where the Minister of Communications, Ms Dina Pule officially opened the station.





SAIEE PRESIDENTIAL ADDRESS— BLOEMFONTEIN

On 7 May 2012, the South African Institute of Electrical Engineers, Interest Group - Free State and Northern Cape, held its Annual Meeting in the Lesedi boardroom at ESKOM-Distribution in Bloemfontein.

This was the first Presidential Lecture to be held at the Centlec Training Centre since Prof. Bea Lacquet presented her lecture there in 2005. Past presidents Ian McKechnie (2007), du Toit Grobler (2009) and Dr. Angus Hay (2010) all presented at the Central University of Technology (CUT) in Bloemfontein. It was appropriate that the presentation was on "Energy Efficiency & Renewable Energy

Resources" considering the current electricity predicament in the country. The meeting was opened by Ben Kotze, the convenor of the interest group, and topics like local courses, CPD credits, application of new members, transfer of grades, other activities and the establishment of a local Centre were addressed and discussed. We hope that the latter soon comes to fruition!

Members and guests enjoyed the Presidential address, networked and enjoyed a lunch sponsored by ESKOM-Distribution. Our sincere thanks for those involved with the arrangements and the sponsors SAIEE, ESKOM Distribution and CUT.



Prospective CEM's attending the first Fundamentals for Energy Management Training (FEMT) course launched in Port Elizabeth.

FUNDAMENTALS FOR ENERGY MANAGEMENT TRAINING COURSE LAUNCHED

The Fundamentals for Energy Training (FEMT) course developed by the Energy Training Foundation (EnTF) was launched in Port Elizabeth recently. FEMT is an invaluable stepping stone to successful AEE (Association for Experiential Education) Certification training as it offers the building blocks for persons who want to enter the energy field with no technical background, or those who need a refresher on the fundamentals of energy, or persons who specialise in one energy field, i.e. electrical, and now need to embrace the other fields of thermal, chemical and mechanical energy. FEMT assists persons in preparing for Certified Energy Manager (CEM®) and Certified Energy Auditor (CEA™) training through in-depth explanation of the various energy fields of chemical, electrical, mechanical and thermal energy fundamentals. The next FEMT courses are scheduled for 23-25 July in Port Elizabeth, 27-29 August in Durban, 10-12 October 2012 at Emperors Palace Gauteng. For more information go to www.energytrainingfoundation.co.za.

CESA ANNUAL PRESIDENTIAL VISIT



From l-r: T.C. Madikane, SAIEE KZN Centre Chairman, CESA President, Mr Naren Bhojaram and Colin Raman, CESA KZN Branch Chairman

April saw the Consulting Engineers of South Africa's (CESA) Annual Presidential visit, Mr Bhojaram presented his 2012 theme, "Engineers - unquestionable ethical". Mr Lohashri Sewnarain, the new SANRAL Regional Manager for the Eastern region addressed the delegates on the role that industry can play in delivering government aims and objectives.

Applications Engineer Construction Technique

Atlas Copco is a world leading provider of industrial productivity solutions. The Portable Energy Division operates within the Construction Technique business area and holds the responsibility for the development, manufacturing and marketing of generators for prime and standby duties.

Atlas Copco Construction Technique SA has a vacancy for a junior electrical engineering position to join our team offering power solutions to mining and other major industrial sectors within Southern Africa.

The candidate will be developed to support the marketing and sales teams within the Southern African Region with application, sizing and control of power generator installations as well as undertaking project management requirements when necessary.

The candidate should hold an Electrical Engineering or B-Tech Degree in heavy current.

Company presentation:

Atlas Copco's Construction Technique business area provides construction and demolition tools, portable compressors, pumps and generators, lighting towers, and compaction and paving equipment. It offers service through a global network. Construction Technique innovates for sustainable productivity in infrastructure, civil works and road construction projects.

If you are interested in the above position, please send your CV to David Stanford - Business Line Manager Portable Energy Division
David.stanford@za.atlascopco.com

www.atlascopco.com

WATTSUP

CLOUD COMPUTING TO TRANSFORM AFRICAN IT INDUSTRY

The inaugural Cloud Summit East Africa, proudly supported by the Kenya ICT Board, will be held in Nairobi from 5 to 6 June 2012. The strategic 2-day invitation-only event is hosted by international business-to-business conferencing company, Kinetic Events.

The event is aimed at IT professionals, senior decision makers and cloud computing experts from top companies in East Africa with a focus on how cloud computing is reforming the African IT market place. As a cost effective solution for businesses to acquire and use, the event will explore debatable issues currently associated with the global cloud initiative.

International investors have played a major role in boosting the African IT industry. By tagging along on Africa's major broadband initiatives, investors can establish clouds that are strategically located in major cities across Africa.

In recent research; South Africa is considered fairly mature in cloud development, with total IT spending expected to reach an estimated \$12bn (US) by the end of 2012.

Cloud computing trends will have a major impact on IT industries globally as an effective means to collaborate with peers internationally and offers longevity to information stored in the cloud.

Shannon Mackrill, Joint Managing Director of Kinetic Events says, "Cloud computing is rapidly changing the African IT industry and the way companies do business. The move from capital spending to operational spending, will offer an affordable way to access services globally."

Undersea fibre optic cables have been implemented in recent years, resulting in the cost of broadband decreasing. African entrepreneurs are taking full advantage of this development by providing superior applications and services that were seemingly impossible to consider only 5 years ago.

With a global focus on computing, security and continuously evolving technologies, Africa has been placed in the middle of a global IT revolution. The summit will place the spotlight on cloud computing in Africa as one of the key global emerging markets for cloud services.



Virgin Galactic Head of Travel and Tourism Development, Carolyn Wincer joins Fiona Ross, Head of brand for Virgin South Africa, Country manager for Virgin Atlantic Simon Netwon-Smith, South Africa's first Accredited Space Agent, Vanessa Rothery and Virgin Galactic's Commercial Director Stephen Attenborough at the announcement.

VIRGIN GALACTIC APPOINTS FIRST SOUTH AFRICAN SPACE AGENT

Virgin Galactic announced the appointment of the country's first Accredited Space Agent (ASA) - Vanessa Rothery - at the South African Headquarters of its sister company, Virgin Atlantic, in Johannesburg.

Stephen Attenborough, Virgin Galactic's Commercial Director who was in South Africa for the launch said: "Virgin Galactic is on track to become the world's first commercial spaceline and South Africans can now book their seats and join Virgin's founder Sir Richard Branson and over 500 other first-time space travellers from around the world." Rothery joins a group of just 140 ASAs from around the world, each handpicked by Virgin Galactic for their proven experience and innovation in the luxury travel sector as well as their passion for adventure and space travel.

Rothery, a Johannesburg native who has already worked for Virgin in the region for a decade, recently completed an intensive training program with Virgin Galactic to give her the knowledge required to complete reservations for the world's first private spaceline. She will be working with selected travel agency partners to make it easier for South Africans to reserve Virgin Galactic spaceflights.

"It's important that people can find out about Virgin Galactic and book with a local expert so we are delighted that South Africans now have that option," said Carolyn Wincer, Virgin Galactic Head of Travel and Tourism Development.

ABERDARE'S QUALITY PROGRAMME ENSURES CONSUMERS GET THE RIGHT SPECIFICATION CABLE FOR THE APPLICATION

The quality of products has always been of concern to consumers and even more so since the introduction of the CPA (Consumer Protection Act). An area where product quality is absolutely imperative in terms of consumer safety and well-being is electrical cabling and wiring.

“There is a need to raise general consumer awareness of the importance of product quality, in so far as electrical cabling and wiring are concerned,” says Henni Scholtz, General Manager: Product Development and Application at Aberdare Cables, the South African-based international manufacturer of a wide range of cabling and wiring for industrial, commercial and domestic applications.

“Consumers need to be aware that there are products in the local market that do not meet the required compulsory safety specifications in terms of quality, safety and performance.. Use of such cabling and wiring can lead to malfunctions, damage to sensitive electrical equipment, and personal injury through fire or electrical shock.”

As a responsible manufacturer, Aberdare ensures that all its cable products carry the SABS (South African Bureau of Standards) mark that ensures products are inspected, tested, audited and conform to laid down SANS (South African National Standard) specifications, that confirms that the products meet the requirements for installations in South African conditions.

“All of our products which are manufactured to SANS standards, carry the SABS mark, for example the marking of low voltage cables as SABS 1507, which shows that we are a SABS Mark holder and that the product was manufactured to SANS 1507,” says Scholtz. “The SABS Mark scheme is a Type 5 scheme, which involves frequent audits and regular selection of product samples and compliance testing by the SABS Netfa laboratory. “This is a confirmation for consumers that the products have been inspected and met the required standards throughout the manufacturing process. We support the SABS and serve on technical committees, that determines the requirements and specifications for cabling and wiring in South Africa.”

Aberdare fully supports initiatives to educate consumers to recognise products that meet the required specifications and is also a member of the AECMSA (Association of Electrical Cable Manufacturers of SA) which promotes standards and technical compliance amongst the industry members.



Lex van Wyk | Teraco Managing Director

TAKING PEERING TO THE PEOPLE

Teraco Data Environments, a vendor neutral data centre provider, recently announced the launch of NAPAfrica, South Africa's first open, free and public peering facility. Teraco Managing Director, Lex van Wyk says, the aim is to make peering simple and open to everyone. “The definition of peering implies settlement-free interconnection, and while the concept isn't new, we are just bringing it to life for the first time in South Africa.”

Historically, Internet Exchange Points (IXP's) provide layer 2 fabric to allow peers to exchange traffic, over private peering sessions at a single point. While NAPAfrica offers a bi-lateral peering model, the company advocates open peering through their nationally located route servers. “Multi-lateral peering is unique to NAPAfrica in South Africa and offers customers access to an immediately visible and ever growing network of peers with just one peering agreement,” says Van Wyk.

Andrew Owens, Teraco's Head of IT, explains the difference between traditional IXP's and the NAPAfrica offering, “Typical IXP's facilitate only bi-lateral or private peering, which in many cases does not fit the “settlement-free” model. NAPAfrica is a neutral exchange, housed in a neutral facility offering free, open peering without multiple peering agreements.

DISCOVERING INNOVATION AND EXCELLENCE IN SCIENCE: THE ESKOM EXPO FOR YOUNG SCIENTISTS' EXPERIENCE

The Eskom Expo for Young Scientists is South Africa's biggest science fair for grade 5 to 12 learners. It provides learners from around the country with the opportunity to share their bright ideas and innovations with other learners, teachers, judges and other interested people from all over the country.

Currently, learners around the country are preparing scientific projects to participate in one of the 28 regions. Regional Expos will be held across the country from 20 July to 1 September 2012. Learners will be selected from regional expos to participate in the national finals, which will be held in Gauteng from 4 to 6 October 2012.

The Eskom Expo for Young Scientists not only exposes learners to the exciting world of science, it also exposes them to the many career opportunities in Science, Technology, Engineering, Mathematics and Innovation (STEMI). By actively encouraging the youth of South Africa to pursue STEMI careers, Eskom aims to address the country's skills-shortage particularly in the scientific field.

To learn more about the Eskom Expo for Young Scientists, visit www.exposcience.co.za.



Taking Up The Design Challenge

There is a total of R214 000 in prize money to be won, as well as the opportunity to be honoured with the prestigious Sparks Trophy
The closing date for entries is the 31st of August 2012.

THE GROWING CONSENSUS OF THE NEED FOR GREENER, MORE RESOURCE EFFICIENT WAYS OF LIVING MAKES THIS AN ERA OF EXPLORATION.

Energy efficiency and eco-friendliness are among the main considerations of forward-thinking consumers. They've become top of mind when building, decorating and revamping homes. It's up to us, the people with the know-how, to create solutions that enable them to achieve their green aspirations.

On the lighting front, we've got a head start. Innovation and advancements in energy efficient, long-lasting lighting technologies have ensured that there is now a low energy alternative for almost every lighting application.

There is still a lot of terrain to be chartered as we merge good design with the energy efficient alternatives available to us. We've been given the reigns, we just have to take them. A smart mix of efficient lighting technologies and a clever approach to lighting design, installation and layout is necessary for practical, aesthetic and efficiency requirements to be in sync. Herein lies the opportunity to create, innovate and satisfy.

TAKE IT FURTHER

Have you explored the terrain of energy efficient lighting? Do you have an idea for an energy efficient lighting technology, lamp, system or product? Eskom is inviting designers, innovators, engineers and students to submit their energy efficient lighting innovations to the Eskom Energy Efficient Lighting Design Competition 2012. The goal of the competition is to show that efficient lighting technologies can be used – and mixed and matched – in contemporary lighting designs and systems for homes. Since 1999, the biennial competition has helped mobilise transformation in the market, motivating lighting designers, architects and interior designers to use energy efficient lighting in their portfolios, and inspiring consumers to adopt innovative and green lighting concepts. Participating and being honoured in the Eskom Energy Efficient Lighting Design programme is an accolade that entrants can leverage as a launch pad into energy efficient design and development in South Africa's increasingly eco-conscious residential sector.

The competition is supported by Philips, the Radiant Group, LED Lighting SA, Voltex, Eurolux, ARB Electrical, OSRAM, the Department of Energy, the *eta* Awards, 49M, NEEA, NMISA, SESSA, IESSA, Technology Innovation Agency, the South African Institute of the Interior Design Professionals, Miss Earth, Electricity and Control, Sparks Electrical News, Vector, Lighting in Design and VISI magazine.





IN THE CORE OF THE CLOUD

Do you want to understand what cloud computing is all about? Do you want to benefit from cloud computing? As a service provider and/or operator, you can provide optimized and innovative cloud computing services only with a thorough understanding of the core infrastructure of the Cloud – the virtualized data centre. This article explains the architectural components of the data centre and their roles in various cloud service categories.

BY I TOMAŽ KLANČNIK | CUSTOMER SUPPORT ENGINEER | NIL DATA COMMUNICATIONS

There is no universally accepted definition for the term “cloud computing.” Many definitions are available, mainly given by people in research or technology areas. In this article, cloud computing will be viewed as a large-scale distributed-computing paradigm that enables a user to consume compute, network and storage resources as on-demand services. The resources are virtualized and allocated to users as managed services; these services are elastic (dynamically scaled up or down) and tend to be billed on a pay-as-you-go basis. Cloud computing is built on research in the fields of grid computing and utility computing.

Grid computing has been around for more than a decade, helping users to accomplish large compute-intensive tasks. Utility computing introduced the idea of using computing power on a pay-as-you-go basis. A cloud supplier (or vendor) is an organization that offers cloud based resources. The number of companies that offer cloud solutions is increasing rapidly.

A data centre is a collection of computer systems that can comprise up to thousands of computers. To use cloud-computing technology, resources available at the data centre have to be abstracted and turned into services; these services are provided to data centre customers as virtual machines.

DEPLOYMENT MODELS

Cloud computing defines three deployment models:

Public cloud – a cloud available to users from a third-party service provider via the Internet. The public cloud provides an elastic, cost-effective way to deploy solutions. The term “public” does not mean that users’ data is publicly visible; public cloud suppliers usually offer access control for their consumers. The use of public clouds can be quite inexpensive.



Figure 1: Public Cloud

Private cloud – a cloud hosted by an organization inside that organization’s firewall. Private clouds offer many of the advantages of a public cloud environment; for example, being elastic and service-based. In a private cloud service, data and processes are managed within the organization. There are no additional security regulations, legal requirements or bandwidth limitations, which can be present in a public cloud environment. In addition, by using a private cloud, supplier and users have greater control of the infrastructure and improved security, since user access and the networks used are restricted.



Figure 2: Private Cloud

Hybrid cloud – a combination of a public cloud and a private cloud that work together. Users in this model normally keep business-critical data and services in their control, outsourcing less-critical processing and information to the public cloud supplier.

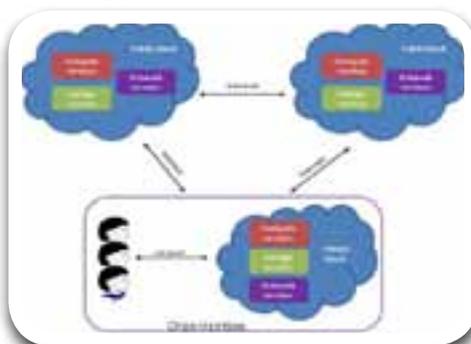


Figure 3: Hybrid Cloud

Since the number of cloud suppliers is increasing rapidly, a cloud resource broker that acts as a third party between resource providers and resource consumers can simultaneously allocate computational resources from many suppliers to a user. The broker gathers cloud suppliers’ information and serves as an information system for the user. It can direct the user to a supplier or can act on behalf of a supplier, thus assisting the user in her search and reducing search time.

CLOUD COMPUTING SERVICES

Cloud computing suppliers can offer various cloud service categories:

Software as a Service (SaaS) – also known as **Application as a Service (AaaS)**, a way of deploying an application over the Internet so that users can use the product without installing the application on local machines. Users run the software remotely via the Internet.

Since the number of cloud suppliers is increasing rapidly, a cloud resource broker that acts as a third party between resource providers and resource consumers can simultaneously allocate computational resources from many suppliers to a user. The broker gathers cloud suppliers’ information and serves as an information system for the user. It can direct the user to a supplier or can act on behalf of a supplier, thus assisting the user in her search and reducing search time.

Platform as a Service (PaaS) – a way of developing and deploying applications online as a service to developers. This category offers an additional layer of abstraction above the virtualized infrastructure. All of the software required for creating an application, such as specific programming languages or application programming interfaces (APIs), is available online, along with the compute and storage resources.

IN THE CORE OF THE CLOUD

continues from pg 19



Infrastructure as a Service (IaaS) – a way of providing hardware (storage and compute) resources and associated operating systems' virtualization technology as services to users over the Internet. Users are supplied with compute and storage resource capacity via virtualization, allowing physical resources to be assigned and split dynamically. Users have to deploy and manage the software services themselves.

These three categories of services are tiered from the bottom up (Figure 4). This means that a PaaS provider uses the IaaS provider in order to function; alternatively, the PaaS provider can deploy and use its own IaaS.

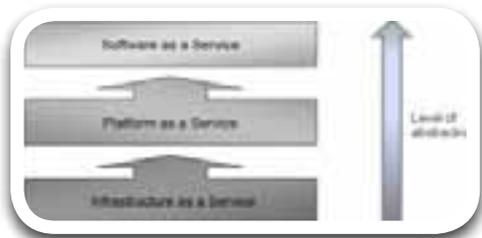


Figure 4: Cloud Services

CLOUD COMPUTING ARCHITECTURE

A four-layer architecture for cloud computing has been proposed. The key element in comparing cloud-computing architecture to other architectures, such as grid architecture, is the inclusion of a unified resource layer.

The fabric layer contains compute resources, storage resources and network resources. The unified resource layer contains resources that have been abstracted by virtualization. This layer presents the idea of resource virtualization offered by the cloud. The resources are converted to services at this layer. Infrastructure as a Service is one example of the services offered by the cloud. The platform layer adds on a collection of specialized tools, middleware and services. These tools can

range from a cloud operating system to specialized software. The application layer contains applications that execute in the clouds. The application layer is connected directly to the unified resource layer.

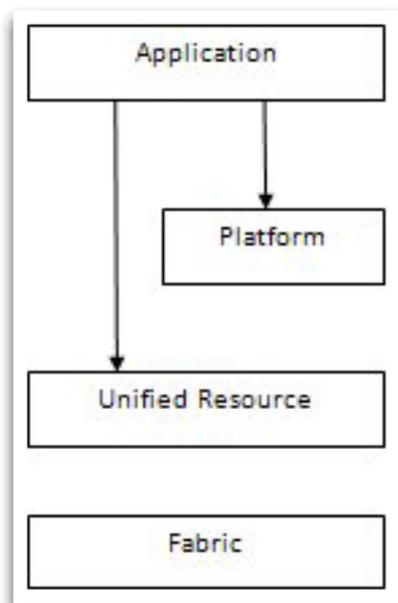


Figure 5: Cloud Architecture

RESOURCE VIRTUALIZATION

To understand cloud architecture from the bottom up, we have to begin with the technology that supports the provisioning of resources, both physical and virtual, in cloud infrastructure. The current state-of-the-art technology in cloud computing is focused on the virtualization of resources at the lowest level.

The main technology enabling virtualization is the hypervisor, a virtual-machine manager that partitions a physical host transparently via emulation or via hardware-assisted virtualization through a layer of abstraction.

This design provides a simulated hardware environment, known as a virtual machine, in which a guest operating system can execute. There are several benefits of using virtual machines. When several servers are

used inefficiently, hardware can be merged and provisioned as needed, enabling the organization to reduce the cost of hardware.

Virtual machines can easily be migrated from one physical location to another as the need arises. There are no limitations on the availability of software, which can be installed into virtual machine images.

There are six types of virtualization:

- Full virtualization – simulates enough hardware to allow an unmodified guest operating system to run in isolation.
- Hardware-assisted virtualization – utilizes the additional hardware capabilities, in the form of virtual-machine extensions within the host processor's instruction set, to accelerate and isolate context switching between processes running on different virtual machines.
- Partial virtualization – involves the simulation of most (but not all) of the underlying hardware of a host and supports resource sharing, but does not isolate guest operating system instances.
- Paravirtualization – simulates all or most hardware by providing software interfaces or APIs that are similar to those of the underlying hardware of the host. The operating system must be modified to be able to run on a hypervisor instead of basic hardware.
- Hybrid virtualization – combines the principles of hardware-assisted virtualization and paravirtualization to obtain near-native performance from guest operating systems.
- Operation-system-level virtualization – achieved through multiple isolated user-space instances. A disadvantage of this virtualization technique is that the guest operating system of the virtual machine must be the same as that of the host, but the guests run at native performance.

Creating virtual machines that run on physical hosts provides two benefits: reducing hardware maintenance cost, and minimizing lost revenue due to downtime. These benefits have pushed virtualization into the light as a new technological requirement for the cloud paradigm. This approach has only recently become feasible because of performance enhancements that have been made to virtualization hardware and software technology. These enhancements have improved the performance of virtual machines to near-native performance of the virtualized resources exposed within a virtual machine, through a reduction in the overhead associated with switching physical resources between the virtual machines, and by taking advantage of the improvements in virtualization-enhancing hardware.

NEW DATA CENTRE ARCHITECTURE

Current data centres are already leaning toward the virtualization of compute, network and storage resources, the technological foundation of a cloud. If we look at the cloud architecture from the data centre's point of view, we can illustrate the key change of a new data centre architecture. The unified resource level (refer to Figure 5) can be presented as a joined combination of virtual-infrastructure management and virtual-machine management. Virtual-machine managers or single-node hypervisors enable virtualization by providing simple primitives (such as start, stop, suspend) for managing virtual machines on a single host. Virtual-infrastructure management, on the other hand, provides primitives to schedule, manage and optimize resources among virtual machines across multiple physical hosts. This technology comprises the cloud-computing paradigm.

As described earlier, full virtualization can separate the entire software environment from its underlying hardware infrastructure.

Virtualization can combine multiple server, storage and network resources into shared pools of resources that can be delivered dynamically and reliably to applications as needed.

This is how it is possible to build a computing infrastructure with high levels of utilization, availability, automation and flexibility.



Figure 6: New Data Centre Architecture

ADVANTAGES OF THE NEW ARCHITECTURE

This new architecture that comprises cloud computing provides many benefits, compared to the classic data centre infrastructures:

- Higher IT cost-effectiveness through the integrated virtualized infrastructure.
- Higher productivity of IT staff due to the unified infrastructure.
- Fast introduction of new services – the virtualization of hardware resources enables fast provisioning of production environments for and prototyping of new services and implementation of test environments.
- Simpler infrastructure scalability – the new design enables assigning additional capacity to individual application processes within the existing infrastructure, with no need for hardware upgrades.
- High reliability of critical processes – the architecture is designed as a supporting infrastructure for critical business processes and therefore contains highly reliable mechanisms based on the users' requirements.

- Unified and transparent security services – the virtualization of the data centre can facilitate the execution of risk-reduction mechanisms. Sources that have never been separated due to high costs or complexity can implement unified security services that are available to all application processes.
- Easier maintenance – in the new architecture, systems, applications and their communication flows are executed on top of a logical infrastructure where most of the operational interventions can be performed without interrupting business processes. Within the new architecture, optimal and reliable operation of the infrastructure throughout its lifecycle is ensured, in cooperation with its owner.
- Simpler management – the architecture simplifies many management processes: the centralization of resources allows for easier inventory control, while the shift of some services to the data centre solves many problems with managing user desktops.

CONCLUSION

Cloud computing is an emerging information-technology infrastructure in which compute; network and/or storage resources are virtualized and accessed as a service. Redesigned data centre architecture provides many advantages for users, service providers and operators by making use of virtualization. Virtualization enables dynamic growth, protection and movement of services, charged on a pay-as-you-go basis, as well as the consolidation and optimization of resources that are becoming a necessity for organizations.

Looking at the future, more organizations will adopt cloud services, and we can reasonably expect this trend to continue and grow. Redesigned data centres are a key element for this growth, since they represent a foundation for enabling cloud-computing technology. **wn**



14 carriers declare Southern and West Africa's highest capacity cable ready for service

WEST AFRICA CABLE SYSTEM UNLEASHES HIGH-CAPACITY BROADBAND CONNECTIVITY FROM SOUTHERN AND WEST AFRICA TO EUROPE

The West Africa Cable System (WACS) consortium has inaugurated the highest capacity submarine cable system ever to land in Sub-Saharan Africa. The 17,200 km WACS submarine cable system unleashes a new wave of broadband capacity on the African continent, linking 14 countries – South Africa, Namibia, Angola, the Democratic Republic of Congo (DRC), the Republic of Congo, Cameroon, Nigeria, Togo, Ghana, Ivory Coast, Cape Verde, the Canary Islands, Portugal, and the UK.

The \$650m WACS submarine cable system will help to lower the cost of broadband access and allow the delivery of innovative applications such as e-education and e-health. The additional high-speed capacity provided by WACS is expected to stimulate new business initiatives and to contribute to enhancing digital links that can have a dramatically positive impact on people's lives on the continent.

In addition to complementing existing high-bandwidth cable systems in the region, WACS will provide much needed diversity for large volume broadband traffic from Southern and West Africa to Europe. In the case of Namibia, the Democratic Republic of Congo, Togo and the Republic of Congo, WACS provides direct access to the global communication network for the first time.

Adrian Moss, Chair of the WACS Management Committee said: *"The sheer volume of capacity now being delivered will contribute to further fostering broadband development, giving impetus to African economies and helping to increase the standard and quality of life of its citizens. Additionally, the system combines high robustness and low-latency to meet the*

performance and stability required to ensure seamless traffic hand-off for the highest level of efficiency end-to-end."

According to Dr Angus Hay, Co-Chair of the WACS Management Committee, *"The trunk route on WACS from Cape Town to London is over 14,500 km long, with the express from South Africa to Portugal being 11,500 km, one of the longest such segments in the world. Latency tests on the WACS system carried out earlier this year from Yzerfontein in South Africa to Highbridge in the UK measured a round trip delay (RTD) of 138.5 milliseconds, the lowest achieved so far over such a transoceanic distance."*

The WACS system was supplied on a turnkey basis by Alcatel-Lucent Submarine Networks (ASN), making use of 10 Gbps technology as well as 40 Gbps optical coherent Dense Wavelength Division Multiplex (DWDM) technology. WACS is the first submarine cable system ever to make use of Generalized Multi-Protocol Label Switching (GMPLS) to provide advanced in-system restoration of wavelengths, increasing network resilience.

The WACS submarine cable is an ultra high capacity fibre optic submarine cable system that links Southern Africa and Europe, spanning the west coast of Africa from Cape Town, South Africa, and terminating in London, United Kingdom, with a total of fifteen landing points.

The 4-fibre pair system has a design capacity of 5.12 Tbps, of which about 500 Gbps will be lit at launch. The system makes use of both 10 Gbps and 40 Gbps technology on different segments. (1 Terabps is 1 000 Gigabps)

The WACS Consortium members are: Angola Cables, Broadband Infracore, Cable &

Wireless Worldwide, Cabo Verde Telecom, Congo Telecom, MTN Group, Portugal Telecom, SCPT (DRC), Togo Telecom, Tata Communications / Neotel, Telecom Namibia / BTC, Telkom SA, Vodacom Group and Vodafone Spain.

With the completion of the West Africa Cable System, operational as of 11 May 2012, Neotel retains its unique position as the only local telecommunications operator connected to each of South Africa's established submarine cable systems. Neotel has built a strong fibre capability in South Africa linked to existing submarine cables. As a member of the WACS consortium,



14 carriers declare Southern and West Africa's highest capacity cable ready for service

continues from pg 23



Neotel's network is now even more robust, in line with the company's stated strategy of investing in a high capacity national optical fibre backbone infrastructure.

Angus Hay, GM: Strategic Business Development at Neotel says, "For Neotel, this means that our customers are highly unlikely to experience downtime since we have the flexibility to move traffic from one cable to another in the event of any cable failure."

The addition of WACS to Neotel's international connectivity dramatically increases the availability of reliable high capacity bandwidth to Western Europe and the Americas, by far the highest traffic route for the country. It also means that Neotel will be able to optimise its international costs by carrying traffic on cost-effective routes. While WACS has a design capacity of 5 Terabits per second (Tbps), of which about 500 Gigabits per second (Gbps) will be lit initially, this will also enable future expansion of Neotel's bandwidth.

"We are committed to enabling business in South Africa through efficient and cost-effective telecommunications. We see ourselves as a catalyst for their global expansion plans, increasing their productivity and improving their own competitiveness," Hay adds.

The commercial launch of the ultra high-capacity 14 500km long West African

Cable System adds more than 40% to South Africa's existing international broadband capacity, and it also marks an important milestone in Vodacom's ongoing drive to unlock the power of the Internet.

According to the Department of Communications, only around 2% of South Africans have access to fixed-line broadband, whereas 17% access broadband via smartphones. The link between Internet penetration and GDP growth is well established, which is why economic growth and job creation hinge on seeing a step change in data connectivity.

The challenge from the fixed-line perspective is that less than 10% of the population has access to a telephone line. On the other hand, with virtually 100% of the population having mobile phone coverage, only a few more things need to fall in place to make that step change a reality.

Speaking about this, Vodacom's Chief Technology Officer, Andries Delpoort said: "It's clear that mobile technology is the quickest and most practical route to spreading Internet access to all South Africans. With a high base of the population already covered, we only need to get two key things in place and SA can quite literally take a giant leap forward. The first part is obvious - cheaper smart devices that everyone can afford. The second part is to ensure that

the mobile networks can support the data traffic." "WACS is an important piece in that network puzzle. Vodacom is investing billions of Rands rolling out new base stations and connecting those base stations into our network via fibre-optic cables. That's fine when the data traffic is just buzzing around within SA, but can hit a bottleneck when it comes to getting data from international websites. WACS addresses this."

The new cable adds over 400 Gigabits per second (Gbps) of international broadband capacity on launch, which is equal to the download of 4.8 million MP3 files or over 5 000 DVDs per minute.

The cable can also be upgraded to provide more capacity when needed. WACS also gives operators like Vodacom additional network resiliency whereby traffic can be rerouted if another cable is severed.

The benefits, however, may not be immediately obvious.

"International connectivity is actually a pretty small part of the overall cost of delivering a megabyte of data via mobile, so this isn't going to change the economics of our industry overnight. However, it is most definitely a step in the right direction in terms of ensuring that South Africa is fully connected to the rest of the world and an important part of Vodacom's drive to unlock the power of the Internet in the country." **WN**

FACTS

- The most important submarine cable system in West Africa and arguably the continent of Africa in 10 years.
- Providing Namibia, Togo and Congo and the DRC the first direct international sub-cable connectivity.
- Total investment is over US\$650m. Over 14,500km submarine fibre optic (4fp) cable system.
- Design Capacity over 5.12Tbit/s. Employing GMPLS (ASON) "intelligent" protection.
- The turn-key supplier of submarine system, SDH and DWDM is Alcatel- Lucent.
- The WACS investment is based on the consortium model; a joint effort between African and global telecoms operators.

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G4400, G4500 & G3500 Series **BLACKBOX** Power Quality Analysers

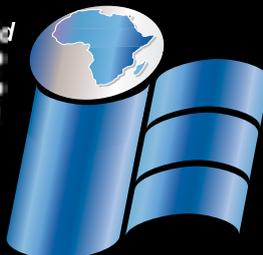
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W

ith 30,000 m³ (more than a Million cubic feet) cooling rooms, spreading over 22 square kilometers (5.5 acres), Karpri supplies refrigeration services, at various temperatures, to many concerns, such as Coca-Cola and Nestlé. Karpri holds three separate machine rooms for comprehensive cooling supply circulation, all monitored and maintained by an experienced staff of mechanical and electrical engineers.

Since 2002 Karpri has been experiencing weekly unexplained power events which seem to occur with no regard to a specific source or trigger. Karpri had spent tens of thousands of Dollars and months of man-hours in order to identify the source of interruption, which caused repetitive failures in their equipment with accumulated damage of hundreds of thousands of Dollars.

The problem has been addressed to the local Israeli Electric Company (IEC) as well as to many consulting companies for a long period of time. The most sophisticated power quality analyzers in the market today, from 4 different manufacturers, were installed on site for long periods but none were successful in determining the source of the repetitive failures.

After years of different investigations, and after Elspec PQZIP compression technology was launched, Karpri was finally able to install power quality analyzers that could really identify the source of the failures. Four Elspec G4420 Power Quality Data Centers were installed at the main service, at the secondary

Karpri is one of Israel's largest refrigeration and cooling warehouses (Freezing works facilities). It was founded in 1963 and it is part of "Tnuva dairy" concern (a Billion+ dollar company).



Monitoring Power Quality Beyond

EN 50160 and IEC 61000-4-30



of each transformer and at one of the MCC with many reported failures (hereinafter named ①, ②, ③ and ④ as showed at Figure 1). Each device utilizes the patented PQZIP compression technology, which provides typical 1000:1 compress ratio, to record all the data at 512 samples per cycle for a period of a few months onboard.

All the devices were connected to the local network and using a unique time synchronization algorithm they synchronized their time over the LAN

between themselves thus ensuring that all data is synchronized by a typical maximum of ± 1 sample. In this way, it was possible to monitor all the information from different locations on the same graph and the same time base.

All the devices were connected to Elspec central PQSCADA servers via the Internet, allowing Karpri to outsource all its power quality management – measurement devices, collecting data, data storage and power quality analysis.

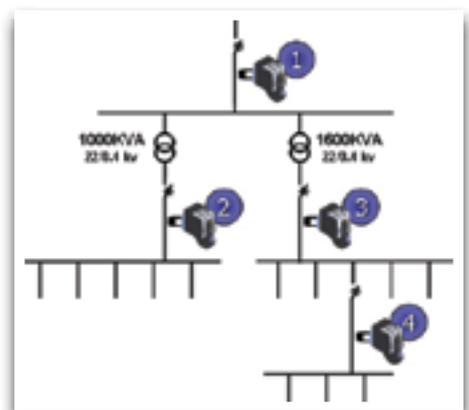


Figure 1
Single Line Diagram with Elspec G4420

Monitoring Power Quality Beyond EN 50160 and IEC 61000-4-30

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Just few days after the instrument implementation was completed, not only the main source of power events was located, but the full scope and progress of the power events was revealed.

Why were all the well-known power quality analyzers blindfolded while Elspec G4420 power quality data center identified the problem on the spot? Since Elspec G4420 recorded all the information all the time using PQZIP compression technology, four main issues were achieved:

1. Not limiting the data to EN50160 violations, allowed monitoring when the customer complained, not only when the data was abnormal.
2. Simultaneous measurements at multiple measurement points, synchronized in time, allowed analysis of abnormal event propagation.
3. Continuous recording of all channels, including phase to neutral and phase to ground voltages, even in Delta networks, revealed lightning protection issues.
4. Simultaneous monitoring according to IEC 61000-4-30 and cycle-by-cycle allowed analysis of very fast phenomena.

COMPLIANCE TO EN 50160

Figure 2 shows the results of EN 50160 compliance at the main service (1). Similar results are measured at each one of the transformer secondaries (2 & 3). Thus the site complies with and even exceeds the standard.

Figure 3 shows the EN 50160 results at the MCC (4), where many faults were observed. However, similar faults occur in points 2 and 3 as well, which perfectly comply with EN 50160. The obvious conclusion is that compliance to EN50160

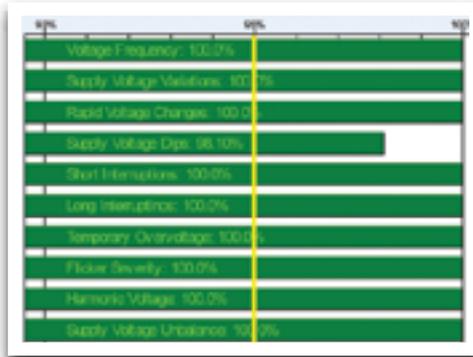


Figure 2: EN 50160 at the Main Service

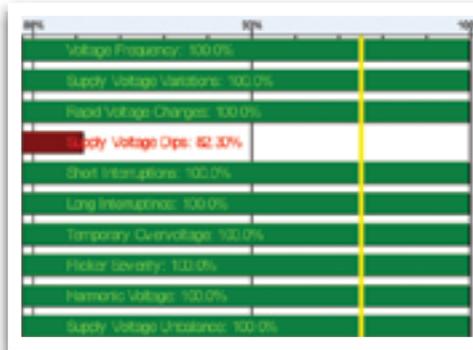


Figure 3: EN 50160 at MCC

cannot provide the answer to source of failures, although it indicates existence of voltage dips in one location.

Intermediate Conclusions

- EN 50160 cannot provide any indication as to the source of failure – failures occur in locations, which comply with EN50160, and other locations, which don't comply;
- Further investigation is required in order to locate the reason for the repetitive failures.

MULTIPLE SIMULTANEOUS ANALYSIS

One of the main benefits of using the PQZIP compression technology and the continuous storing of all the information at high resolution is the ability to monitor events at several locations synchronized by

time. Figure 3 shows the phase L2 to neutral voltage at all 4 locations from 1 at the top to 4 at the bottom. Only the voltage dip at 4 was more than the commonly used 10% threshold. When using a trigger-based logger, the troubleshooting engineer would have only a few cycles before and a few cycles after the event, from location 4 only. The data from the other three locations wouldn't be logged. In this way, it would be difficult to understand the event propagation over the network.

Figure 4 shows the L2 voltage on locations 1, 2, 3 and 4 (from top to bottom). It shows two events – on the left side an event started from 4, to the transformer secondary 3, up to the primary 1 and down to the other's transformer secondary 2. On the contrary, the event on the right went in did the other direction from 2 to 1 and down to 3 and 4. The lack of additional measurement points prevents better analysis of the source of failure in order to prevent it from recurring.

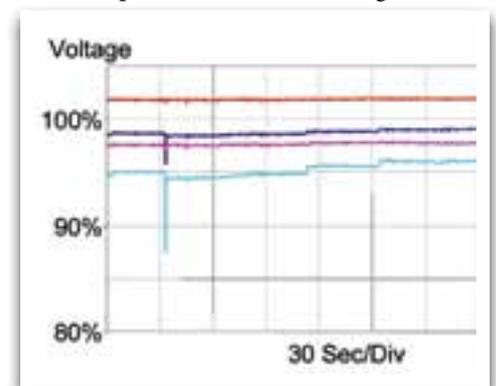


Figure 4: L2 Voltage at 4 Locations

Figure 5 is zooming on the left event, which shows the event propagation by time, in addition to the levels analysis done above.

Figure 6 shows the voltages, currents, kW, kVAR and kVA trends of a typical dip at

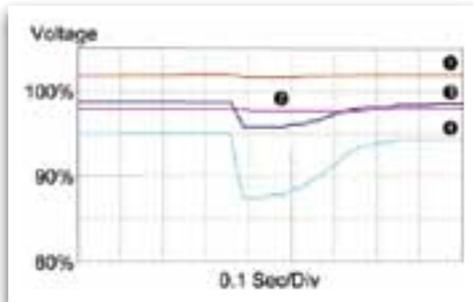


Figure 5: L2 Voltage Zoom

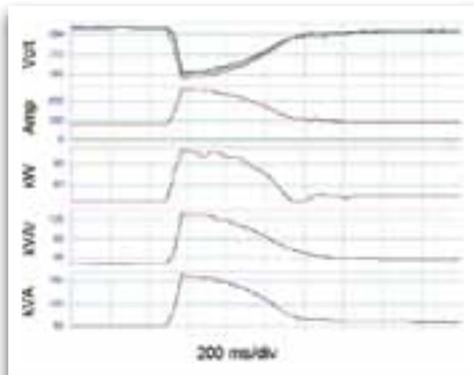


Figure 6: Typical dip at MCC

the MCC (4) which is intended to deeper investigation. It clearly shows that the dip is caused by the startup of one of the motors and can easily be compensated using an Elspec Equalizer – the world's fastest reactive power compensation system. However, since these dips occur every few minutes, it is not likely to be the source of the failure. Moreover, similar failures occur at locations where the dips are significantly smaller.

Intermediate Conclusions

- There are voltage dips in each one of the transformers;
- These dips can be reduced by using Elspec Equalizer;
- These dips happens all the time and they are not the source of the failures;
- Further investigation is required in order to locate the reason for the repetitive failures.

LINE-TO-GROUND VOLTAGES

The site is connected using two Delta/Star transformers. Since the voltage supply is Delta, the measurements are commonly limited to the line-to-line voltages only. This is also what is required in the different standards and regulations. The G4400 analyzers record all the information all the time, including line-to-neutral values. When the network is Delta and the neutral is not connected, the line-to-neutral values are the line-to-ground ones. One of the benefits of the additional measurements is shown in Figure 7. Due to short circuit between phase L3 to the ground (the bottom chart), the Line-to-ground voltage suffered a significant event, which caused rapid changed from 0 to 26kV, rather than the nominal 12.7kV (changes from 0% to 205%). During the same failure, the dip on the line-to-line voltage was less than 1% from nominal and 3% from the steady state level (21.8kV with respect to 22.0kV and 22.4kV).

The technical justification for monitoring only the line-to-line voltages is that the line-to-ground voltages do not go through the transformer, since it is D/Y. However, the over and under line-to-ground voltages do affect the transformer itself and reduce its life. Moreover, in sites where there are medium voltage (MV) loads, this voltage

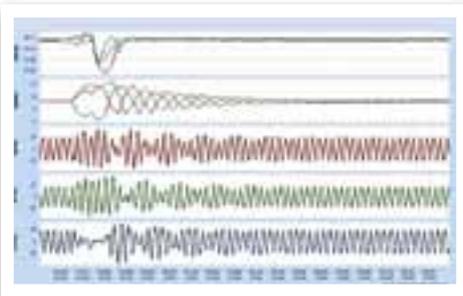


Figure 7: Line-to-Ground Event

can cause significant damages to the loads as well.

Intermediate Conclusions

- To protect the transformers, it is recommended to prevent the line-to-ground events;
- The solution can be from both side of the meter – the utility can improve its grid and/or the customer can install better lightning arrestors;
- This phenomena affects the MV only and it is not the source of the failures;
- Further investigation is required in order to locate the reason for the repetitive failures.

IEC 61000-4-30 HARMONICS ANALYSIS

The site includes many generators of harmonic pollution, mainly the 5th harmony. The loads generate harmonic current which create voltage pollution. Figure 8 shows a typical condition - maximum 3.3% THD V, maximum 20% THD I, 6.5V and 140A at 5th harmony.

Normally, measurements are performed in accordance with IEC 61000-4-30. This standard requires averaging of all parameters over 200 ms period (10 cycles at 50Hz or 12 cycles at 60Hz). However, this averaging may hide shorter phenomena. In some cases, short events don't have the required energy to cause damage. However, it depends on the weakness of the most sensitive device. Figure 9 shows the different results of the Voltage and Current THD when calculating every cycle (red) and according to IEC61000-4-30 (green). Rather than maximum Current THD of 19%, the true value is 53%. Similarly, the Voltage THD is 12% and not 4%.

Monitoring Power Quality Beyond EN 50160 and IEC 61000-4-30

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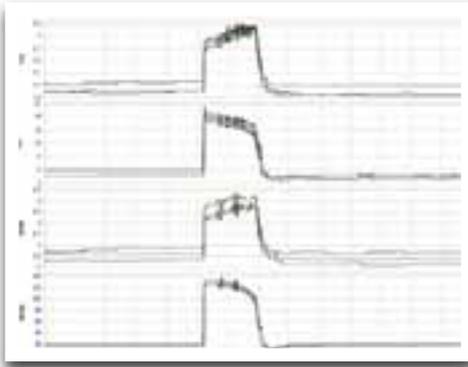


Figure 8: THD and 5th Harmonic

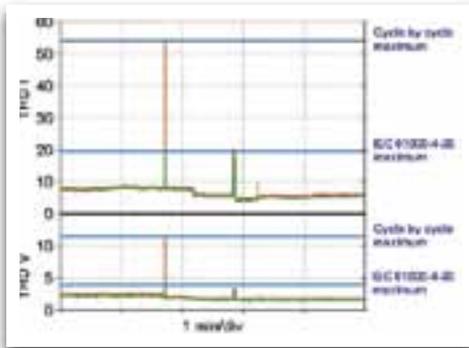


Figure 9:

Cycle-by-cycle and IEC 61000-40-30 THD

WHY IS IT IMPORTANT?

Due to superposition, the network is represented at 5th harmonic differently than in the fundamental (Figure 10). The load functions as current source (IH). Normally, the network equivalent impedance ($Z_S = Z_{SOURCE} = \text{utility network plus transformer}$) is the lowest and the harmonic current flows to the utility network, which can withstand the pollution. However, in some cases the network impedance is increased (e.g. connection or disconnection of capacitors) and the harmonic current flows to the lowest impedance, which is a sensitive load. In addition, due to the increased impedance, the current source cannot

supply the same amount of current and during this resonance the current is smaller.

Normally, harmonics are averaged because the importance is the total energy in the harmonics. In this case, the peak power of this resonance is 3kVA (Figure 11). Obviously, the 200 ms average is less, but still it was enough to cause damage. Moreover, sensitive loads probably fails before the 200 ms period is over.

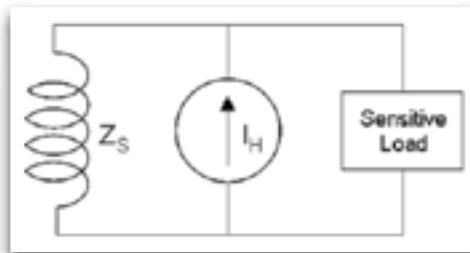


Figure 10:

Simplified Network Representation at 5th Harmonic

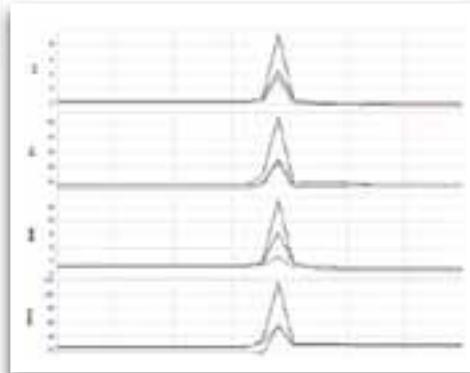


Figure 11: Temporary Resonance

Intermediate Conclusions

- The source of failure is probably due to temporary resonance at 5th harmonic
- To prevent the failures, a fixed passive filter is required

THE SOLUTION

To prevent the resonance, a passive filter should be used. The filter should have low impedance at the 5th harmonic and

be installed as close as possible to the transformer. In this way, when a situation as described above happens, the lowest impedance is the passive filter which can withstand the harmonic current and the sensitive loads will not be affected. It is not possible to install controlled filters (passive or active) because the fastest ones have one cycle reaction time and will be activated (or activated too late).

Karpri has installed two Elspec fixed tuned passive filters to 5th harmonic (tuned to 235 Hz). Since the installation of the filters, no additional failures were reported. Moreover, some of the loads that were disconnected when not in use in order to protect them were left connected continuously.

References

In his letter to the customer (ref. 900-031 from 5-11-06), the consulting engineer, says: "The power quality analysis system, installed at the plant by Elspec Ltd. was successful in locating anomalies which the local utility (Israeli Electric Company - IEC) could not locate within the entire period of time in which their instruments were installed at the site. Further more, according to the provided graphs, it can be clearly observed that the rising in harmonics THD capacity occur simultaneously with temporary external changes in the IEC 22KV network which indicates that there is an existing correlation between the two phenomena. We shall send a copy of the graphs to IEC for extensive explanations about these repeated simultaneous phenomena, which occur at a few hours pattern. In accordance to the measurement results so far, we are advising to keep Elspec's analysis systems



operating. The requested payment seems reasonable.”

Mr. David Lustiger, Karpri's CEO, "So many engineers, so long time and so much money spent without successful identifying the cause for the failures. Elspec's solution proved to be the most comprehensive though easy to implement and most important – the only one that worked!"

MAJOR BENEFITS

- Continuous measurement allows analysis of every anomaly;
- Cycle-by-cycle harmonics measurement can expose problems;

- Line-to-ground Voltage should be monitored also in Delta networks;
- EN 50160 is a basic checklist and is only the first step in analysis;
- Elspec G4k solution can identify anomalies where other monitors failed.

CONCLUSION

Standards were created to provide equal starting point to the power quality analysis and to help meters show the same values. However, in many cases limiting the information to the standard prevents the troubleshooting engineer from monitoring the anomalies, not to mention identifying their source.

Elspec G4k series, equipped with PQZip compression technology, provides continuous measurement of available information all the time in 1024 sample/cycle. There is no limit of the available data, since no thresholds or setups are used. In addition, it measures both in accordance to IEC 61000-4-30 and cycle-by-cycle in order to guarantee a full true view of the electrical network.

Using Elspec G4k for power quality analysis assures that anomalies not only are monitored, but also their root is identified.

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Free Energy, Perpetual Motion and all that stuff

I want a perpetual motion machine.

Actually, a perpetual motion machine will not be good enough; it must not only run forever without consuming any input energy, it must also deliver useful energy at its output (electrical preferred).

BY I PROF. IVAN HOFSAJER
SCHOOL OF ELECTRICAL AND
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Undeniably, this would be a useful device. The engineering applications of something like this will be enormous. As an academic, I have had numerous inventors approach me with just such a device. It has taken on many different forms and promised to deliver varying amounts of free energy. They have all had one characteristic in common: they just do not quite work, but the inventors are absolutely sure that with just a bit more effort success is around the corner.

Free energy devices offer more average energy available at the output than the energy put into the device. This challenges our understanding of the conservation of energy. It also challenges a deeply rooted engineering principle of 'nothing for nothing' or in more elegant terms, that design trade-offs are inevitable.

It is often easy to discredit anything that differs from your own way of thinking for no other reason than that it differs from your own way of thinking. The perpetual motion and free energy devices are from my perspective totally impossible because they violate the principles of thermodynamics. These principles were drilled into me by my undergraduate lecturers, and I too drill them into my students. However, someone who is not familiar with thermodynamics may consider free energy to be a perfectly valid concept and convincing them otherwise is indeed a very difficult task. Even with the tools offered by thermodynamics, it is often tough to offer a well-grounded argument against a particular device or invention other than to state that "it is not possible". Such an argument is no different from the proponents of free energy stating that "it is absolutely possible". Thermodynamics itself can also be challenged. Who is to say that my lecturers were correct? They may have just been perpetuating a myth as I may also be doing.

To break this impasse and to come to some form of sensible analysis of any device claiming to deliver free energy, it is necessary to start from the fundamentals. Only two very simple issues need to be agreed upon and the whole theory of thermodynamics may be dispensed with. This will come as a relief to anybody who at some point studied thermodynamics merely to pass the exam and was hopeful that they would not need to worry about it again in the future.

REPEATABILITY

The first issue on which we need agreement is that of repeatability. This is normally not too tough to agree on. In an experiment, if all conditions remain the same then the outcome will remain the same. Stated alternatively, if you do the same thing for a second time you will get the same result as previously, and if not, then something was different from the first time you did it. This requirement states that the physical behaviour of the natural world is constant and the laws of nature do not arbitrarily change. If a free energy device was working in the past and we duplicate the experiment, then it should work again.

MEASUREMENT

The second is an agreement on how something will be measured. This is considerably more difficult, especially where power and energy are concerned. Agreeing on how to measure the power output of a free energy device is vital in order to demonstrate its performance. There is no place for misconceptions which very often arise, such as ideas that the higher the output voltage of a transformer, the more powerful it is. Additionally, it is very important to remove any form of bias from the measurements. It is tempting to observe what you are hoping for so that you can prove yourself correct.



With agreement on repeatability and measurements, it is now possible to investigate the validity of any free energy device (With this approach it is possible to investigate any physical phenomenon). The first step is to measure and obtain data from the device. Using the measurement data it is possible to propose a theory or set of rules describing what is happening; presumably in this case that free energy is being produced and delivered to an output. If this theory or set of rules is indeed valid then it will be possible to predict how the principle would work in other conditions, for example by scaling up or increasing the output. This can then be tested by constructing a new or modified device and running it to see if it performs as predicted. In the case where it does not perform as predicted, the process iterates with a new or modified theory of how it works. This continues until a consistent theory is obtained which can then be used with confidence to design almost any form of the free energy device. This procedure, often referred to as the scientific method, has stood us well in the past in trying to discover the truth of how nature works. It should be applied with rigor to any device to see if it is indeed delivering free energy. Sadly this is something that is never done by the proponents of such devices.

It is important to realise that this procedure of measure, analyse, predict, measure can never prove that something is correct, all it can do is claim that to date something has not been proved to be incorrect. As far as free energy is concerned, we cannot state with absolute certainty that it does not exist. All we are able to state is that in the

whole of the history of scientific enquiry the fact that it does not exist has never been shown to be incorrect.

As mentioned before, the most common mistake free energy inventors make is in measuring energy and power incorrectly. A classic example is the measurement of the electrical power drawn from a battery. High school physics tells us that the power is given by voltage multiplied by current. The current may be determined by measuring the voltage across a small value shunt resistor. This is all well and fine, except when the current drawn is pulsating in nature. The parasitic inductance of the shunt resistor will cause an additional voltage to appear across the shunt, giving rise to an incorrect current measurement and hence an incorrect power measurement. Convincing someone of the nature of this error can be quite difficult. Even more challenging is when the measurement needs to be made in the presence of reactive power.

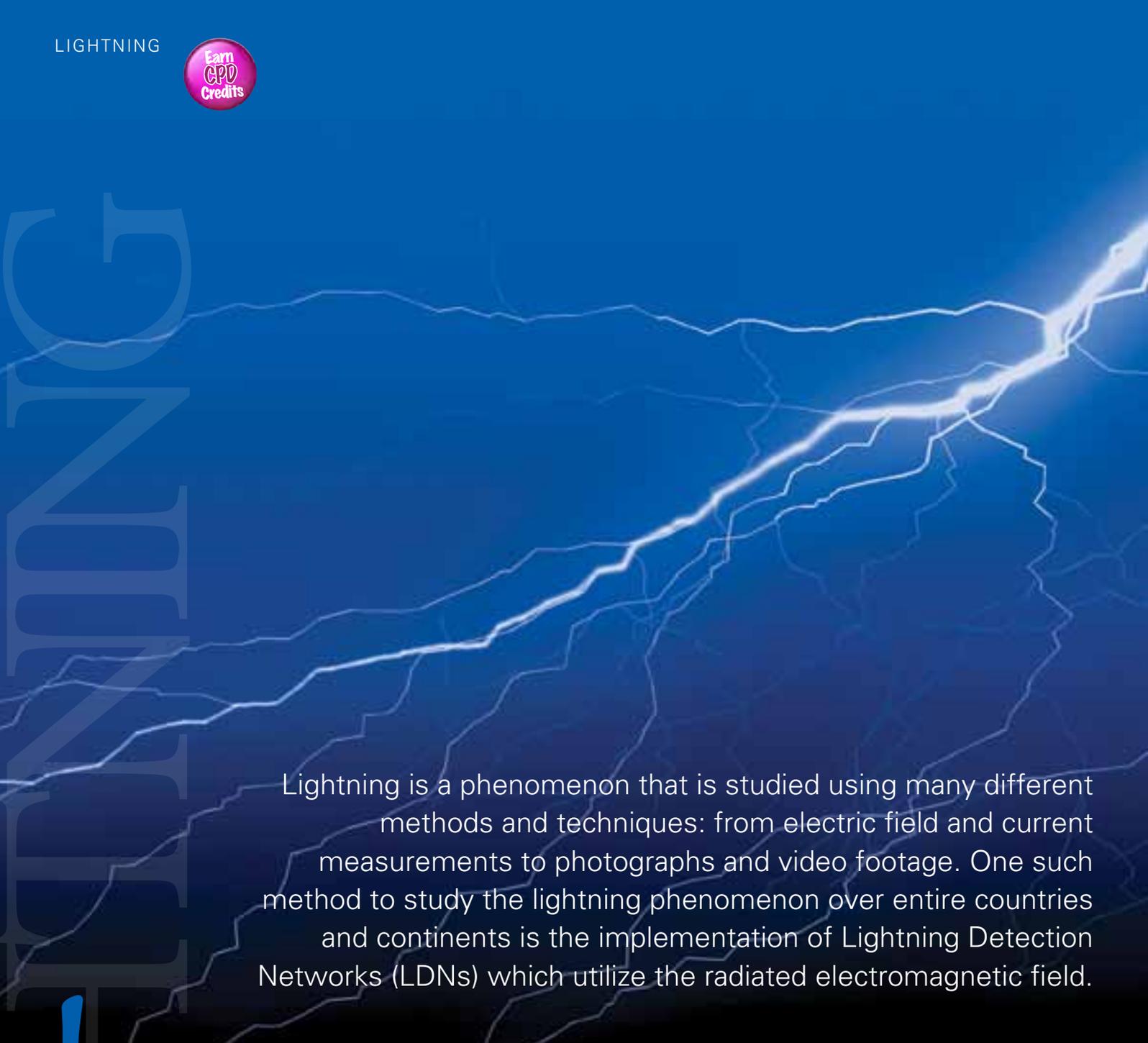
Another error many proponents make is to use conventional theory to try and design or explain a device that violates that very same theory. An example of this is trying to design a circuit that delivers more energy to a load than what it draws from the source. The circuit is designed by using normal circuit principles, Ohm's law, Kirchhoff's law, etc. A circuit designed using these circuit tools can never be shown to violate energy conservation, as the tools themselves were developed under the condition of energy conservation. In order to show that energy conservation is not valid for some circuits, it is first necessary to show that

Ohm's and Kirchhoff's laws do not apply to some circuits. This is a tough task.

Often the proponents of free energy are too caught up with the application to be able to concentrate on the actual free energy production mechanism. For example, an inventor might propose a car that runs on water. This is good for publicity and really captures the imagination but any real contribution will lie in how water is being used as a fuel and this is where the focus of the inventor's attention should lie. If it works for a car, it will work for a power plant as well.

Conspiracy theories abound concerning free energy devices. Many devices thought to have worked flawlessly in the past are said to have been suppressed by some sinister authority. I find this hard to believe, although I base this on nothing other than my knowledge of how the global research community functions. Should there be even a glimmer of a possibility that free energy may exist then there will be an unstoppable avalanche of work taking place across the globe as everyone races to be the first to demonstrate and lay claim to it. This will be closely followed by waves of commercialisation and refinement. This will be almost impossible to stop.

Notwithstanding the arguments given here it is indeed tempting to think of the possibility of a free energy device. It is equally tempting to think about winning the lottery. However, while I might one day win the lottery if I buy a ticket, I am less sure that I will come across a functional free energy device. **wn**

A large, stylized lightning bolt graphic in white and light blue, striking from the top right towards the bottom left, set against a dark blue background with faint, larger lightning bolts.

Lightning is a phenomenon that is studied using many different methods and techniques: from electric field and current measurements to photographs and video footage. One such method to study the lightning phenomenon over entire countries and continents is the implementation of Lightning Detection Networks (LDNs) which utilize the radiated electromagnetic field.

these networks are designed to detect lightning strikes that occur within the area covered by the network and to report where the strike occurred as well as other aspects such as the magnitude of the current peak. These networks allow for research and understanding of the meteorological nature of lightning. Areas in which lightning occurs the most frequently can be established as well as what time of year sees the most lightning activity.

The lightning phenomenon, however, is not only of interest to the meteorological sciences – lightning can cause severe damage to infrastructure and living beings. In this regard, LDNs are becoming increasingly used to provide evidence of lightning activity that may have been the cause of such damage. This may include examples such as transmission line faults, property damage or even loss of life. In many of these cases the exact time that the damage occurred is unknown – this

is especially true of forensic cases in rural areas (Blumenthal, 2009). If the information provided by a LDN is to be used as a deciding factor in possible insurance claims of this nature, it is important that the operation of the network, and therefore the implications of the reported data, is understood correctly.

LIGHTNING DETECTION NETWORKS

Lightning Detection Networks consist



MATCHING LIGHTNING DETECTION NETWORK DATA WITH REAL LIGHTNING EVENTS

BY I HUGH HUNT

of a number of sensors that are placed at distance from each covering the region in which lightning is to be detected. These networks can be found in many countries throughout the world in differing forms. One of the most known networks is the U.S. National Lightning Detection Network (U.S.NLDN) which consists of 114 Vaisala LS7001 sensors across the United States of America and has been in operation since 1989 (Mata, 2012). The South African Lightning Detection Network (SALDN)

is operated by the South African Weather Service (SAWS) and Eskom, the South African power utility. The network is made up of 24 Vaisala LS7000 sensors placed across the country and one sensor located in Swaziland.

The number of sensors present in each of these networks varies depending on the size of the country and the area that is to be covered. The make and design of the sensors also varies between networks.

These sensors detect the electromagnetic fields that propagate from lightning discharges and attempt to provide as much information about a lightning event as possible. A lightning strike is also termed a lightning flash and this flash consists of a number of strokes – the initial return stroke followed by a number of subsequent strokes. Given how the sensors operate, LDNs are capable of detecting each of these individual strokes. An algorithm that groups detected strokes based on their

MATCHING LIGHTNING DETECTION NETWORK DATA WITH REAL LIGHTNING EVENTS

continues from pg 35



proximity in location and in time determines which of these strokes were part of a single flash. The network also provides an estimate of peak current stroke as well as whether the stroke was a lightning event to ground or an event within the clouds.

There are two measures of how effectively an LDN is operating: Detection Efficiency and Location Accuracy. Detection efficiency is the percentage of actual lightning strokes occurring that were detected by the networks – sometimes the sensors do not detect a stroke. Location accuracy is a measure of the error in the location of an actual lightning stroke and where the LDN reported the location of the stroke to have occurred.

LOCATING LIGHTNING STROKES

To determine the location of a lightning stroke, LDNs need information from multiple sensors. Two techniques are then used to determine the location of strokes: Magnetic Direction Finding (MDF) and Time-of-Arrival (TOA). MDF uses two loop antennas to determine the direction of the magnetic field propagating from the lightning discharge. With two or more sensors, the intersections of these directions can be found and the location of the lightning stroke is determined. With TOA, the time the sensor detects the electric field change due to lightning is measured. Since the distance between each sensor is known, it then becomes possible to triangulate the position of a lightning stroke. Both these methods are implemented in LDNs to determine the location of lightning strokes (Rakov, 2003).

Figure 1 shows an example of both MDF and TOA techniques. It also shows what occurs when errors are introduced into the measurements of the sensors – there is disagreement between the sensors as to the location of the lightning stroke. It is common for these errors to occur and, in order to deal with this and determine the location of a lightning stroke, LDNs use algorithms to determine the optimal position or “best fix” of the sensor measurements and use this point as the location of the lightning stroke. The more sensors that detect the stroke, the more accurate this optimal position becomes. Investigations of the U.S. NLDN using results from rocket-triggered lightning tests have also shown that the greater the number of reporting sensors, the smaller the error was for the location of the stroke reported by the U.S. NLDN (Jerauld, 2005).

CASE STUDY ON BRIXTON TOWER

Figure 2 shows a photograph of a lightning flash to the Brixton Tower in Johannesburg, South Africa on the 10 May 2010. This photograph shows one stroke that was a component of the flash but a number of other photographs captured at the same time indicate that there was a flash to the tower consisting of a number of strokes. The question is now, how did the SALDN interpret this event?

All the data from this day can be extracted from the SALDN network database. The strokes detected by network that match this flash can be distinguished from other strokes in the area since they occurred at the same time the flash was captured on photographs. The SALDN

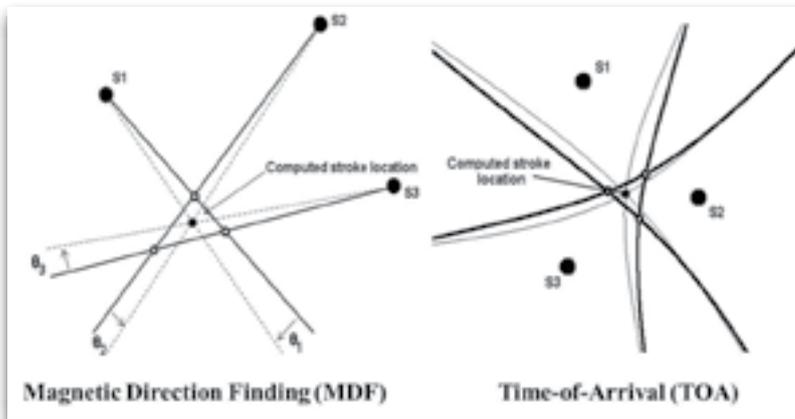


Figure 1. Locating lightning strokes with Magnetic Direction Finding and Time-of-Arrival techniques.

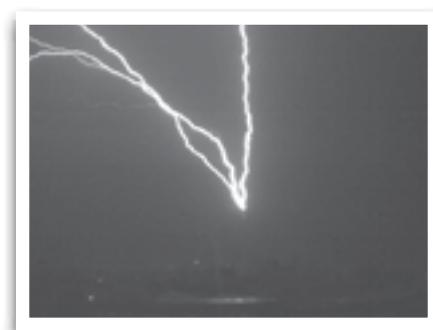


Figure 2. Lightning flash to the Brixton Tower, Johannesburg, South Africa on 10 May 2010. Photograph courtesy of Yu-Chieh Liu.



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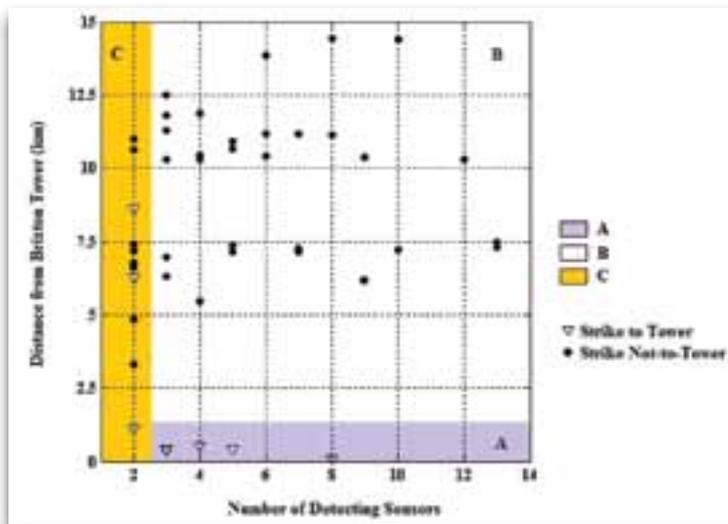
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MATCHING LIGHTNING DETECTION NETWORK DATA WITH REAL LIGHTNING EVENTS

continues from pg 36



There are two measures of how effectively an LDN is operating: Detection Efficiency and Location Accuracy.

Figure 3. Lightning data from SALDN for the Johannesburg region, 10 May 2010. The distance between the location the SALDN reported strokes to have occurred and the location of the Brixton is compared with the number of sensors that detected the stroke.

does not report the locations of these strokes at the exact location of the Brixton Tower due to the MDF and TOA errors that are involved in the stroke location methods as previously mentioned.

The data for the lightning flash is shown graphically in figure 3. A distinction is made between strokes to the Brixton Tower (indicated by the inverted triangles) and strokes that nearby (indicated by the solid circles). The figure then shows the distance from the Brixton Tower that each stroke was reported have occurred at as well as how many sensors detected each stroke. Strokes to the tower (inverted triangles) that were detected by many sensors are reported to have occurred near the tower and this is indicated in Region A (blue area). Strokes that were not to the tower (solid circles) but were still detected by many sensors are reported to be far from the tower as seen in Region B (white area). Strokes detected by few sensors, found in the orange area, Region C, are both near and far from the tower regardless of whether they were to the tower or not.

CONCLUSION

These are observations that need to be considered when information provided by LDNs is to be used as evidence for lightning activity. If the location of an event involving damage or loss of life is known but the time at which the event occurred is not, care must be taken deciding if a lightning flash caused the damage based on LDN data. The LDN may have reported a lightning stroke near the location of the event. If this stroke

was only detected by a few sensors, it is likely that there may be an error in the reported location. Strokes detected by many sensors are more likely to have their location reported accurately.

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Strange new materials experimentally identified just a few years ago are now driving research in condensed-matter physics around the world.

Beyond the High-Speed Hard Drive

BY I BRIAN WANG



TOPOLOGICAL INSULATORS OPEN A PATH TO ROOM-TEMPERATURE SPINTRONICS

First theorized and then discovered by researchers at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) and their colleagues in other institutions, these "strong 3-D topological insulators" - TIs for short - are seemingly mundane semiconductors with startling properties. For starters, picture a good insulator on the inside that's a good conductor on its surface - something like a copper-coated bowling ball.

A topological insulator's surface is not an ordinary metal, however. The direction and spin of the surface electrons are locked together and change in concert. And perhaps the most surprising prediction is that the surface electrons cannot be scattered by defects or other perturbations and thus meet little or no resistance as they travel. In the jargon, the surface states remain "topologically protected" - they can't scatter without breaking the rules of quantum mechanics.

"One way that electrons lose mobility is by scattering on phonons," says Alexis

Fedorov, staff scientist for beamline 12.0.1 of Berkeley Lab's Advanced Light Source (ALS). Phonons are the quantized vibrational energy of crystalline materials, treated mathematically as particles. "Our recent work on a particularly promising topological insulator shows that its surface electrons hardly couple with phonons at all. So there's no impediment to developing this TI for spintronics and other applications."

The TI in question is bismuth selenide, Bi₂Se₃, on whose surface electrons can flow at room temperature, making it an attractive candidate for practical applications like spintronics* devices, plus farther-out ones like quantum computers. Much of the research on electron-phonon coupling in Bi₂Se₃ was conducted at beamline 12.0.1 by a team including Fedorov, led by Tonica Valla of Brookhaven National Laboratory. Their results are reported in Physical Review Letters.

THE RIGHT TOOL FOR THE JOB

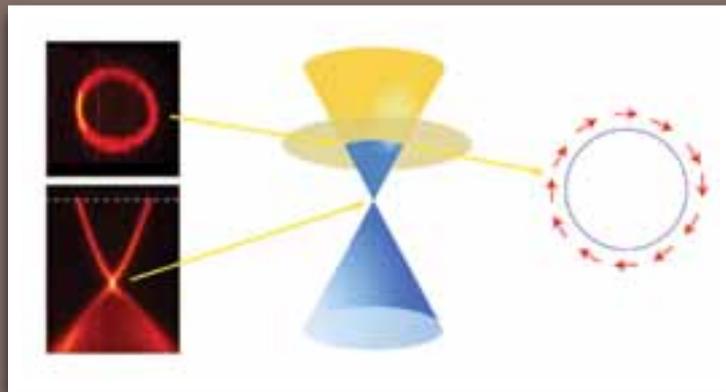
To study a TI's surface conductivity, electron transport on its surface has to

be separated from total conductivity, including the poorly conducting bulk. One experimental technique, called angle-resolved photoemission spectrometry (ARPES), is adept at doing just this.

ARPES shines bright light, like that produced by the Advanced Light Source, on a sample and captures the electrons that the energetic photons knock free. By recording the angle and energy of these photoemitted electrons on a CCD detector, ARPES gradually builds up a direct graphic visualization of the sample's electronic structure.

"Of the several ARPES beamlines at the ALS, beamline 12.0.1 seems to have an ideal balance of energy, resolution, and flux for research on topological insulators," says Fedorov. "This beamline was used for some of the first experiments establishing that 3-D TIs actually occur in nature, and several teams have worked here validating the characteristics of TIs."

The photoemitted electrons in an ARPES experiment directly map out such features



ARPES maps the electronic properties, including the band structure and Fermi surface, of the topological insulator bismuth selenide (left). Like graphene, the lower energy valence band of a topological insulator meets the higher energy conduction band at a point, the Dirac point, with no gap between the bands (center). Unlike graphene, however, the Fermi surface of a TI does not usually pass through the Dirac point. For surface electrons, distinct spin states (red arrows) are associated with each different orientation in momentum space (right). (Credit: Image courtesy of DOE/Lawrence Berkeley National Laboratory)

as the material's band structure -- the energy difference, or gap, between electrons bound in atoms' outer shells, the valence band, and charge carriers that are free to rove, the conduction band. Insulators have wide band gaps, semiconductors have narrower ones.

The band structure of the surface states of a topological insulator like Bi₂Se₃ appear as two cones that meet at a point, called the Dirac point. There's no gap at all between the valence and conduction bands, only a smooth transition with increasing energy. This is similar to the band structure of the fascinating material graphene, a single sheet of carbon atoms, the thinnest possible surface. ARPES diagrams of band structures like these look like slices through the cones, an X centered on the Dirac point.

Although graphene and topological insulators have similar band structures, other electronic characteristics are very different. The combinations of different speeds and orientations equivalent to a

material's highest particle energies (at zero degrees) make up its momentum space, mapped by the Fermi surface. While the Fermi surface of graphene lies between the conical bands at the Dirac point, this is not true of TIs. The Fermi surface of Bi₂Se₃ cuts high across the conical conduction band, mapping a perfect circle. It's as if the circular Fermi surface were drawn right on the surface of the topological insulator, showing how spin-locked surface electrons must change their spin orientation as they follow this continually curving path.

Values including electron-phonon coupling can be calculated from the diagrams that ARPES builds up. ARPES measures of Bi₂Se₃ show that coupling remains among the weakest ever reported for any material, even as the temperature approaches room temperature.

Says Fedorov, "Although there's still a long way to go, the experimental confirmation that electron-phonon coupling is very small underlines Bi₂Se₃'s practical potential." With continued progress, the spin-locked

electronic states of room-temperature topological insulators could open a gateway for spintronic devices -- and for more exotic possibilities as well.

For example, by layering a superconducting material onto the surface of a topological insulator -- a feat recently achieved by a group of Chinese scientists working at beamline 12.0.1 -- it may be possible to create a theoretical but yet unseen particle that is its own antiparticle, one that could persist in the material undisturbed for long periods. Discovery of these so-called Majorana fermions would be an achievement in itself, and could also provide a way of overcoming the main obstacle to realizing a working quantum computer, a method of indefinitely storing data as "qubits."

The experimental examination of strong, 3-D topological insulators is a field hardly more than five years old, and the potential rewards, both for fundamental and applied science, have only begun to be explored. **wn**



I had the privilege of tapping into Jane Buisson-Street's memory and learning more about this phenomenal woman who I see sitting quietly in committee meetings.

Jane Buisson-Street

BY I MINX AVRABOS

Born in England, Jane spent her junior school years at a number of schools, starting off in the UK and then in South Africa, she attended Roedean School until matric. At one stage during that period of time, ideas of being a lawyer floated around in her head, but a brief introduction to Latin soon put pay to that idea.

During the course of Jane's high school years she undertook projects such as doing the lighting for a number of amateur dramatic societies and school productions, which then lead to her redesigning the school stage lights, as well as dissecting anything, electrical that was left unsupervised. (This in turn lead to a number of threats from her parents...).

Jane successfully completed matric at 16 and went on to graduate with a National Higher Diploma in Electrical Engineering (Heavy Current). As practical semesters are an essential component of this type of qualifications, she approached a number of large companies for employment.

One particular interview stands out to this day, remembering this was the mid 1980s: On walking in for an interview, two male interviewers looked at her quizzically and said that they were waiting for MISTER James Egner. It took a while to convince them that it was actually 'Miss' Jane Egner who applied. A short while thereafter she was asked, "What type of contraception do you use?" *"Let's just leave it at that, it is*

highly unlikely that an interviewer ever asked that question again!" Jane said. Oh, and she won the R10 for "Best Letter award" after writing a letter letting off steam about that interview.

Eventually Jane was employed by GEC and worked for several divisions. By the time of graduation she realised that hands-on site work was what she preferred and was fortunate enough to be employed as an assistant commissioning engineer by GEC projects.

Then the fun and games began...

As most of the projects Jane was involved in, were to work with mine-winders, she headed off to get her red ticket (Certificate of Fitness). After having sat in the waiting room for a while to see the clinic doctor, she went in to the consultation room only to find a grey-haired doctor with eyes the size of saucers. He asked her to return in a few days, as he needed to determine which health guidelines needed to be followed for women who worked underground.

The following few years were quite an adventure, working on mine winders and conveyors on the surface and underground on a number of mines throughout South Africa. To this day she's happy to work either at the top of the shaft or at the bottom.

On one mine in particular there was a shift manager who always brought extra lunch to share when she was on site, much to the chagrin of her colleagues. There were also a number of occasions when her boss was

congratulated about how knowledgeable his daughter was about the workings of certain equipment.

Working underground was (and still is) quite an experience, often requiring people to dig deep into themselves. For instance it can be hot, it is dark and never quiet, even if there is no equipment noise or voices - and there were definitely no ladies toilets. During the 1980s and early 1990s, there were no women's facilities on the majority of sites; they were usually found in the closest administration block that could involve a 5km drive.

Parts of coal-miners equipment are gumboots. Herein lies the problem: at a ladies size 4½, good old-fashioned gumboots are not a fashion statement and hence not made! The substitute: white butcher boots that are about half the length. Add to that - white overalls! So her typical appearance after a shift was white boots with a type of tie-die effect up the legs.

The longest project she was involved in was in KZN as a member of a three man commissioning team at a major manufacturing plant. It was a two-year project that involved stripping out an existing analogue control, installing and commissioning the newest GEC digital technology while production was maintained. The hours were long; conditions were tough and often lonely, while living in a hotel does not compensate for being away from home for so long.

Jane Buisson-Street

continues from pg 43

Pregnant, dressed in pink overalls & hardhat with protruding belly making climbing over large machinery quite a challenge.



During this two year period the clients technical staff asked her boss if she could be reassigned to an office for a while because some of the men were uncomfortable as she could get the drives going within a particular time frame, and they couldn't.

It was during this time that Jane registered for a BSc through UNISA. On the way to her wedding, and also when she went into labour for the first time a few years later, she finished assignments off. (They were not late, just needed time off). In the latter case there was at least some assistance from her husband and doctor. How many of you remember "Verily say I unto you, marry not an engineer"? You have to feel sorry for her husband, a chemical engineer. The by-product of their marriage is a son, a daughter, two dogs and a cat.

After her marriage, she accepted voluntary retrenchment as being pregnant, dressed in pink overalls & hardhat with protruding belly make climbing over large machinery quite a challenge.

6 months after the birth of her son, she went back to work, but this time as a lecturer at Technikon Pretoria's Nelspruit Campus. Jane was the second lecturer to be appointed to the Faculty of Engineering staff on that campus. Initially Power and Mechanical Engineering was offered and two lecturers taught all the S1 and S2 subjects. That first year of being an engineering educator was tougher than any of her experiences as a student.

During the first few years, Electrical Engineering was offered at Eskom's Sterkspruit site, which involved a bus ride to and from Nelspruit daily; imagine the chaos when the bus broke down or did not arrive at all for the return trip.

Jane moved to Johannesburg, after spending 9 years in Nelspruit. She then lectured at the Witwatersrand Technikon from 1999 to 2008. It was quite an experience for Jane to be back on the campus, which was a building site in her student days, as well as having colleagues who had been her mentors. Lecturing at TWR was a dream compared to her previous experience at Nelspruit as substantially fewer subjects were assigned to each member of the academic staff.

Jane became the HoD of Computer Systems Engineering and was a senior lecturer after the merger that resulted in the University of Johannesburg. She did her Masters degree in Information Engineering at Wits, after completing the BSc. Computer Science and Stats.

After the merger of the Witwatersrand Technikon and RAU, Jane had time to reflect and realise that South Africa had lost over a decade's worth of competent artisans and craftsmen.

"I feel it's safe to say that we are in the midst of an education crisis. There has been, and still is, concern regarding issues such as throughput rate, - quality of education,

best teaching practises, course material and qualification structures which I was and still am very passionate about."

One of the biggest lessons learnt, being out in the field is hard work, both physically and mentally. So is being an engineering educator particularly for those who care; and it is not a 9 months of a year job. The emotional investment is exhausting. Jane has on two occasions had female students who have gone into labour while attending lectures, an experience none of her male colleagues ever got to share.

Medically boarded in 2009, which was a time to step back and smell the roses. She has become very involved in SAIEE and Computer Society of South Africa (CSSA) when she can, as well as being examiner and moderator for a number of institutions throughout the country. She spends time reading when her sight allows and has reverted back to a habit of asking "Why?" that disappeared over the last decade or so of working. She's even been known to try out snow skiing (with painful consequences) and scuba diving (no need for a walking stick down there).

During our interview, I realised that this woman has accomplished more than most, and have earned her accolades on merit, and not because she is a woman. She had to work so much harder to prove herself to her peers, but always came out on top. Jane made me realise, being a woman gives one no excuse to not achieve more! **Wn**

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The Birth Pangs of the Rand Easter Show

BY | JOHN DAVIES | JOHANNESBURG ELECTRICITY DEPARTMENT

John Davies Pr. Eng MSAIEE, now 86 years old, and who was Johannesburg Electricity Department's Consumers Engineer for over 15 years reminisces on one of the highlights of his career, namely, of how he was very much involved in the birth of the Rand Easter Show. The story he tells is just too amazing and makes fascinating reading.



THE ASSOCIATION OF ELECTRICAL SUPERVISING ENGINEERS (S. A.)

Once upon a time (ha ha!!) (Actually during the early 1960's... at a Council meeting of the Association of Supervising Electrical Engineers, we were debating on how to increase our membership, and it was suggested that we try and sponsor an Electrical Exhibition and have a 'Stall' where we could do all the necessary advertising. I feel very humbled that, as Chairman, I could have decided to say that it was not a very good idea and move on to the next item. However, I did not, and this proved to be a turning point in history, because resulting from this decision, the baby was duly born that grew to be the mammoth Rand Easter Show that it is today.

By an amazing coincidence (Divine Orchestration perhaps?), a Promotion Agency was starting an exhibition called ELECTRA, having procured for this purpose one hall at the Milner Park Agricultural Showground in Braamfontein, Johannesburg.

A Mr. Norman Pinker who ran this Promotions Agency (and who was a real 'Fire Brand') was the man who actually did all the negotiating with the 'Powers That Be' and really got the 'Show on the Road' (pun intended!!).

THE S.A. AGRICULTURAL SHOWGROUND IN MILNER PARK, JOHANNESBURG

Up until 1965 this Showground had only been used for the Annual Easter Show of the South African Agricultural Society (founded in 1894) where they showed off Cattle and Farming Equipment etc: (So this is why the Rand Show is always held each Easter!!) ... (Gosh! You live and learn, Hey Wot!!) To cut a long story short, we worked like crazy trying to persuade Electrical Companies

to exhibit in this hall in order to make themselves better known and to promote their sales etc:. We had our own Stall at the 'Place of Honour' (thanks to Norman) at the main entrance to the hall.

OUR FIRST "BIG LAUNCH"

However, we decided to give it A REALLY BIG LAUNCH the following year, which was held from 25th to 31st August 1966. We again had our own A.S.E.E. stall at the entrance to the hall where write-ups were handed out giving details of the Association and inviting Electrical Engineers who had come to see the Exhibition to join the Association (some Engineers actually joined there and then). Our membership figure rose enormously as a result of the whole operation.

We invited Dr. H.G. MONNIG, the Scientific Advisor to the South African Prime Minister to officially open the Exhibition. (Which he duly did and he made a splendid and very appropriate speech).

We also invited the most prominent Engineers we could think of as Guests of Honour to give everything a really good send off. I still have a large glossy photograph of our stall and also a FULL PAGE devoted to ELECTRA in 'THE STAR' Newspaper dated 25 August 1966 (together with my captioned picture as Chairman of the Association!)

OUR OWN A.S.E.E. AUDITORIUM AND A BIG 'SYMPOSIUM'

Needless to say, our 1966 were a huge success and the following year (1967) we even had our own A.S.E.E. Auditorium where we held a big Symposium entitled "Electrical Safety in the Home". Mr. A. A. Middlecote, a Director in the S.A Bureau of Standards chaired this symposium.

It is simply amazing how enormous projects grow out of tiny insignificant beginnings. As they say "Huge Oak trees from tiny Acorns grow". THE RAND EASTER SHOW is a typical example of this, and reads almost like a Fairy Tale!! ... Let me elaborate ...

The Birth Pangs of the Rand Easter Show

continues from pg 47



*“Time like an ever rolling stream bears all its sons away;
They fly forgotten as a dream - dies at the opening day” - (Isaac Watts 1674 – 1748)*

On the “Panel” were Mr. J.L. Whitwell also of the S.A. B. S, Mr. L.B. Cumming, Head of the Consumers’ Branch of the JHB Electricity Dept. (whom I succeeded, incidentally), Mr. F. Stern, Sales Director of a large firm of Domestic Appliances and Mr. L. Thorpe, Regional Manager of the National Occupational Safety Association.

THE SUBSEQUENT YEARS: THE EXHIBITION TAKES OFF LIKE A ROCKET!!

During the following years more halls were negotiated as, now, very many Electrical firms became extremely keen to participate.

Eventually, firms other than those in the electrical industry wanted to ‘climb on the bandwagon’, and the misnomer “ELECTRA” was changed to “THE RAND EASTER SHOW”

As a result of all this, the whole thing took off like a rocket and expanded out of all proportion.

THE WHOLE ‘CABOODLE’ MOVES OUT TO “THE RAND SHOW GROUND” SOUTH OF THE CITY IN 1985

Finally, in 1985 it became so enormous, that it was bursting at the seams at Milner Park, so it was moved out to the south of Johannesburg and was called “The Rand Show Ground”.

SUMMARY

For anyone who wishes to dispute any of the foregoing, here is a brief Summary of the actual facts: -

FACT 1 - The S. A. Agricultural Society was founded in 1894 and up until the early 1960’s they only exhibited Cattle and Farming Equipment: at Milner Park, Braamfontein, Johannesburg.

FACT 2 - In the early 1960’s The ELECTRA EXHIBITION sponsored by The Association of Supervising Electrical Engineers procured one hall from the foregoing where only Electrical Products were displayed.

FACT 3 - The ELECTRA EXHIBITION was officially opened by Dr. H.G. MONNIG, the Scientific Advisor to the Prime Minister in August 1966.

FACT 4 - In 1967 The A.S.E.E. was given its own Auditorium where it held a big Symposium that centered on Public Safety in the Home..

FACT 5 - Towards the end of the 1960’s more halls were procured and the Exhibition was thrown open to firms other than Electrical ones.

FACT 6 - The name “ELECTRA” therefore became a misnomer, and during the 1970’s

its name was changed to “THE RAND EASTER SHOW”

FACT 7 - The Rand Easter Show became so big that it became unmanageable at Milner Park, and, in 1985, a huge piece of ground was secured in the Southern part of the City, henceforth to be known as “THE RAND SHOW-GROUNDS”

All the foregoing facts can be easily verified.

LOOKING BACK IN ABSOLUTE AMAZEMENT!!

It is amazing, when I look back and see, in my mind’s eye, such a simple beginning, namely, a dozen or so of us insignificant ‘Electrical Chaps’ at one of our monthly meetings and someone (it wasn’t me, or I certainly would have remembered!!!) saying “How about us sponsoring an Electrical Exhibition? Perhaps we can possibly attract some new blood into our organisation in some way”. At least, I had the honour of being Chairman during these birth pangs.

POST SCRIPT

I, myself, am approaching 90 years old and I just wonder if there is any other members of our old ASEE Council still alive who remember those exciting times in ancient history. If so, do get in touch with me on email howarddavies@iburst.co.za. 

GET YOUR OWN COPY

"Living amongst the stars at the Johannesburg Observatory"

Written by Dirk J Vermeulen, vice-chairman of the Historical Section of the South African Institute of Electrical Engineers (SAIEE), has traced the fascinating evolution of the Johannesburg Observatory from the early 1900s to its current ambitious goal of becoming a dynamic science and education centre.

Own it now for only R275*

"The First Ten Decades - the history of the SAIEE"

Written by Mike Crouch, Past President of the South African Institute of Electrical Engineers (SAIEE), was commissioned by the Centenary Committee to record and celebrate the contributions that electrical engineers and in particular, members of the SAIEE made to the profession and the betterment of society over the past century. **Own it now for only R250***



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You said...



Dear Minx

I was very interested to see the Duvha article in the February issue. I am an Eskom pensioner contracted to the Eskom Academy of Learning. I develop and present technical training courses on Power stations, particularly to Generation Division's Engineers and technical Supervisors. These include Occurrence Management (Incident Investigation techniques) and Generator Engineering. I make wide use of various Eskom and international incidents for case studies. So I have been eagerly awaiting the release of the official investigation report for the Duvha Turbo-generator 4 failure, with the view of including it in my various courses. This has thus far not occurred, as Eskom has not yet released it.

So I expected that the **wattnow** article would be an insightful review of the "hot off the press" report, using the actual information which until now has not been made available. I was thus very surprised (and disappointed) to find that the article is nothing of the kind. With all due respect, the author appears to have taken various hearsay stories and constructed the article based on their often inaccurate or even incorrect content!?

1. "Cost and time to repair are estimated at R3 billion and up to two years". The last estimate I HEARD was R1.5 billion.
2. "The explosion was apparently caused..." Yes APPARENTLY. What was the actual Root Cause? This information has been a closely guarded secret up until now.

3. "Evidently the test on the 9th of February....." Where is the evidence? Does the author have it? If so where was it obtained? Hearsay is that some information has been leaked and disciplinary action taken against personnel found to be responsible!!

4. "It would be of great interest to many members of the SAIEE to receive more information....." I agree, and await official release of the report with keen and impatient interest.

5. Where did the author obtain the photos? I am not aware that these are freely available. Wikileaks?

6. The Reliability analysis looks very strange indeed! The statement "This implies that "n", the number of failures of the turbo-alternatorper 106 (actually 10 to the power of 6) hours is 2.62" is based on a previous failure of another TG altogether. If the analysis is conducted on that basis, ie. based on a fleet of generators, then I suggest the combined running hours of the entire fleet must be included in the calculation, not the time period between the two incidents.

7. Incidentally a similar incident to the Vereeniging one occurred at Pretoria West station (in the 90's I think). The operator was instructed to shut down the machine, but was unable to close the governor valves. This was later found to be due to a piece of metal trapped in the valve jamming it open. The operator must

have been slightly bright, as he reasoned that opening the Generator circuit breaker would also deload the machine, thus achieving his objective. He did so, and the electrical load did reduce to zero - instantaneously! But the turbine was still being driven by the incoming steam for full load. It immediately ran away, accelerating rapidly until the generator rotor winding wedges failed. The windings flew outwards into the airgap, causing the generator to seize, fracturing the shaft, and wrecking the turbine. I think some of our members like Alan Mitchell and Gert Coetzee were involved in investigating this incident.

I will not be surprised if Eskom also writes to you about the article!?

Regards

Bev Lawrence
Fellow

ED - Thank you for your letter of opinion on the Duvha Powerstation. I invite any of the SAIEE members to shed some light on this turbine failure, content which can be substantiated.

Dear Minx

I was following the posts regarding training for apprentices and technicians and thought you may be interested to know about the academic qualification we received and what has happened to it.

I graduated as an Alumni in the early

"I was issued a statement by the government (National) which stated that my Diploma was equivalent to the 'new' Higher Diploma."

80's with a National Diploma for Technicians-T4. I attended the graduation ceremony and received my diploma at the city hall. The last of the old diplomas.

At the same ceremony were students with the "new" National Diploma-T3.

My diploma was replaced by a Higher National Diploma-T4. I was issued a statement by the government (National) which stated that my Diploma was equivalent to the "new" Higher Diploma.

The Higher National Diploma has been discontinued. A National Diploma - S4 is now issued, followed by a BTech degree.

The S4 is comprised of level 3 subjects as was T3.

BTech is comprised of level 4 subjects as was T4. A project is required for BTech whereas we had to do an extra year of practical work

experience (during which time we did lots of projects). Both are NQF7.

I can register for MTech with my diploma.

My T4 was around for at least 15 years and the new T4 for at least 10 years, which is a lot of graduates.

The BTech system does not have provision for all us old guys and we do not know where we fit in. It would be nice if government could issue a statement like they did when the "new" diploma was introduced. We are being discriminated against and this is evident when looking at job adverts.

I was almost overlooked by Eskom until I produced the statement of equivalence attached.

SAIEE also automatically accept BTech but we must apply on merit based on experience.

I have enquired with all the relevant bodies to no avail.

When standard 10 was replaced by grade 12 and OBE we all still knew where we stood.

It seems as if T4 just disappeared.

Regards
Mark Pope

ED: Thank you for your mail - I've read it with such trepidation.

I hope your letter will generate into something/someone giving you a direct answer; or

*You can turn your letter, with all the attachments, into an article which I can publish in the **wattnow** - on your personal experience and thereby invite someone to contact you to give you an official answer with your dilemma. **wn***

Networking Breakfast

The SAIEE is hosting a Women in Electrical Engineering Networking breakfast. You are hereby cordially invited to join us on this fulfilled morning. Prizes to be won - don't forget your business cards.

DATE 11 July 2012
VENUE Sunnypark Hotel, Johannesburg
TIME 7:30 for 8:00am
COST R275 p/p non-members
R250 p/p SAIEE members
RSVP Gerda Geyer - geyerg@saiee.org.za
011 487 9043 - **BY 29 JUNE 2012**

SAIEE CPD Courses 2012

For more information or to book your space, contact ROBERTO BENITES | T 011 487 9042 | E roberto@saiee.org.za

ELECTRIC POWER CABLE TUTORIAL

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WHERE JOHANNESBURG
PRESENTER DICK HARDIE, Pr Eng and FSAIEE
DATE 24 May 2012
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EAST LONDON COURSES

WHERE EAST LONDON | Blue Lagoon Hotel, Blue Bend, Beacon Bay
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LECTURER PROF. PIET SWART
DATE 4-6 June 2012
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COURSE Transmission Lines
LECTURER FRED VISSER
DATE 5-6 June 2012
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COURSE Photovoltaic Solar Systems
LECTURER ATILLIO DALVIT
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A course for those in the technical environment needing to effectively communicate in writing and thus develop their relationships with colleagues and customers.

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LV PROTECTION

LOW VOLTAGE CIRCUIT BREAKERS | voltages; overcurrents, overload protection; short circuit protection, LV breaker operation, arc extinguishers, type of faults, asymmetry, energy limiting, cascading **STANDARDS** | specifications & the law, early circuit breaker standards, SA & European Standards, limitations of applicability, circuit breaker standards & other countries, SANS 10142-1, the OHS Act and SANS 10141, the CoC **LV COORDINATION** | selective coordination & backup protection, backup protection levels, current-time curve, current coordination, time coordination, full rated systems, Type 1 & 2 coordination, RCD coordination, ACB's **EARTH LEAKAGE PROTECTION** | history of earth leakage, standards, residual currents, direct and indirect contact, earth leakage technologies, levels of protection, earth leakage limitations, solutions to limitations and split concentric cables **EARTHING & ELECTRICAL SUPPLY SYSTEMS** | supply & earthing systems, the TN, TT and IT systems, importance of the PEN conductor, SANS 10142-1 requirements, point of supply and point of consumption, split metering & service connections **INDUCTION MOTOR PROTECTION & STARTING** | motor starting options, starting currents, inrush currents, breakers & contactors, application criteria and limits, earth leakage protection for motors, effects of harmonics **RISK MANAGEMENT & MAINTENANCE** | maintenance priorities, consequence of failure, maintenance & safety, risk & problems, LV breaker installation, early life problems, maintenance of ACB's, terminal maintenance, operation for reliability, thermal effect of enclosures

WHERE JOHANNESBURG
DATE 27 - 28 June 2012
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CPD CREDITS 2

BLOEMFONTEIN COURSES

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Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels comprising of a number of cells containing a photovoltaic material. This course will provide the knowledge on how to inspect a site for the installation of a PV Solar System, provide the basic knowledge for installation, do necessary calculations for the correct applications, analyse different configurations and operating characteristics, provide the rules and regulations with regard to compliance of statutory requirements, and safety procedures and codes of practice.

LECTURER ATTILIO DALVIT, MSc Information Technology
DATE 10-11 July 2012
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members | **RETIRED MEMBERS** R1,925
CPD CREDITS 2

UNDERSTANDING SWITCHGEARS

DAY 1 LOW VOLTAGE CIRCUIT BREAKERS: The concepts of overcurrent protection are explained together with the principles of current sensing and their relationship to the operation of Low Voltage Circuit Breakers | **MEDIUM VOLTAGE CIRCUIT BREAKERS:** The principles of electric arc breaking and arc extinction, together with the importance of transient recovery voltage are discussed whilst explaining the differences in arc breaking in various insulating media. **INTERNAL ARC:** The main objective of this module is to examine the requirements and methods of testing enclosed switchgear and controlgear assemblies under conditions of internal arcing in air due to an internal fault. This is complimented by a study of the physics of the electric arc.
DAY 2 ELECTRICAL SAFETY: The concepts of electrical safety are explored together with a study of the

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relevant protection components identifying in particular the importance of earthing. LV COORDINATION: The relationship and differences between discrimination and selective coordination in low voltage systems are explained covering circuit breakers, RCDs and motor starters COORDINATION IN MV AND HV SYSTEMS: Short circuit coordination procedures for MV and HV systems are discussed whilst examining the nature of short circuit currents and the effect of rotating machines on the short circuit current. This is complimented by a description of the setting of protection relays. MAINTENANCE: The benefits of proactive maintenance programs together with the related problems of risk are briefly discussed showing the differences to low voltage switchgear which are mainly intended to be maintenance free devices.

LECTURER VIV COHEN FSAIEE

DATE 11-12 July 2012

COST R3,850(incl. VAT) - 20% discount for active SAIEE members | **RETIRED MEMBERS** R1,925

CPD CREDITS 2

PHOTOVOLTAIC SOLAR SYSTEMS

Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels comprising of a number of cells containing a photovoltaic material. This course will provide the knowledge on how to inspect a site for the installation of a PV Solar System, provide the basic knowledge for installation, do necessary calculations for the correct applications, analyse different configurations and operating characteristics, provide the rules and regulations with regard to compliance of statutory requirements, and safety procedures and codes of practice.

WHERE JOHANNESBURG

PRESENTER ATTILIO DALVIT, MSc Information Technology Management (UK)

DATE 18-19 July 2012

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ELECTRIC ARC FLASH SAFETY

This training provides a thorough knowledge of the dangers and recommended safe behaviours for those who work around or manage electrical arc flash hazards. This course goes beyond the theoretical to give attendees a complete understanding of regulations regarding electrical and arc flash safety and how to apply them in real-world situations. The course also details differences contained in the 2012 NFPA70E standard from the 2009 version. The e-Hazard arc flash training is the most complete in the industry, given in a concept-based, learner friendly format.

WHERE JOHANNESBURG

PRESENTER ZAHEER JOOMA Pr Eng

DATE 26 JULY 2012

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CPD CREDITS 1

PRESENTATION SKILLS FOR ENGINEERS

WHERE JOHANNESBURG

PRESENTER MICHELLE HAFFNER, BA Honours Atmospheric Sciences, Post Grad Diploma in Education

DATE 14-15 August 2012

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CPD CREDITS 2

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Each subscriber's online profile keeps a record of the number of credits earned.

Each member receives a certificate at the end of the year citing the number of category I CPD credits accumulated through the year.

Special rates apply for SAIEE members or members of voluntary associations approved by the SAIEE



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SAIEE Member: R1000 One year subscription

Non-Member: R2400 One year subscription

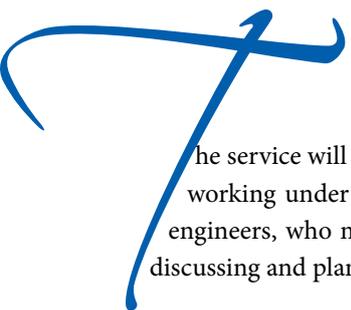


Please fax completed form to 011 487 3002 or email: craigs@saiee.org.za | www.wattnow.co.za

Mentorship

The offer comes at a time when our country is suffering a shortage of skills, and we believe that mentoring is an essential requirement in the training and development of the next generation of engineers. If, as a member of the SAIEE, you believe that you need a mentor you can request a mentorship service from the Institute.





The service will be of particular benefit to those young engineers working under the leadership of busy and pressurized Professional engineers, who may not have the time to assist young engineers in discussing and planning their career paths.

This initiative is particularly relevant to young engineers who are working in an environment devoid of engineers or with non technical managers. The young engineer may feel frustrated because he or she cannot benefit from the wisdom of an experienced engineer.

It will give a young engineer, the mentee, a chance to talk to a mentor, who will be his or her advisor, teacher and role model, away from the work environment. His or her mentor, matched to a similar profile, will understand the mentee's work and personal situation, having been there him- or herself.

The mentee will be able to discuss problems and frustrations with his independent mentor, who would have no stake in the outcome, and who would be able to provide an unbiased opinion and advice. The mentee might not be able to do so with his superiors, particularly if he is unhappy, and is considering an alternative career. The mentor and mentee could arrange to meet regularly, on terms that would suit both parties. The goal is to ensure both Mentee and Mentor have enough time to communicate any concerns or advice they have.

The mentor could recommend to the mentee what course of action to take without being too prescriptive while the final decision and the consequences remain with the mentee.

Among its more than 5500 members the SAIEE has many experienced engineers who are willing to act as mentors. They are spread across the country and include engineers who are experienced in steelworks, furnaces, rolling mills, mining, manufacturing, electrical generation, transmission and distribution, through to light industrial, process control, instrumentation, telecommunication, robotics, automation, software development and engineering management of these sectors.

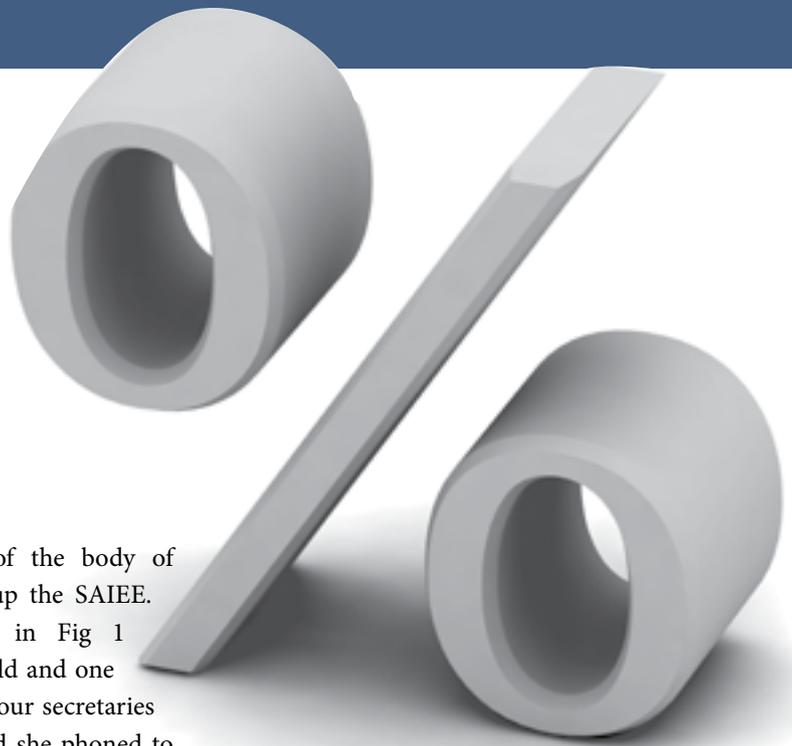
So if you feel that you would benefit by talking to a mentor, please contact Sue Moseley on the number below. She has a database to match the profiles of mentors and mentees.

Prospective SAIEE Mentors

*If you feel you that you have the time and interest to help mentees, please contact Sue Moseley on 011 487 9050 or suem@saiee.org.za. In addition you gain CPD credits for when you are required to re-register. **wn***



SAIEE



M

embers can be proud of the body of engineers that make up the SAIEE.

Almost unbelievably in Fig 1 the range is from 108 to 19 years old and one had better believe it. When one of our secretaries who did not believe the figures and she phoned to enquire about the oldest living member on record - the call was answered by obviously and elderly lady who suspiciously enquired why a female was wanting to talk to her husband! Alive and well were both centurions and living in Germiston. Seems working close to electricity or being married to an electrical engineer has something to do with longevity.

What really is amazing is that 39% of the membership is under the age of 40! I think it is safe to say that our 103-year-old Institute is in fact young. I also believe that the age profile of the SAIEE to be somewhat unusual but not beyond belief because it directly reflects the output of the tertiary institutions in South Africa.

This brings me to the next important aspect of these statistics.

Fig 2 shows the transformation of the Institute and as one of our executive remarked when shown the picture "this is a picture of the new wave of electrical engineers". Fig 2 depicts the tremendous growth of

the membership towards the countries demographic profile - while the Institute has always been entirely nonracial since its inception in 1909 and open to admitting anyone with the required minimum qualifications in electrical engineering, currently 38% of our members are black with the oldest being in the 76 to 85 year age group.

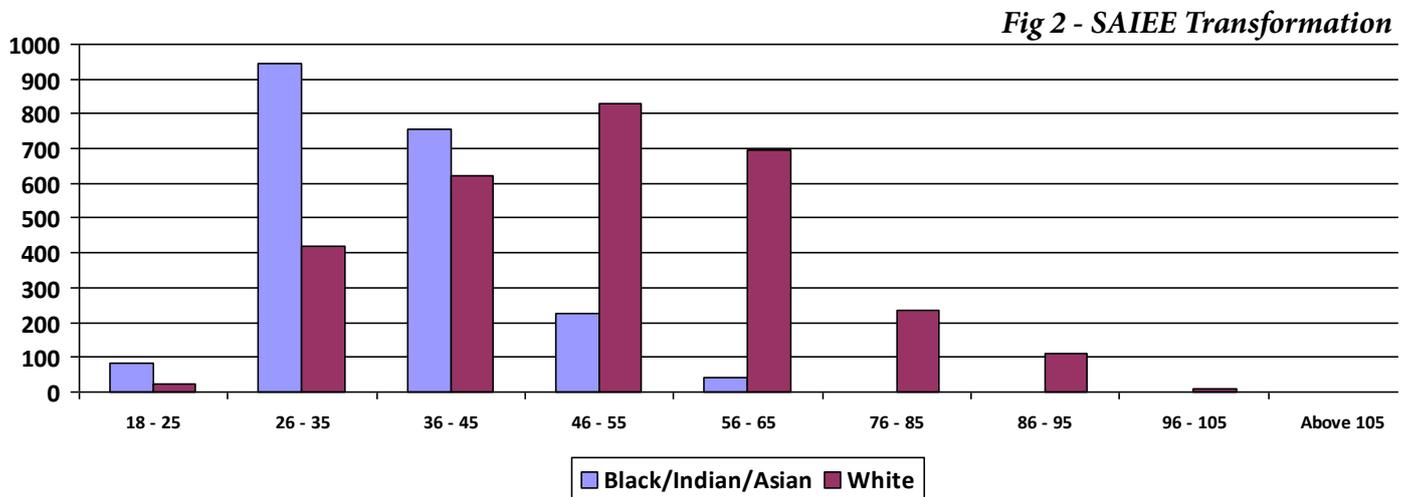
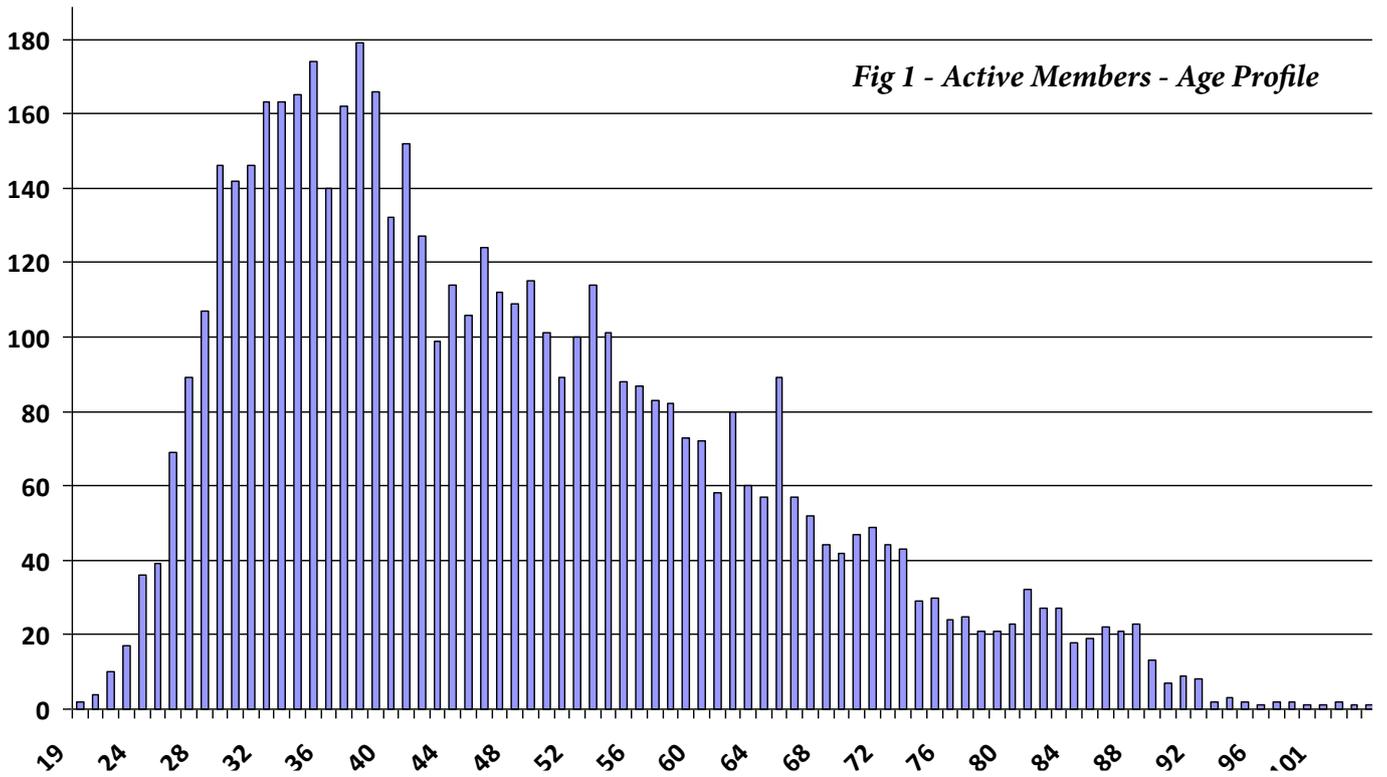
Remarkable statistics given that one cannot alter history and from the 56-65 age group the new wave begins and as seen in the 26-35 age group the membership matches the countries demographic profile. This trend will no doubt continue going forward.

Currently the Institute enjoys the recruitment of between 30 and 60 new members per month but the sad news is that the attrition rate is also high (probably something to do with the long tail in Figure 1 and the after-effects of the economic recession of 2008 and post world cup slow down) so the real growth over the last few years is about 3%.

Building the new head office at Observatory initially brought much human and vehicular traffic plus noise and dust during 2011. I longed for the pre-building quite days where to do my normal office work on this beautiful site was a quiet almost relaxing pleasure. This dream of tranquility was not to be because since we have occupied the new building and with all the

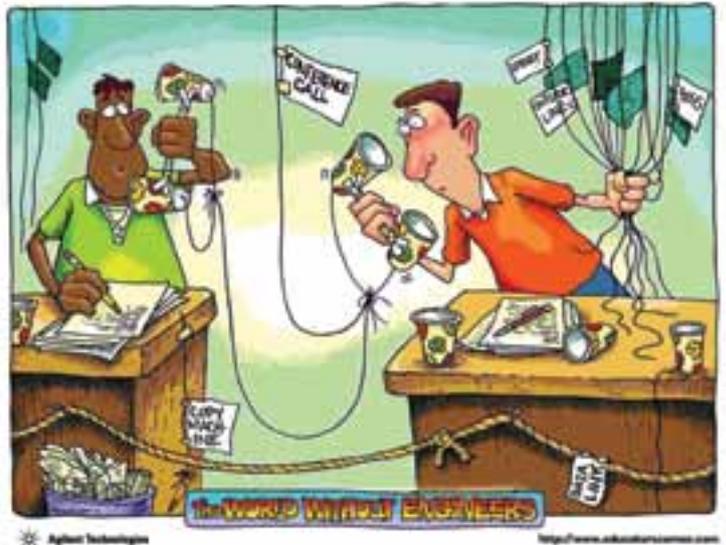
SAIEE VITAL STATISTICS

BY I STAN BRIDGENS | SAIEE BUSINESS DIRECTOR



pomp and ceremony that went with it life has remained very hectic. The new building has brought with it a new impetus and the stream of visitors and members has increased significantly. I am confident that apart from the “new wave of members” the Institute is into a new wave of growth and now with the new facilities is better equipped to produce even more amazing statistics. Watch this space for more statistics!

For more information on how to become a member, visit www.saiee.org.za or contact Ansie or Tracey on 011 487 3003. **wn**



SAIEE Membership Benefits

Members of the SAIEE now enjoy the following a wide array of benefits:

You simply cannot afford not to be a member!

- A discount of up to R1110 on their ECSA registration fee, which is due in April every year, provided that they join the SAIEE before the end of March that same year.
- Upon joining the SAIEE there is a standard entrance fee of R650, an annual membership fee of R840.00 for Members, and between R1013.00 and R1027.00 for Senior members depending on age. Most of this will be recovered through the ECSA discount.
- SAIEE members receive 11 issues of the **wattnow** magazine valued at R330.
- The SAIEE Africa Research Journal (ARJ) our peer reviewed research publication (which incorporates the SAIEE Transactions) is also available to SAIEE member's quarterly upon request.
- The real rewards of being a member can be realized through attending monthly lectures, debates, tours and site visits organized by the SAIEE. These are mostly free of charge and provide refreshments at no extra cost. Members are awarded valuable CPD credits for attending these events.
- Membership has significant career benefits, as membership holds prestige and recognized status in the profession. SAIEE gatherings provide excellent opportunities for members to interact with normally inaccessible captains of industry.
- SAIEE letters after your name indicate your membership grade and are a useful measure of your experience.
- Members receive generous discounts on the SAIEE run CPD courses and earn (category 1) CPD credits. Members also have the option of joining the wattnow online CPD program at a fraction of the cost.
- The SAIEE mentorship program assists members to gain professional status through the Institutes large database of mentors.
- SAIEE members are awarded 1 CPD credit (Category3) for being a member of the SAIEE.
- Members are able to serve on organizing committees and gain valuable experience and professional networking in doing so.
- Use the electrical engineering library at SAIEE House.

APPLICATION REQUIREMENTS FOR SAIEE MEMBERSHIP

It is always exciting to receive an application as it means that we will soon be welcoming another new and valuable SAIEE member to our family of nearly 6000 members. However, more often than not the application is incomplete.

To avoid unnecessary delays in the process it is important to highlight the problems regularly experienced within the administration with received applications:- Many applicants do not read the list of requirements. We require the following documents:

- Copy of the applicants **ID**;
- Certified copies of **achievement certificates**;
- A copy of the applicants **CV**;
- The completed **application form**;
- **Proof of payment** for the application fee. Membership fee will be confirmed on acceptance of membership.

Copies of the above listed documentation should **accompany the application forms** but frequently are submitted after the application forms are sent in.

A number of applicants do not fill in every answer to questions asked on the application forms, **please complete the form in full**.

Payment of both application fees and membership fees are frequently **not paid timeously**.

Only once all the above requirements have been met is the application considered complete, enabling the process to continue efficiently.

Please, help us to help you receive the many benefits of SAIEE Membership sooner rather than later!!

2012 Membership

Rates as from 1st January 2012

fees
New Members FEES
see Notes 1 & 4 below.

Grade of Membership	Annual Subscriptions paid before 31 March 2012		Annual Subscriptions paid after 31 March 2012		New Members FEES see Notes 1 & 4 below.	
	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)
Student	106	75	118	84	118	84
After 6 yrs study	684	486	760	540	760	540
Associate	684	486	760	540	760	540
Member	756	537	840	596	840	596
after 6 years	884	627	982	697	n/a	n/a
after 10 years	924	656	1,027	729	n/a	n/a
Senior Member	924	656	1,027	729	1,027	729
after 6yrs/age 40	1,002	711	1,113	790	1,113	790
Fellow	1,002	711	1,113	790	1,113	790
Retired Member (By-law B3.7.1)	423	300	470	334	n/a	n/a
Retired Member (By-law B3.7.3)	nil	nil	nil	nil	n/a	n/a

NOTE

1. Entrance fee for all grades of membership is R650 (except Students which is free)
2. Transfer fee to a higher grade is R300.00 for all grades of membership (except Student within 3 months of qualifying).
3. Members are encouraged to transfer to a higher grade when they qualify. It will be noted that the fees of Member and Senior Member grades after 10 and 6 years respectively are equal to the fees at the next higher grade.
4. Members elected after June pay a reduced subscription fee.

By-law B3.7.1 reads "a member in good standing who has been a member of the Institute for at least ten (10) consecutive years, has reached the age of sixty (60) and who is no longer actively engaged in the profession, may apply to Council for an adjustment.

By-law B3.7.3 reads "any member complying with the conditions of B3.7.1 but who has been a member of the Institute for not less than 25 consecutive years, shall on written application to Council, be exempt from the payment of further subscriptions."

By-law B3.9 reads "any member in good standing who has been a member for fifty (50) consecutive years shall be exempt from the payment of further subscriptions."

Members not in good standing by failing to pay their subscriptions by end of July of each year will be struck-off the SAIEE membership role subject to Council decree.

Calendar of events

If you want to see your function or event listed here, please send the details to Minx Avrabos at minx@saiee.org.za

JUNE 2012

2-3	2012 4th IEEE Intl Conf. ICCSN 2012	Zhengzhou, China	www.iccsn.org
6 - 8	10th West African International mining & power exhibition	Accra International Conference Centre, Ghana	www.exhibitionsafrica.com
12-14	Power-Gen Europe	Cologne, Germany	www.powergeneurope.com
13	2012 Oil & Gas Finance Forum	New York City, United States of America	www.minellc.com/oagff12
16-17	Electrical and Electronics Engineering Conf. (ICEEE'2012)	Bangkok, Thailand	www.psrcentre.org
23-27	8th World Congress on Cost Engineering, Quantity Surveying and Project Management	International Convention Centre, Durban	www.icoste.org
25-29	Africa Rail 2012	Sandton Convention Centre, Johannesburg	www.terrapinn.com
26	Africa Energy Forum 2012	Berlin, Germany	www.energynet.co.uk

JULY 2012

2	EWEA Technology Workshop: Analysing Wind Farms	Lyon, France	www.ewea.org/techworkshops
3-5	2012 Intl Conf on Power Engineering and Renewable Energy	Bali, Indonesia	www.icpere2012.org
9-13	Power Africa 2012	University of Witwatersrand, JHB	www.powerafrica2012.com
11	Women's Networking Breakfast	Sunnypark Hotel, JHB	011 487 3003
15-17	SAITEX 2012	Gallagher Convention Centre, Midrand, JHB	www.exhibitionsafrica.com
16-19	Africa Mining Congress 2012	Sandton Convention Centre, Johannesburg	www.terrapinn.com
20	East Africa Business Summit & Expo 2012	Hilton Sandton Hotel, Johannesburg	www.eastafricabse.com
24	2012 International Conference on Smart Grid Systems	Kuala Lumpur, Malaysia	www.icsgs.org/cfp.htm
24	2012 4th Intl Conf on Mechanical and Electrical Technology	Kuala Lumpur, Malaysia	www.icmet.ac.cn

AUGUST 2012

2-4	Conf: Advances in Power Conversion & Energy Technologies	Mylavaram Andhra Pradesh India	www.lbrce.ac.in/apcet
13-17	The Cosmic Kaleidoscope: Pulsars and their Nebulae, Supernova Remnants and More	Kruger Park, South Africa	fskbhe1.puk.ac.za/knp2012/
15	IP Expo	Sandton Convention Centre, JHB	www.ipexpo.co.za
17	2012 Intl Conf on Electrical Engineering and Comp Science	Shanghai, China	www.iceecs.org
27-29	2012 IEEE Intl Conf on Smart Grid Engineering (SGE)	Oshawa, Canada	www.ieee.org

SEPTEMBER 2012

10-13	Cloud Computing Africa Conference & Exhibition	Sandton Convention Centre, Johannesburg	www.terrapinn.com
20-21	Energy Efficiency and Behaviour Conference 2012	Helsinki, Finland	www.behave2012.info

OCTOBER 2012

8-9	2nd Annual Smart Grid And Smart Meter Summit	Abu Dhabi, UAE	www.fleminggulf.com
23-25	Africa Electricity 2012	Gallagher Convention Centre, Johannesburg	

Have some fun and stand a chance to win R1000. Complete the May issue crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, May Crossword Puzzle, P.O. Box 751253, Gardenview, 2047* or email it to *minx@saiee.org.za*. The completed crossword puzzle should reach us by no later than **29 June 2012**. The winner of R1000 will be announced in the July issue of the *wattnow* magazine.

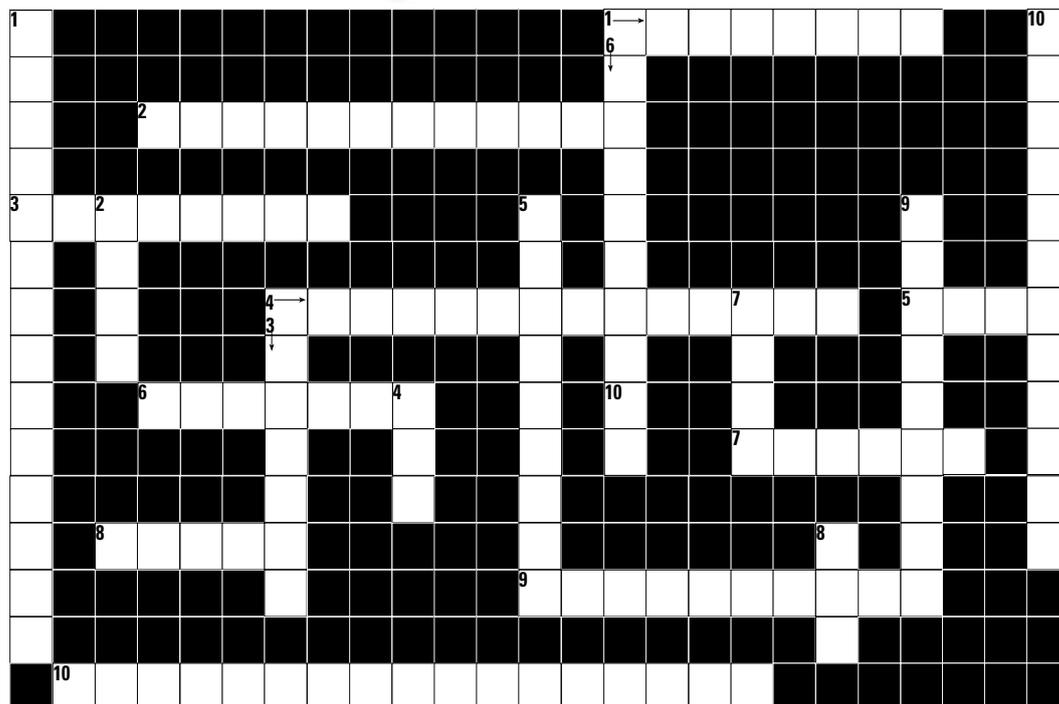
R1000

WIN

ALGAE-X, THE TANK CLEANING SPECIALISTS, ARE THE PROUD SPONSOR OF OUR CROSSWORD PUZZLE.

ACROSS

- Which famous social networking site went live in 2004? (8)
- What is www? (12).
- The modern name for "Packet Networks" (8)
- What is the general term for anything that involves delivering hosted services over the internet? (14)
- Asymmetric Digital Subscriber Line (abbr.) (4)
- The oldest and most influential computer network in the world (7)
- Who claimed to have started the Internet? (6)
- Surname of 3 down (5)
- What forms of communication delivers the slowest broadband service? (10)
- Who designed the first website? (17)



DOWN

- The very first social networking site launched in 1997? (14)
- Hyper Text Transfer Protocol (abbr.) (4)
- Who was the first person to use the internet? (7;5)
- Transmission Control Protocol (abbr.) (3)
- :-) or :-o or :-((9)
- What type of cable is the latest method of delivering broadband services? (10)
- Who manages the IP address space allocations globally? (4)
- File Transfer Protocol (abbr.) (3)
- What numerical label is assigned to devices participating in a computer network? (9)
- Who used the @-sign first on email in 1972? (3,9)

Communications Crossword Winner: Esther Stavropoulos from Pretoria

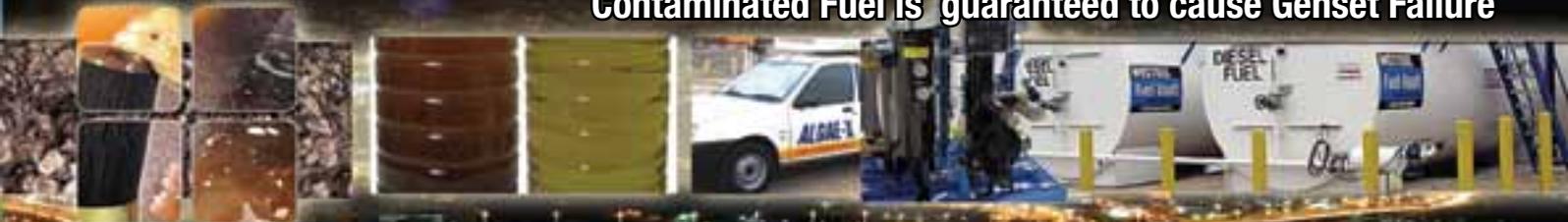
ACROSS 1 Square Kilometre Array **2** Bridgens **3** Stevenage **4** Elisha **5** Bankruptcy
6 KAO **7** Voyager1 **8** Charles **9** SAIEE **10** Wideband **11** Motorola **12** Syncom
13 Krone **14** AlgaeX **15** Crone.

DOWN 1 Stan **2** EASSY **3** GLOSNASS **4** Alec **5** Reeves **6** Watson **7** Earth
8 Product **9** Gray **10** Tomlinson **11** Mike **12** ECSA

Terms and conditions: 1. Only one entry per person. 2. Winners will be notified via email. 3. Incorrect information will automatically disqualify the entrant. 4. Anybody may take part except the office staff of the SAIEE, their family members and members of the Publications Committee. 5. *wattnow* magazine and the SAIEE cannot take any responsibility for lost entry forms or any damage, losses or injuries related to the draw of the prize. 6. The winner must be prepared to be photographed and such photograph will be published in the relevant issue of the *wattnow* magazine. 7. Closing date for entry is 29 June 2012. 8. The winner will be announced in the July issue of the *wattnow* magazine. 9. The Managing Editor's decision is final and no correspondence will be entered into.

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Bloemfontein Centre Convener | Ben Kotze

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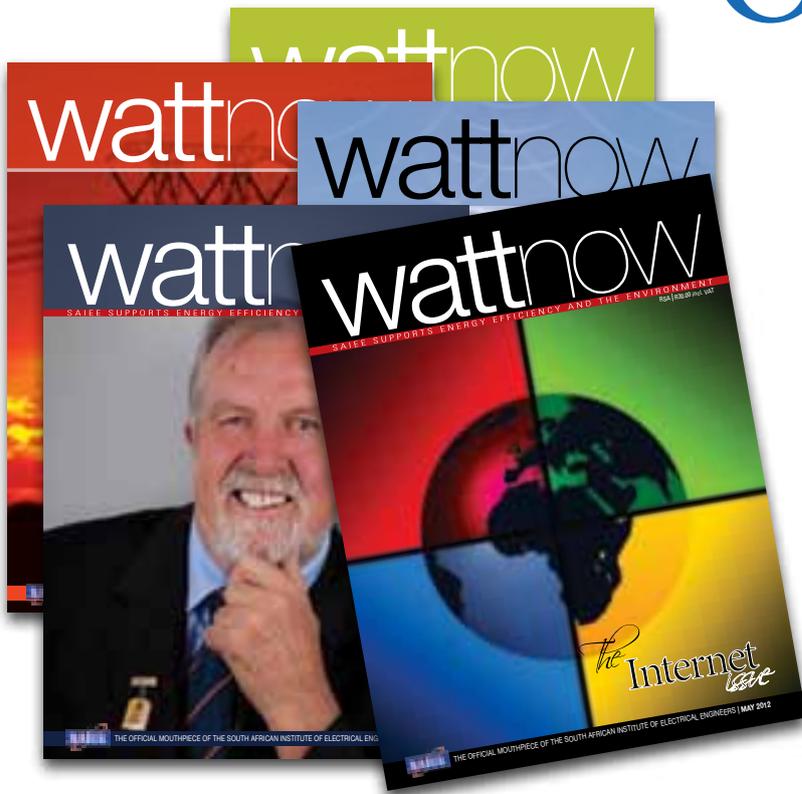


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