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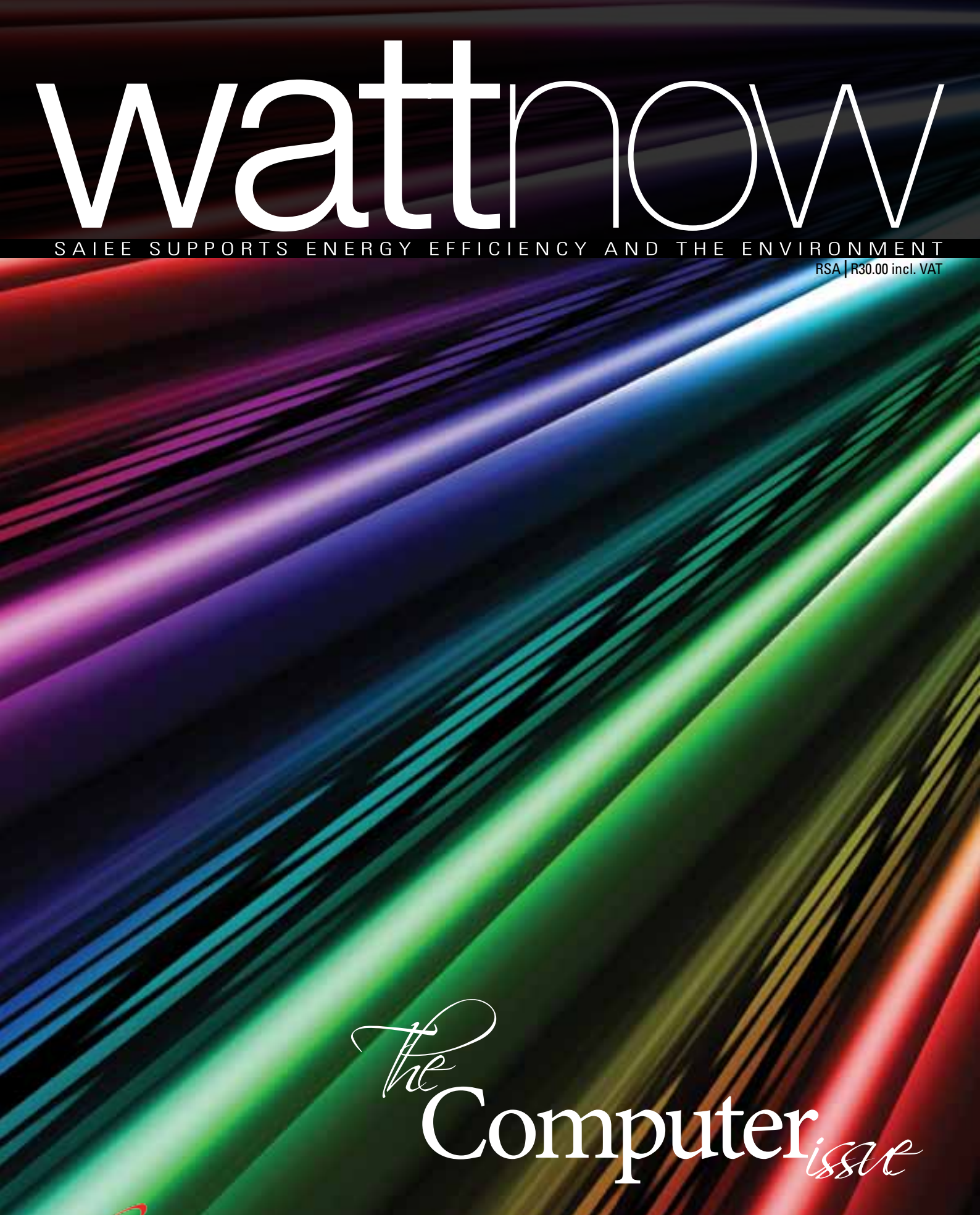

the Computer issue

SAIEE THE OFFICIAL MOUTHPIECE OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | **JULY 2012**

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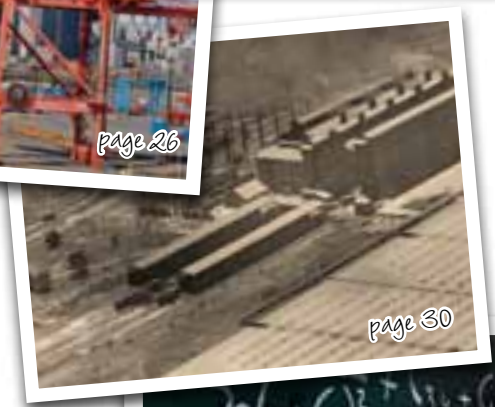

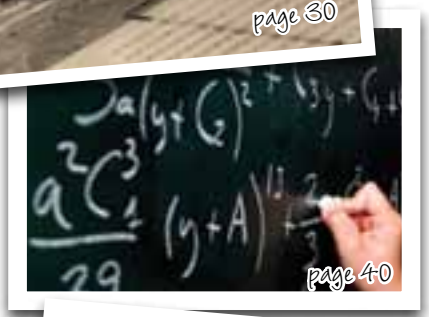

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ISSN: 1991-0452

July sees us featuring Computers, the thing that very few of us can live without - even engineers. I cannot imagine my life without my Apple – but still, I'm sure life was less complicated without it…. or maybe harder. It all depends on how you look at this double-edged sword.

On page 18, we take a look at the History of Computers, where it all started and who were the pioneers of these life-changing machines.

In our Power section on page 26, we learn more about the power compensation requirements of container cranes, as well as looking at the history of electricity, from the illumination of the very street light in Kimberley in 1882, until recently, which makes for a very interesting read.

On page 32 you will find the latest on prepaid meter scams – please read this and take note not to fall in this trap.

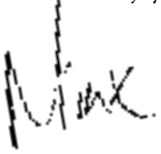
In our Lightning section on page 36, Jeremy Usher and colleagues shares with us information on the scale of national lightning.

I've received a few beautiful articles from elderly members and I thought that many of our members might share similar memories on the 'good ol' days'. Mr Howard Davies remembers Mr Bobby Kane, who was also a President of the SAIEE in 1956, on page 48; and Mr Boshoff remembers his Railway Apprentice days on page 52.

Page 54 showcases only two letters I received from members, therefore you will find two funnies on the same page, courtesy of Mr Davies. Please let me know your thoughts on the jokes, and if you would like to see more of it.

Time is running out to enter the iPad competition (pg 5). Please send your articles to me as soon as possible – and when your article is published in the **watt**now, you also receive 1 CPD point! Come on; set aside a few hours, and start typing. I'm looking forward to receiving your article.

Herewith your July issue – keep warm and enjoy the read.



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

ALL SAIEE MEMBERS!

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

wattnow prizes will be awarded for articles written by SAIEE members that are published in the **watt**now 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 **watt**now will be eligible.

SAIEE members have broad and expert experience and knowledge about many Engineering projects topics in which they have been involved. **watt**now 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, and in doing this, earn 1 CPD credit when your article is published in the **watt**now magazine.

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.

SAIEE
South African Institute of Electrical Engineers

The Presidential calendar has once again been a full one this past month.

The first official event I attended together with our Executive Director, Stan Bridgens, was the Consulting Engineers of South Africa (CESA) Gauteng Presidential Visit and the 60th Anniversary Celebrations held on the 6th of June at Midrand. This association has only corporate members totaling around 480 companies, representing some 22000 individual engineers – mainly civil but there are also a number of electrical engineers. We were addressed firstly by the CESA President, Mr Naren Bhojaram on "CESA Engineers, Unquestionably Ethical". The guest speaker was Dr Nazir Alli, SANRAL CEO, and he spoke about – you guessed it ! "…..Roads: Life-blood of the Nation." An unusual event occurred that night – I was the lucky recipient of one of six bottles of wine in a lucky draw!!!!

The following week I was off to visit our KZN centre to present my Presidential address at both Pietermaritzburg on the 13th and Ethekwini on the 14th. There were more than 30 attendees in Pietermaritzburg, and close on 60 attendees in Durban.

The Centre is efficiently led by TC Madikane, its Chairman, assisted by the Centre Secretary, Gill Nortier. TC has organized his Committee to reflect the Council sub-committees, and the success of this is reflected in the full programme planned for the year as well as the financial state of the Centre.

Stan and I attended a meeting at the Engineering Council of South Africa (ECSA), to discuss a draft guideline scope of services and tariff fees for 2013, a mandate on ECSA imposed by the Engineering Profession Act No 46 of 2000. ECSA's task has been made more daunting as there has been some advice that the Competition Commission could construe the setting of tariffs to be anti-competitive.

I attended the launch of the Exxaro Chair in the field of Energy Efficiency at the University of Pretoria on the 21st of June. This subject reflects my Presidential theme, and I was very impressed with the presentations given which reflect the excellent work done by University of Pretoria. The number of post-graduate students in this School is the largest in the country. The head of the School is Professor Sunil Maharaj, a member of our Council.

Professor Saurab Sinah heading up one of the departments is the Managing Editor of the Institute's Africa Research Journal.

On Wednesday I presented my address to the Mpumalanga Centre. I am very encouraged by the strength and enthusiasm of all our centres. Mpumalanga has a very enthusiastic committee, and there were about 35 people at the meeting at which I presented. The topic has once again proven to be popular, as the Chairman had to call an end to the question session.

Until next Month, keep warm, and help to keep the SAIEE flag flying!!

Mike Cary | SAIEE President 2012

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Southern Power Maintenance provides the technical expertise to keep the economic hub of (Mzansi) running. It is our business to make sure that Gautengers' power is always available. Power Utilities turn to us for the most reliable services and expertise to ensure that their customers have power always available and in the process electrify their bottom line. Invest in maximum operational efficiency..... Discover SPM.

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WATTSHOT

In this issue, we feature some gadgets and gizmo's for the tech sawy!

FLIPPIN' COOL RETRO FLIP CLOCK

This retro-look clock combines high precision electronics with steam punk design thanks to its exposed workings and gear operated flip swatches.

The base, spine, and frame are all metal solid, while the flip down number swatches have been fashioned from extra durable acrylic for a desk clock meets work of art.

When you need to adjust the time, the turn dial is conveniently situated on the right side of the clock while the battery housing has room for a single D battery for months and months of cool clock functioning. Perfectly placed next to your computer as well as the perfect gift for friends and family you're having trouble buying for. Selling for R765 (incl.)

ION® COPYCAT HANDHELD PORTABLE SCANNER

If it's not on the web it doesn't exist. Well that's what we've heard. Thankfully it's a load of codswallop because plenty of pages exist outside the pixellated confines of your computer. But not for long because the amazing CopyCat Handheld Scanner is here to digitise anything and everything you fancy.

This ingenious battery-operated device allows you to capture books, magazine pages, photos, text and virtually any document you can think of in a matter of seconds, wherever you may roam. Simply sweep it across the required pages and presto, the high res images are written onto micro SD card (up to 32GB), ready for idiot-proof USB drag-and-drop transfer to PC or Mac. Capable of storing more than 30,000 pages, the CopyCat scans colour images at an impressive 600 dpi, and comes with nifty OCR software that converts text images into editable text in Word, Clipboard or Excel. Selling for R1,299 (incl.)

MINI OPTICAL FINGER MOUSE (1200DPI)

Get rid of the cumbersome, clunky mouse and switch over to an optical finger mouse. This multi-tasking mouse function allows users to write or type when operating the USB Finger Mouse at the same time. Operate the USB Finger Mouse between your index finger and thumb. The 3D internet wheel fully supports the wheel operation functions of Windows OS series. Selling for R108 (incl.)

HEXBUG MICRO ROBOT CREATURE

These creepy crawly robots are packed full of high tech wizardry that enable them to dodge obstacles and run away from loud noises. All of this is possible because of a tiny microprocessor that allows the Hexbug to process signals from their antennae and an inbuilt microphone. As they scurry along if you slap the table in front of them, or clap your hands, they'll stop, back up and a zip off in another direction. These funky little critters make great little desktop friends.

HEXBUG comes in five distinct shapes and colors. Sells for R350 (incl.)

SANDISK LAUNCHES HIGH-PERFORMANCE EXTREME SOLID STATE DRIVE

Also known as an electronic disk for data storage, SSD uses solid-state memory to store persistent data with the intention of providing access in the same manner of a traditional block hard disk drive with no moving components. SSD's of today are based on using non-volatile flash memory as opposed to RAM, which loses content when it loses power. SSD's are the perfect alternative to HDDs (Hard Disk Drives) which use magnetic heads and spinning disks to record information.

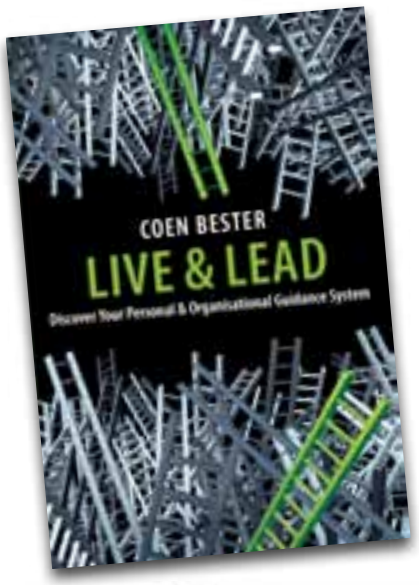
SanDisk Corporation (NASDAQ: SNDK), a global leader in flash memory storage solutions, recently announced a high-performance solid state drive (SSD) for the IT channel. The SanDisk Extreme® SSD is up to 10 times faster than a 7,200 RPM hard disk drive, enabling computer users to quickly boot and shut down their systems, launch applications faster and reduce waiting times. The drive is also more durable and power efficient, delivering a reliable computing experience while maximizing battery life. The SanDisk Extreme SSD is solely distributed by Tudortech, leading distributor and custodian of global photographic, electronic and IT brands throughout the African continent. It is available in 120 gigabyte (Gb), 240Gb and 480Gb capacities from selected retail outlets.
For further information visit www.tudortech.co.za or contact Tudortech on (011) 803 2226.

RIM LAUNCHES THE BLACKBERRY CURVE 9320

The new BlackBerry® Curve™ 9320 smartphone features all the BlackBerry messaging and social features that make it easier to connect and share with everyone around you. The BlackBerry Curve 9320 also offers 3G and Wi-Fi® connectivity as well as longer battery life to help customers make the most of their day.

"The BlackBerry Curve 9320 is a truly social smartphone and is a great addition to the BlackBerry Curve series, which has propelled BlackBerry to being voted the 'Coolest Brand Overall' by South Africa's youth in the recent Sunday Times Generation Next Brand Survey Awards," said Rui Brites, Director Product Management for RIM in South Africa. "This new BlackBerry Curve model is designed to make it incredibly easy for customers to be socially-connected and we expect it will be especially popular with young people." Please check with your service provider for availability and pricing.

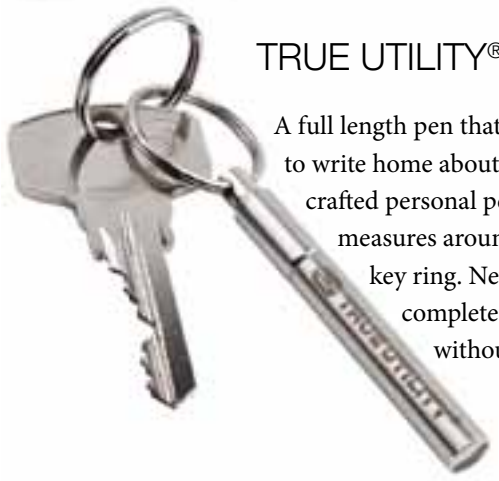
WATTSHOT



LIVE & LEAD BY COEN BESTER

Intrigued by the question, "how do you prepare a leader for a path that he will travel but once?" Coen Bester set out on a discovery journey to find a credible solution to this challenge. Inspired by the power and elegance of the modern day GPS, he came up with the human equivalent of a GPS – the Personal Guidance System, or PGS. He takes the reader along a fascinating journey of self-discovery as he puts the device together in true engineering fashion.

He makes a starling and convincing conclusion that this mental model is not only applicable on the level of the individual, but also to the organization as a whole and that it provides a powerful framework for the strategic management of the organization. The implication on leadership is profound, and he shows how the true power of the PGS comes alive in the hands of a leader who grasps the concept. Available at bookstores. See page 55 for our competition.



TRUE UTILITY® TELEPEN

A full length pen that is as small as your door key? Now that's something to write home about! Engineered in stainless steel, this beautifully crafted personal pen extends telescopically to 115mm, yet only measures around 50mm as it hangs inconspicuously on your key ring. Never get caught out without a pen again! Supplied complete with three free refills. How did you ever live without one? Retail price, R125 (incl.)

TRUE UTILITY® CASHSTASH (CASH HOLDER)

It's 4 am on a Sunday morning, the night's antics have managed to whisk your wallet away on a suprise and unwanted adventure leaving you well and truly up the creek. Fortunately you've planned ahead and clipped the Cash Stash to your key ring. This handy little stash pot is designed to hold a financial parachute for when you really, really need it. Fold your note around the stainless steel cash clip and then slip it into the Cash Stash. Now when you're stranded miles from home you can hail a cab and announce in your most dignified voice, "home James, and don't spare the horses". Machined from aircraft grade aluminium, it's waterproof, discrete, and small enough for you to forget all about it until you really need it.
No matter what you get up to on your night out make sure you never run out of money again with the Cash Stash. Retails for R116 (incl.)

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

4D 61435/E

A coastal engineering wonder was born when two men put their heads together for the good of their coastline – and coastlines around the world. It all began in 1963, when a storm devastated the Eastern Cape coast of South Africa. Anxious to protect their harbour, two East London engineers developed a series of branching concrete blocks called dolosse that, when piled together, could absorb the ocean's power. The simple design was so successful that the men decided not to patent it, which is why these unique blocks can be found in their millions in over 100 countries across the globe.

Those engineers knew something we at PPS have long believed – that the key to success lies in sharing it. That's why the graduate professionals who join us become more than clients, but members who get to share in our profits. It's called mutuality, and it's just one of the ways we've been protecting the health and prosperity of professionals for over 70 years.

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WATTSUP

NETWORKING BREAKFAST HUGE SUCCESS!

*Some of the ladies who were present at the SAIEE/**watt**now Networking Breakfast.*

Wayne Fisher and Bill Bergmann

(l-r) Tracey Owgan and Chris Collyer.

(l-r) Judy Blom & Prof Noel Schultz

(l-r) Gerda Geyer & Minx Avrabos

(l-r) Minx with Prof Bea Lacquet

(l-r) Amantha Maharaj & Thandiwe Nkambule

Jane du Buisson-Street, Barbara Spence and Lesley Martin

Rose & Mike Crouch

(l-r) Bea Lacquet, Pat Naidoo, Mike Cary & Viv Crone

The SAIEE, in conjunction with the **watt**now magazine, successfully hosted a Networking Breakfast for members and clients.

Our guests, who braved the cold weather, enjoyed a hot breakfast and networked with colleagues, friends and acquaintances.

Dr Noel Schultz, IEEE PES President and our speaker, shared various milestones in her career as a working mother and wife, and how to promote your business through networking and social media.

After Dr Schultz's presentation, Minx Avrabos, Managing Editor of the **watt**now magazine, thanked everyone for their presence and did a lucky draw of prizes, which was sponsored by Craving Novity, for DVD hampers, Wetherlys for their donation of Spier wine in beautiful wooden boxes, and Magnetic Nail Academy for donating a pedicure valued at R250.

We would like to thank all our sponsors, members and clients for joining us on this day. Our next networking event will be the "**watt**now birthday bash" which will take place on the 16th of November 2012. Watch this space!

ANTICIPATED CUSTOMER EXPERIENCE MANAGEMENT AFRICA SUMMIT TO TAKE PLACE IN AUGUST

The anticipated Customer Experience Management Africa Summit will be held in Cape Town from 2 to 3 August 2012. The event will bring together Africa's industry leaders, and provide a unique platform to build relationships, share ideas and most importantly, to do business. The summit is produced by international business-to-business conferencing company, Kinetic Events.

Customer experience management is at the forefront of enterprise strategies with a focus on industry challenges including multiple channel integration through social and mobile platforms. These challenges are forcing innovative industry leaders to embrace opportunities and emerge as brands with a distinctive competitive edge. Forecasting industry CEM trends and patterns, your brand simply cannot afford to overlook investing in the future of customer interaction processes. The CEM Africa Summit comes at a critical stage within the industry, pioneering the opportunity to discover innovative industry trends and developments including the latest technological advancements in supplying end-user specific software.

For more information, to register to attend contact Shaunei Meintjes on +27 21 555 0866 or shaunei@kineticevents.net.

DIGITAL MATTER EMBEDDED – LEADERS IN INNOVATIVE TECHNOLOGY

Digital Matter Embedded (DME) is an innovative technology company that designs, develops and deploys embedded electronic devices and the software that makes them operate and communicate. From mobile GPS devices communicating on the GSM and satellite networks to 'black box' electronics tailor-made to the specific requirements of clients across a wide range of industries, DME provides state-of-the-art, custom technology solutions.

DME commands some of the most impressive experience and expertise in the electronics and software industries. This has given rise to unique, practical and invaluable technologies that have revolutionised industries - such as the RICA data capture terminal, which is integrated into all South Africa's cellular network providers and have registered more than 35 million cellphone users, and the GPS Log Book, a device that simply plugs into the cigarette lighter of a vehicle to generate SARS compliant tax log books, sales visits reports, delivery tracking and general proof of activity.

To create bespoke solutions in a rapidly evolving technology landscape, Digital Matter Embedded has formed partnerships and reseller agreements with top hardware and software suppliers, as well as joint ventures and partnership agreements with leading technology companies.

Louis Meiring
CEO Zest WEG Group

ZEST WEG GROUP KEEN TO EMULATE HOLDING COMPANY'S WINNING FORMULA FOR LEADERSHIP

The Zest WEG Group is keen to emulate the performance of its holding company, leading Brazilian motor and controls manufacturer WEG, which was recently named among the Top Companies for Leaders for 2011.

Initiated in 2001 by human capital consulting and outsourcing solutions leader Hewitt Associates (today Aon Hewitt), Top Companies for Leaders is the world's most comprehensive longitudinal study of leadership and leadership practices. Recognised for its global scope and research rigour, the study attracts hundreds of companies around the globe that seek outside insights on leader building and how to develop and sustain their leadership pipeline. The study is also focused on hiring, coaching and developing leadership, and rewarding success.

This is the second time that WEG has been recognised in this study — the first time being in 2009. The 2011 study ranked WEG at Number 4 in the Latin American category in recognition of its individual and teamwork efforts in promoting the WEG brand and taking the company's leadership to global levels of development and success.

"Success in business is becoming increasingly linked to the quality of the company's leadership," Louis Meiring, chief executive officer of the Zest WEG Group, says. "It is therefore critical for companies in today's highly competitive market to know how to develop a team of leaders that will propel the business forward in a vigorous and future-orientated manner.

"We certainly stand to gain from exposing our leaders to WEG's leadership principles. This kind of leverage will have positive spinoffs both in the African context and within the WEG Group."

WATTSUP

HARD DRIVE SHREDDER PROVIDES PIECE OF MIND WHEN IT COMES TO THE REMOVAL OF CONFIDENTIAL INFORMATION

Confidential business and private information can sometimes get into the wrong hands, even when individuals believe that it has been removed from their hard drives PC, laptops and printer hard drives; the latter of which is unfamiliar to many people. "The ideal is the 100% physical destruction and not deletion of data, in order to ensure that hackers are unable to access any information assumed to have been previously removed," says Michael Springer – Managing Director of Pitney Bowes South Africa.

Pitney Bowes' supplier, HSM has introduced a shredder (HDS 230) that provides companies and individuals with complete peace of mind. This equipment effectively 'shreds' the hard drive of their PC or laptop into small particles.

"The advantage of this shredder is that it is extremely easy and safe to use." says Springer. The HSM Powerline HDS hard drive shredder is designed for longevity, with a sturdy, solid-steel cutting unit and a powerful, robust drive. The unit's high throughput capacity and energy-saving continuous operation makes it an intelligent choice for reducing the carbon footprint.

"Pitney Bowes firmly believes in finding creative and user-friendly alternatives to both the common and specialised challenges faced by its clients. The introduction of the HSM Powerline HDS hard drive shredder into our portfolio of products is a classic example of our customer-centric business philosophy.

Apart from its benefits to clients in terms of reduced security risk, the product also performs well on the environmental sustainability front, making it a perfect match for our existing product range," Springer concludes.

SIEMENS SOUTHERN AFRICA ADDING LOCAL VALUE THROUGH THE MANUFACTURING OF THE LATEST MEDIUM VOLTAGE SWITCHGEAR TECHNOLOGY IN SOUTH AFRICA

Global technology innovation leader Siemens officially launched South Africa's proudly manufactured NXAir Medium Voltage Switchgear at its Northriding facility, as part of its localisation initiative, which is already helping boost the local economy.

"The launch follows a successful partnership between Siemens and Voith Hydro, which funded approximately R15 million for the pre-production and main production lines for the NXAir Switchgear", says Celeste van Niekerk, the head of Socio-Economic Development at Siemens Southern Africa. Previously imported from Europe, Siemens is now supplying the NXAir technology across Africa.

This initiative came as a result of the awarding of the Ingula Pumped Storage Scheme main Generating Plant Contract to Voith Hydro by Eskom. The contract included the Competitive Supplier Development Programme (CSDP) obligation, which required Voith Hydro to invest in the South African Industry, by creating a competitive local supply of medium voltage switchgear - making locally available a specification which is suitable for use at Eskom's new build power stations and within the entire distribution network. Voith Hydro then selected Siemens as the technology partner and the Northriding facility, being part of the low and medium voltage business set-up of the Siemens Infrastructure and Cities Sector (IC), was best suited for the manufacturing of this technology.

The investment required Siemens Southern Africa to obtain a manufacturing license from its global parent company, Siemens AG, which came into fruition in October 2011. With commissioning of the punching and bending machines completed in November 2011, the first three local prototype NXAir panels were manufactured and presented to both the Voith and Eskom project management teams to verify and streamline the final product.

KASPERSKY LAB PRESENTS SECURITY SCAN

Kaspersky Lab has announced the release of Kaspersky Security Scan – a new utility designed to check the security status of your computer. It's ideal for users who currently do not use any anti-virus solution, or who have doubts about their current security software and seek a second opinion. This utility also introduces new users to Kaspersky Lab's industry-leading security technologies. Kaspersky Security Scan is easy to install and remove, works side-by-side with other anti-virus solutions and, if it finds any problems, advises users on an appropriate full-scale protection solution such as Kaspersky Anti-Virus, Kaspersky Internet Security or Kaspersky PURE.

Kaspersky Security Scan is available for free download at Kaspersky Lab's official website. To learn more about the utility, visit this page: www.kaspersky.com/security-scan.

GREEN HOUR CELEBRATES A YEAR ON RADIO

The Green Hour radio program, an initiative of the Southern African Association for Energy Efficiency (SAEE) and Kingfisher FM in Nelson Mandela Bay (NMB), celebrates its first anniversary after producing 44 energy efficiency and sustainability awareness shows.

Launched on the 4th of July last year, the SAEE joined forces with Gareth Burley, a radio presenter on Kingfisher FM to start a national conversation about energy efficiency. The community in NMB have been privileged to hear live studio interviews from various prestigious personalities within the energy industry. Gareth presents the lunch show weekdays on Kingfisher FM, and Green Hour on Mondays from 1-2pm with live streaming on www.kingfisherfm.co.za. In addition, daily energy news is broadcast at 1:30pm

and newsfeeds and Green Hour audio clips can be found by visiting the SAEE's Green Hour blog on www.saee.greehour.org.za. During the past year inroads have been made on the social media networks through the Green Hour Facebook group 'The Green Hour – Kingfisher FM' which has received over 34 000 friends and likes, and over 140 000 friends and tweets with Twitter at 'GreenHourSA'.

Stevan Tseng

Lighting design competition inspires new direction for young innovator

Solutions are born from creativity and independence. For creativity to be fostered, people should stop being hypnotised by consumer marketing and traditional paradigms and find their own way. This is according to Stevan Tseng, a Cape Town-based architectural student whose participation in the 2010 Eskom Energy Efficient Lighting Design Competition has inspired him to venture along the path of green design, a burgeoning field in South Africa and worldwide.

"Participating in the Eskom Energy Efficient Lighting Design Competition has had a significant impact on my thinking. Now, working in the architectural field, I want to gain as much experience as I can within the field of green design, to better understand the trends and technologies, where and how they can be used, as well as how to make them more user-friendly," says Tseng.

Tseng has recently focused his attention on investigating the possibilities of biomimicry, or biometrics, which is the examination of nature, with the goal to create products and processes that are based on nature's time-tested patterns.

Essentially, it's the process of looking at nature to solve human problems and the emerging field of biomimetics has given rise to new technologies created from biologically inspired engineering in both the macro scale and nanoscale levels.

"Aside from looking great on my CV, participating in the competition has motivated me to take a journey in what I consider to be a most exciting direction. Certainly, the competition has the potential to encourage more people to take the simplest steps toward a greener future. By being creative, we can find solutions," he says.

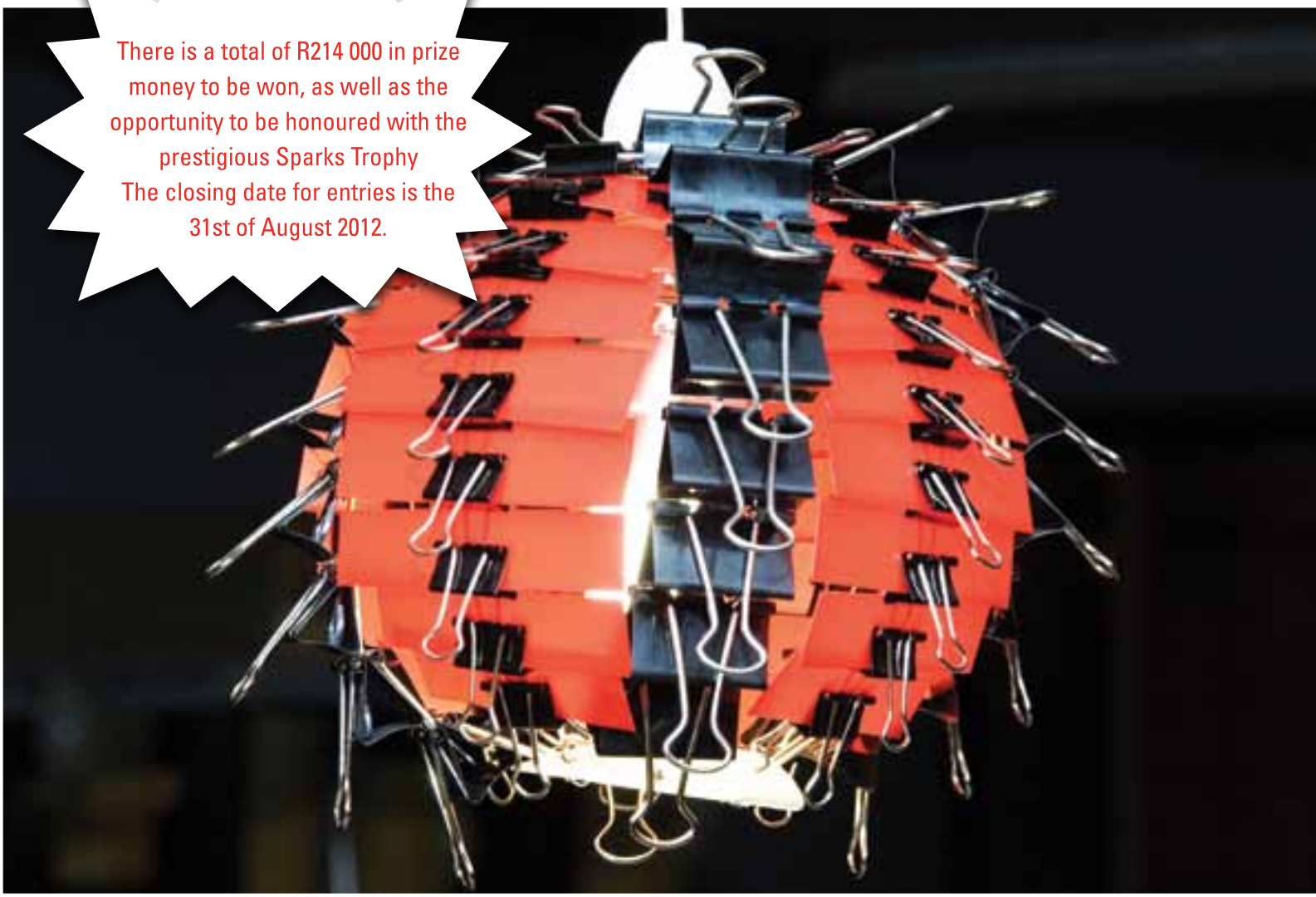
Tseng's submission to the 2010 Eskom Energy Efficient Lighting Design Competition earned him the special award for "Most Promising Designer: Innovation". Called the "Foldback Clip Light", his design was a glowing sphere of translucent louvers held between columns of spines made with fold back clips.

Using readily-available materials, such as translucent plastic for the louvers and black fold back clips – typically used to synch piles of paper together in a neat bundle – Tseng's "Foldback Clip Light" was an innovative illustration of how reused materials and energy efficient and low-heat compact fluorescent lamps (CFLs) can be imaginatively combined in lamp design.

Andrew Etzinger, Senior General Manager of Integrated Demand Management (IDM) at Eskom and the champion for energy efficient lighting design says Tseng's participation in the competition is an accolade that he will be able to continue leveraging in his career.

"Many of our previous entrants have used the programme as a launch pad into energy efficient design and development in South Africa's increasingly eco-conscious

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.



residential sector. Of course, it is enormously satisfying to hear stories of previous contestants exploring the frontiers of green design and inspiring others to adopt efficient technologies as part of their lifestyles.

"This serves as validation of the competition, not only as a channel for uncovering innovation, but also as a catalyst for change."

Since 1999, the competition, which is held every second year, 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.

Eskom is calling on everyone with a flair for design, a love of lights or a passion for the planet to submit their ideas to this year's Eskom Energy Efficient Lighting Design Competition before mid-night on 31 August 2012.

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.

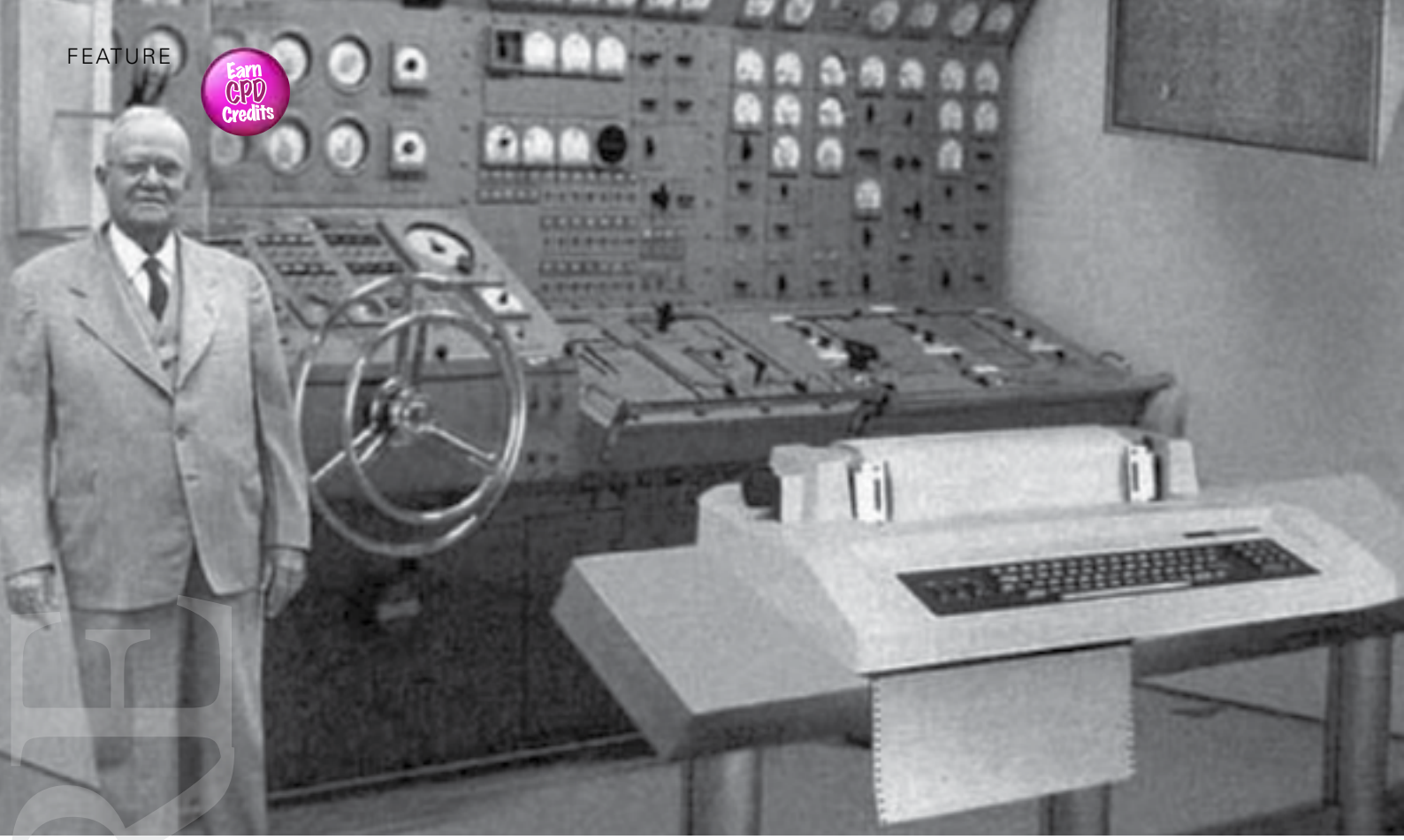
The competition is supported by Philips, the Radiant Group, LED Lighting SA, Voltex, Eurolux, ARB Electrical, OSRAM, the Department of Energy, the eta Awards, 49M, NEEA, NMISA, SESSA, IESSA, Technology Innovation Agency, the South African Institute of the Interior Design Professionals, Miss Earth, Electricity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

THE CATEGORIES ARE:

- **CATEGORY A** – Residential Luminaire Design, for full-time students at tertiary institutions including universities, colleges, design centres and schools of design.
- **CATEGORY B** – Innovative Energy Efficient Lighting Design, for professional graphic designers, electrical engineers, product designers and researchers.
- **SPECIAL AWARDS** – Most Promising Young Designer, for secondary school learners.
- **SPECIAL AWARDS** – Most Promising Designer, to honour amateur designers.

Submissions should take the form of an energy efficient lamp design, system or product that is suitable for use in residential homes.

Full details are available at www.lighting-design.co.za or from Ruth Kolevsohn at ruth@silverroot.co.za



The History of Computers

"Who invented the computer?" is not a question with a simple answer. The real answer is that many inventors contributed to the history of computers and that a computer is a complex piece of machinery made up of many parts, each of which can be considered a separate invention.

COMPILED BY I MINX AVRABOS
WRITTEN BY I MARY BELLIS

This article covers many of the major milestones in computer history (but not all of them) with a concentration on the history of personal home computers.

1936 - KONRAD ZUSE - Z1 COMPUTER

First freely programmable computer.

Konrad Zuse (1910-1995) was a construction engineer for the Henschel Aircraft Company in Berlin, Germany at the beginning of WWII. He earned the semi-official title of "inventor of the modern computer" for his series of automatic calculators, which he invented to help him with his lengthy engineering calculations. Zuse has modestly dismissed the title while praising many of the inventions of his contemporaries and successors as being equally if not more important than his own.

One of the most difficult aspects of doing a large calculation with either a slide rule or a mechanical adding machine is keeping track of all intermediate results and using them, in their proper place, in later steps of the calculation. He wanted to overcome that difficulty. He realized that an automatic-calculator device would require three basic elements: a control, a memory, and a calculator for the arithmetic.

1942 - JOHN ATANASOFF & CLIFFORD BERRY

ABC Computer - Who was first in the computing biz, is not always as easy as ABC. The Atanasoff-Berry Computer was the first electronic-digital computer built by Professor John Atanasoff and graduate student Clifford Berrybuilt at Iowa State University between 1939 and 1942. It represented several innovations in computing, including a binary system of arithmetic, parallel processing, regenerative memory, and a separation of memory and computing functions.

Presper Eckert and John Mauchly were the first to patent a digital computing device, the ENIAC computer. A patent infringement case (Sperry Rand Vs. Honeywell, 1973) voided the ENIAC patent as a derivative of John Atanasoff's invention. Atanasoff was quite generous in stating, "there is enough credit for everyone in the invention and development of the electronic computer." Eckert and Mauchly received most of the credit for inventing the first electronic-digital computer. Historians now say that the Atanasoff-Berry computer was the first.

1944 - HOWARD AIKEN & GRACE HOPPER

Harvard Mark I Computer

Howard Aiken and Grace Hopper designed the MARK series of computers at Harvard University. The MARK series of computers began with the Mark I in 1944. Imagine a giant roomful of noisy, clicking metal parts, 55 feet long and 8 feet high. The 5-ton device contained almost 760,000 separate pieces. Used by the US Navy for gunnery and ballistic calculations, the Mark I was in operation until 1959.

The computer, controlled by pre-punched paper tape, could carry out addition, subtraction, multiplication, division and reference to previous results. It had special subroutines for logarithms and trigonometric functions and used 23 decimal place numbers. Data was stored and counted mechanically using 3000 decimal storage wheels, 1400 rotary dial switches, and 500 miles of wire. Its electromagnetic relays classified the machine as a relay computer. All output was displayed on an electric typewriter. By today's standards, the Mark I was slow, requiring 3-5 seconds for a multiplication operation.

1946 - JOHN PRESPER ECKERT & JOHN W. MAUCHLY

20,000 vacuum tubes later...

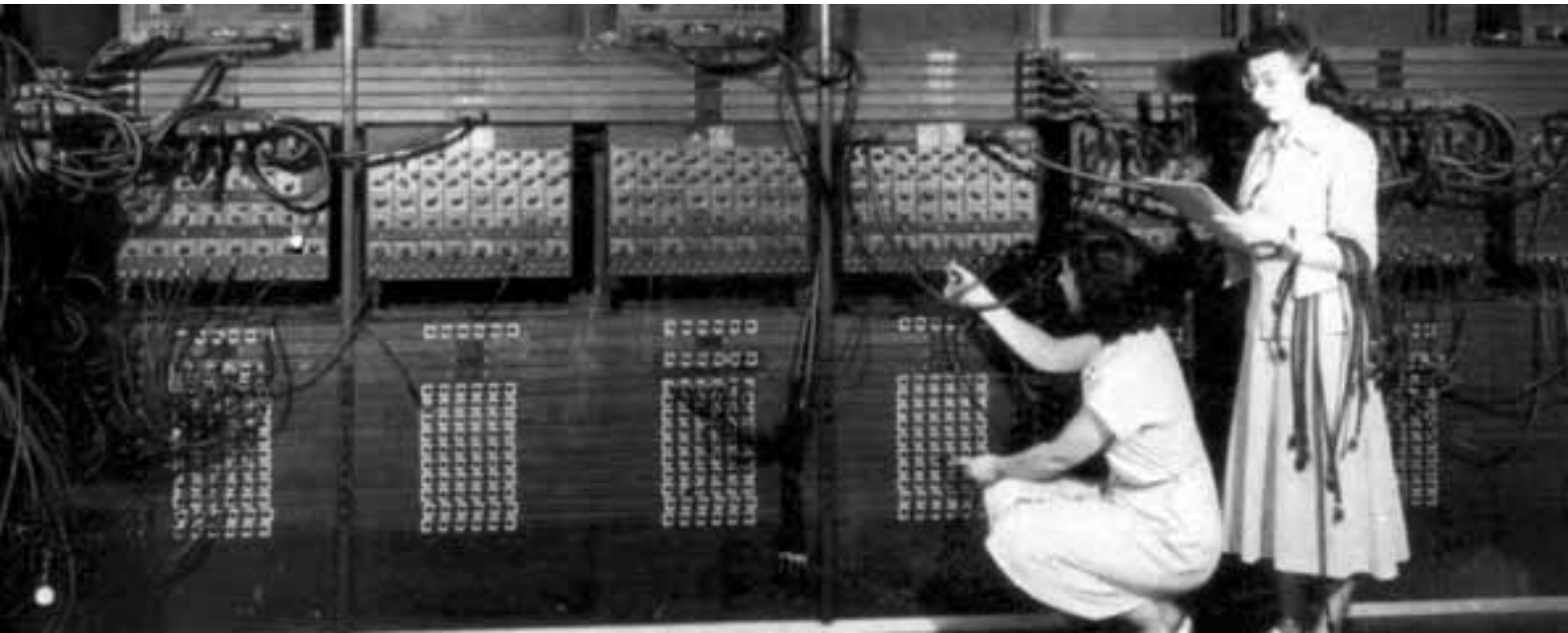
"With the advent of everyday use of elaborate calculations, speed has become paramount to such a high degree that there is no machine on the market today capable of satisfying the full demand of modern computational methods."- from the ENIAC patent (U.S.#3,120,606) filed on June 26, 1947.

In 1946, John Mauchly and John Presper Eckert developed the ENIAC I (Electrical Numerical Integrator And Calculator). The American military sponsored their research; the army needed a computer for calculating artillery-firing tables, the settings used for different weapons under varied conditions for target accuracy.

The ENIAC contained 17,468 vacuum tubes, along with 70,000 resistors, 10,000 capacitors, 1,500 relays, 6,000 manual switches and 5 million soldered joints. It covered 1800 square feet (167 square meters) of floor space, weighed 30 tons, and consumed 160 kilowatts of electrical power. There was even a rumour that when turned on the ENIAC caused the city of Philadelphia to experience blackouts, however, this was first reported incorrectly by the Philadelphia Bulletin in 1946 and since then has become an urban myth.

In one second, the ENIAC could perform 5,000 additions, 357 multiplications or 38 divisions. The use of vacuum tubes instead of switches and relays created the increase in speed, but it was not a quick machine to re-program. Programming changes would take technicians weeks, and the machine always required long hours of maintenance. Research on the ENIAC led to many improvements in the vacuum tube.

At 11:45 p.m., October 2, 1955, with the power finally shut off, the ENIAC retired.



FEATURE

The History of Computers

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1948 - FREDERIC WILLIAMS & TOM KILBURN

Baby and the Williams Tube turn on the memories.

In 1948, Tom Kilburn, assisted by another TRE researcher, Geoff Tootill, worked on designing and building a a prototype machine. Nicknamed "The Baby". For the first time in history, a computer used a stored program. Tom Kilburn wrote that computer program, first executed on June 21, 1948.

The team designed a second computer (Manchester Mark 1) and commissioned an outside company called Ferranti Ltd. to build the computer in 1949. Ferranti and the Manchester University team collaborated in 1951 and built the world's first commercially available general-purpose computer called the Ferranti Mark 1. The first machine off the production line was delivered to the University of Manchester.

1951 - JOHN PRESPER ECKERT & JOHN W. MAUCHLY

First commercial computer & able to pick presidential winners.

After leaving the academic environment of The Moore School of Engineering to start their own computer business, they found their first client - the United States Census Bureau. The Bureau needed a new computer to deal with the exploding U.S. population (the beginning of baby boom).

On March 31, 1951, the Census Bureau accepted delivery of the first UNIVAC computer. The final cost of constructing the first UNIVAC was close to one million dollars. Forty-six UNIVAC computers were built for both government and business uses.

John Presper Eckert and John Mauchly's UNIVAC was a direct competitor with IBM's computing equipment for the business market. The speed with which UNIVAC's magnetic tape could input data was faster than IBM's punch card technology, but it was not until the presidential election of 1952 that the public accepted the UNIVAC's abilities.

1953 - INTERNATIONAL BUSINESS MACHINES (IBM)

The year 1953 saw the development of IBM's 701 EDPM, which, according to IBM, was the first commercially successful general-purpose computer. The 701's invention was due in part to the Korean War effort. Inventor, Thomas Johnson Watson Junior wanted to contribute what he called a "defence calculator" to aid in the United Nations' policing of Korea.

One obstacle he had to overcome was in convincing his father, Thomas Johnson Watson Senior (IBM's CEO) that the new computer would not harm IBM's profitable punch card processing business. The 701s were incompatible with IBM's punched card processing equipment, a big money-maker for IBM.

Only nineteen 701s were manufactured (the machine could be rented for $15,000 per month).

1954 - JOHN BACKUS & IBM

The first successful high level programming language.

FORTRAN or Formula Translation was the first high level programming language (software) invented by John Backus for IBM in 1954, and released commercially in 1957. Fortran is still used today for programming scientific and mathematical applications. Fortran began as a digital code interpreter for the IBM 701 and was originally named Speedcoding.

John Backus wanted a programming language that was closer in appearance to human language, which is the definition of a high level language, other high language programs include Ada, Algol, BASIC, COBOL, C, C++, LISP, Pascal, and Prolog.

John Backus headed the IBM team of researchers, at the Watson Scientific Laboratory, that invented Fortran. On the IBM team were the notable names of scientists like; Sheldon F. Best, Harlan Herrick (Harlan Herrick ran the first successful fortran program), Peter Sheridan, Roy Nutt, Robert Nelson, Irving Ziller, Richard Goldberg, Lois Haibt and David Sayre.

The IBM team didn't invent HLL or the idea of compiling programming language into machine code, but Fortran was the first successful HLL and the Fortran I compiler holds the record for translating code for over 20 years. The first computer to run the first compiler was the IBM 704, which John Backus helped design.

Fortran has been used for programming video games, air traffic control systems, payroll calculations, numerous scientific and military applications and parallel computer research. John Backus won the 1993 National Academy of Engineering's Charles Stark Draper Prize, the highest national prize awarded in engineering, for the invention of Fortran.

1962 - STEVE RUSSELL & MIT

The first computer game invented.

"If I hadn't done it, someone would've done something equally exciting if not better in the next six months. I just happened to get there first." - Steve Russell aka "Slug" on inventing Spacewar

It was in 1962 when a young computer programmer from MIT, Steve Russell fuelled with inspiration from the writings of E. E. "Doc" Smith, led the team that created the first popular computer game. Spacewar was almost the first computer game ever written, however, they were at least two far-lesser known predecessors: OXO (1952) and Tennis for Two (1958).

It took the team about 200 man-hours to write the first version of Spacewar. Steve Russell wrote Spacewar on a PDP-1, an early DEC (Digital Equipment Corporation) interactive mini computer that used acathode-ray tube type display and keyboard input. The computer was a donation to MIT from DEC, who hoped MIT's think tank would be able to do something remarkable with their product. A computer game called Spacewar was the last thing DEC expected who later provided the game as a diagnostic program for their customers. Steve Russell never profited from Spacewars.

1964 - DOUGLAS ENGELBART

In 1964, the first prototype computer mouse was made to use with a graphical user interface (GUI), 'windows'. Engelbart received a patent for the wooden shell with two metal wheels (computer mouse U.S. Patent # 3,541,541) in 1970, describing it in the patent application as an "X-Y position indicator for a display system." "It was nicknamed the mouse because the tail came out the end," Engelbart revealed about his invention. His version of windows was not considered patentable (no software patents were issued at that time), but Douglas Engelbart has over 45 other patents to his name.

In 1968, a 90-minute, staged public demonstration of a networked computer system was held at the Augmentation Research Centre - the first public appearance of the mouse, windows, hypermedia with object linking and addressing, and video teleconferencing.

Douglas Engelbart was awarded the 1997 Lemelson-MIT Prize of $500,000, the world's largest single prize for invention and innovation. In 1998, he was inducted into the National Inventors Hall of Fame.

1969 – ARPANET

The original internet

On a cold war kind of day, in swinging 1969, work began on the ARPAnet, grandfather to the Internet. Designed as a computer version of the nuclear bomb shelter, ARPAnet protected the flow of information between military installations by creating a network of geographically separated computers that could exchange information via a newly developed protocol (rule for how computers interact) called NCP (Network Control Protocol).

The first data exchange over this new network occurred between computers at UCLA and Stanford Research Institute. On their first attempt to log into Stanford's computer by typing, "log win", UCLA researchers crashed their computer when they typed the letter 'g'.

Four computers were the first connected in the original ARPAnet. They were located in the respective computer research labs of UCLA (Honeywell DDP 516 computer), Stanford Research Institute (SDS-940 computer), UC Santa Barbara (IBM 360/75), and the University of Utah (DEC PDP-10).

As the network expanded, different models of computers were connected, creating compatibility problems. The solution rested in a better set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) designed in 1982.

As non-military uses for the network increased, more and more people had access, and it was no longer safe for military purposes. As a result, MILnet, a military only network, was started in 1983. Internet Protocol software was soon being placed on every type of computer, and universities and research groups also began using in-house networks known as Local Area Networks or LAN's. These in-house networks then started using Internet Protocol software so one LAN could connect with other LAN's.

In 1986, one LAN branched out to form a new competing network, called NSFnet (National Science Foundation Network). NSFnet first linked together the five national supercomputer centers, then every major university, and it started to replace the slower ARPAnet (which was finally shutdown in 1990). NSFnet formed the backbone of what we call the Internet today.

1971 – THE FLOPPY DISK

Nicknamed the "Floppy" for its flexibility.

In 1971, IBM introduced the first "memory disk", as it was called then, or the "floppy disk" as it is known today.

The first floppy was an 8-inch flexible plastic disk coated with magnetic iron oxide; computer data was written to and read from the disk's surface.

It was considered a revolutionary device for its portability, which provided a new and easy physical means of transporting data from computer to computer.

The first disks were designed for loading microcode into the controller of the Merlin (IBM 3330) disk pack file (a 100 MB storage device). So, in effect, the first floppies were used to fill another type of data storage device.

Overnight, additional uses for the floppy were discovered, making it the hot new program and file storage medium.

The History of Computers

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1973 - ROBERT METCALFE & XEROX

- The Ethernet Computer Networking

I came to work one day at MIT and the computer had been stolen, so I called DEC to break the news to them that this $30,000 computer that they'd lent me was gone. They thought this was the greatest thing that ever happened, because it turns out that I had in my possession the first computer small enough to be stolen! - Robert Metcalfe on the trials and tribulations of inventing the Ethernet.

The Ethernet is a system for connecting computers within a building using hardware running from machine to machine. It differs from the Internet, which connects remotely located computers by telephone line, software protocol and some hardware. Ethernet uses some software (borrowed from Internet Protocol), but the connecting hardware was the basis of the patent (#4,063,220) involving newly designed chips and wiring.

The patent* describes ethernet as a "multipoint data communication system with collision detection".

1974/75 - SCELBI & MARK-8

The first consumer computers

In the early 1970s, anyone wanting to use a computer had to wait in a long line, as computers were few and far apart. The desire and the market were increasing for a computer that could be used at home or in the office, the "personal computer".

Several different manufacturers marketed "personal computers" between 1974 and 1977 in response to that desire. These were mainly kits (major assembly required) advertised in the back pages of magazines like Popular Science.

In March 1974, the QST magazine featured the first advertisement for a "personal computer." It was called the Scelbi (SCientific, ELectronic and BIological) and designed by the Scelbi Computer Consulting Company of Milford, Connecticut.

Based on Intel's 8008 microprocessor, Scelbi sold for $565 and came with 1K of programmable memory, with an additional 15K of memory available for $2760. The second "personal computer kit" was the Mark-8 (also Intel 8008 based) designed by Jonathan Titus. The July issue of Radio Electronics magazine published an article on building a Mark-8 microcomputer, information the general public was hungry for.

At the same time, the Intel Company introduced the new 8080-microprocessor chip, made for controlling traffic lights. It was to become the microprocessor inside the very successful Altair computer.

1981 – MICROSOFT

MS-DOS Computer Operating System

On August 12, 1981, IBM introduced its new revolution in a box, the "Personal Computer" complete with a brand new operating system from Microsoft, a 16-bit computer operating system called MS-DOS 1.0.

As for an operating system (OS) for an IBM computer, since Microsoft had never written an operating system before, Gates had suggested that IBM investigate an OS called CP/M (Control Program for Microcomputers), written by Gary Kildall of Digital Research. Kildall had his Ph.D. in computers and had written the most successful operating system of the time; selling over 600,000 copies of CP/M, his operating system set the standard at that time.

IBM tried to contact Gary Kildall for a meeting, executives met with Mrs Kildall who refused to sign a non-disclosure agreement. IBM soon returned to Bill Gates and gave Microsoft the contract to write a new operating system, one that would eventually wipe Gary Kildall's CP/M out of common use.

The "Microsoft Disk Operating System" or MS-DOS was based on Microsoft's purchase of QDOS, the "Quick and Dirty Operating System" written by Tim Paterson of Seattle Computer Products, for their prototype Intel 8086 based computer.

1984 - APPLE MACINTOSH COMPUTER

The more affordable home computer with a GUI.

"Hello, I am Macintosh. Never trust a computer you cannot lift... I'm glad to be out of that bag" - talking Macintosh Computer.

In December, 1983, Apple Computers ran its' famous "1984" Macintosh television commercial, on a small unknown station solely to make the commercial eligible for awards during 1984. The commercial cost $1.5 million and only ran once in 1983, but news and talk shows everywhere replayed it, making TV history. The next month, Apple Computer ran the same ad during the NFL Super Bowl, and millions of viewers saw their first glimpse of the Macintosh computer. Ridley Scott directed the commercial, and the Orwellian scene depicted the IBM world being destroyed by a new machine, the "Macintosh".

Seventy-four days after the introduction of the "Macintosh", 50,000 units had been





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The History of Computers

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Apple founders Steve Jobs (left) and Steve Wozniak.

Microsoft founders Bill Gates (left) and Paul Allen.

sold, not that strong a show. Apple refused to license the OS or the hardware, the 128k memory was not enough and a single floppy was difficult to use. The "Macintosh" had "Lisa's" user friendly GUI, but initially missed some of the more powerful features of the "Lisa" like multitasking and the 1 MB of memory. Jobs compensated by making sure developers created software for the new "Macintosh", Jobs figured that software was the way to win the consumer over.

In 1985, the "Macintosh" computer line received a big sales boost with the introduction of the LaserWriter printer and Aldus PageMaker, home desktop publishing was now possible. But 1985 was also the year when the original founders of Apple left the company.

1985 - MICROSOFT WINDOWS

Microsoft begins the friendly war with Apple.

On November 10, 1983, at the Plaza Hotel in New York City, Microsoft Corporation formally announced Microsoft Windows, a next-generation operating system that would provide a graphical user interface (GUI) and a multitasking environment for IBM computers.

Bill Gates showed a beta version of Windows to IBM's head honchos. Their response was lacklustre probably because they were working on their own operating system called Top View. IBM did not give Microsoft the same encouragement for Windows that they gave the other operating system that Microsoft brokered to IBM. In 1981, MS-DOS became the highly successful operating system that came bundled with an IBM computer.

Top View was released in February of 1985 as a DOS-based multitasking program manager without any GUI features. IBM promised that future versions of Top View would have a GUI. That promise was never kept, and the program was discontinued barely two years later.

No doubt, Bill Gates realized how profitable a successful GUI for IBM computers would be. He had seen Apple's Lisa computer and later the more successful Macintosh or Mac computer. Both Apple computers came with a stunning graphical user interface.

Microsoft finally shipped Windows 1.0 on November 20, 1985, almost two years past the initially promised release date. wn

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Dynamic Reactive Power Compensation of Container Cranes

Overall requirements for the reactive power compensation of a container crane vary based on overall crane size and container weights. These dynamically changing requirements affect not only the efficiency of the crane, but also put significant strains on the local electrical distribution system.

WRITTEN BY | BOB SEAGRAVE

Cranes exhibit the characteristics of an asynchronous motor. During normal lifting and trolleying modes, kW is consumed by the motors. When the motors are lowering containers, they utilize dynamic braking and produce active power (kW), and export this power to the local electrical distribution system. However, harbour cranes consume reactive energy (kVAr) during all load conditions. The large reactive energy demand causes voltage stability (flicker) issues, decreased electrical service utilization and reduced crane efficiency. The only complete answer to the dynamic reactive energy consumption of harbour cranes is real-time compensation. This solution requires four-quadrant measurement capability as well as the ability to respond to all reactive energy requirements in less than one network cycle (16.7ms on 60Hz).

Figure 1 – Typical PFC Profile

TYPICAL CRANE POWER FACTOR SYSTEM

As a standard design, container cranes are fitted with no-load capacitor systems, typically rated at less than 25% of the reactive energy requirements of the crane at peak load.

Figure 1 illustrates an operating measurement of an 80-ton container crane with 300kVAr fixed capacitors installed.

The peak reactive power requirements are still ~1500kVAr (500 / phase), and that voltage drop caused by the large reactive energy demand is > 10%. Further, peak currents were well above 2,000A.

TYPICAL CONTAINER CRANE POWER PROFILE

A typical container crane will both consume and produce active power (kW). Consumption takes place during lifting a container and trolleying. Due to dynamic braking present, when containers are lowered, the crane produces kW and exports power to the electrical distribution system. However, the motors consume reactive power (kVAr) during all load conditions. Figure 2 graphically depicts the power profile of a typical container crane.

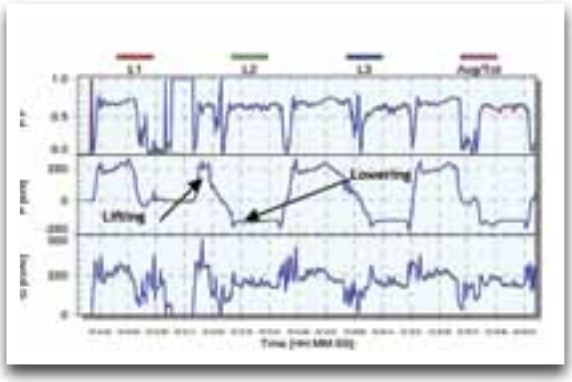

Figure 2 – Power Profile

During the cross-over between lifting and lowering, the kW load of the motor(s) crosses the zero-axis. At this time, there is a purely inductive (kVAr) load, then transitions to –kW and +kVAr. This phenomenon causes significant problems for most power factor correction systems, as negative kW readings cause operating errors. The solution is in the form of a four-quadrant controller, which can

Dynamic Reactive Power Compensation of Container Cranes

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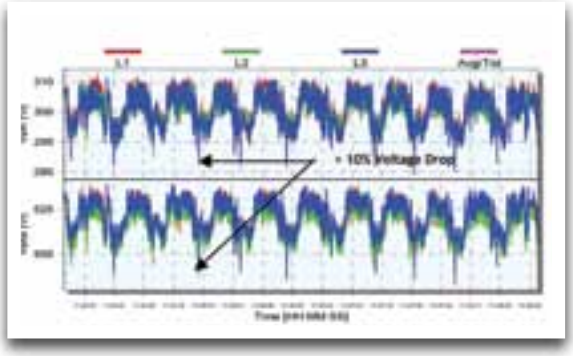

Figure 3 – Voltage Drop

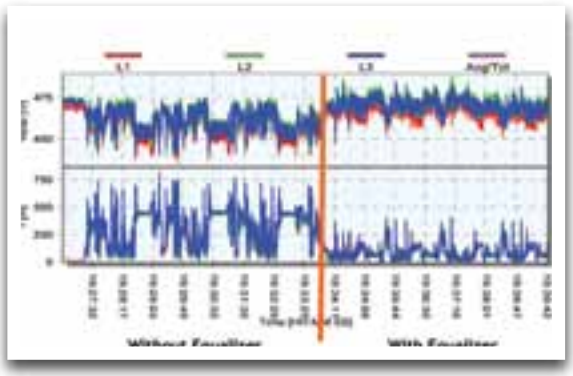

Figure 4 – Voltage & Current Results

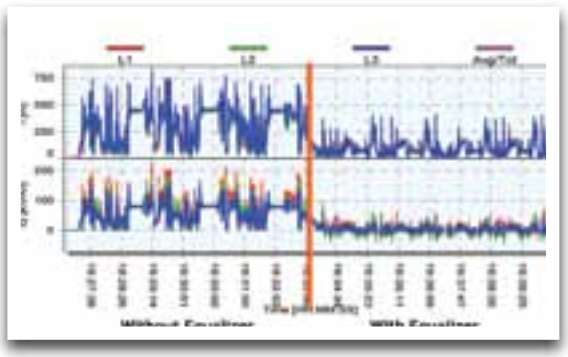

Figure 5 – Reduction of Reactive Energy Demand

detect (+/-) kW and (+/-) kVAr. Only with such a controller can accurate compensation be attained.

VOLTAGE DROP

Voltage drop can cause significant operating problems for motors and drives. Many times the voltage drop impacts motor efficiency and performance, however it can also cause the motor or drive to shut down. The result of supply voltage drop is increased cycle time for container loading/unloading and downtime costs to reset motors and drives. Figure 3 shows an example of a harbour crane with 2x400hp DC hoist motors and a 200hp DC trolley motor without dynamic compensation. Voltage drops of over 10% are quite common in container crane applications.

CURRENT: SPIKES, HARMONICS & THEIR IMPACT

Due to the very large and dynamic reactive energy requirements of a container crane, large current spikes are an inherent characteristic in these machines. Many times, the peak currents are either at the limits of the protective devices (breakers/fuses) or exceed their ratings. The result of such high currents is premature fuse failure or nuisance tripping of the main circuit breaker(s), causing downtime and lost revenues.

Another problem associated with current is harmonics. Most container crane motors employ some type of drive, whose functions can range from changing AC voltage to DC to varying the speed of a motor depending on its load. High harmonic levels can cause many different power quality issues that impact the overall maintenance and life of motors and electrical infrastructure.

Overheating caused by harmonics can reduce the life expectancy of a motor, cause nuisance trips of protective devices, and can reduce the efficiency of the electrical distribution system.

REAL-TIME DYNAMIC COMPENSATION

The impact of real-time, dynamic reactive compensation on container crane performance and electrical system efficiency is significant. In Figure 4, a dynamic compensation system was installed to minimize voltage drop and reduce peak currents to avoid nuisance circuit breaker trips and improve the efficiency of the crane motors. As evidenced in the graph, nominal voltage levels were raised to normal supply values, voltage drop was reduced by nearly 60% and peak currents were reduced by over 50%.

Figure 5 depicts the dramatic impact on the reactive energy requirements of the crane motors in this same application. They are all but eliminated, minimized to 50% of the smallest step size of the compensation system – a resultant drop of almost 90%.

CONCLUSION / SUMMARY

Container ports throughout the world are realizing the benefits of real-time reactive power compensation. By installing Elspec's Equalizer system, container ports around the world have improved voltage stability, lowered maintenance costs, increased service utilization of the port's electrical system, achieved harmonic current reductions and decreased power system losses.

Further, many container crane operators have benefited from increased hoist acceleration and final trolleying speed without the nuisance trips resulting from over-current and under-voltage. wn

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A Brief History of Electricity in South Africa

Due largely to its mineral wealth, South Africa became a forerunner in the development of commercially based electricity. Just three years after Thomas Edison illuminated New York in 1879, the diamond city, Kimberley, switched on electric streetlights on 2 September 1882 making it the first city in Africa to be illuminated in this manner. At this time, London still relied on illumination by gas lamps.

In 1889, the company Siemens & Halske was granted the concession to supply electricity to Johannesburg and Pretoria. This company also obtained a concession to transmit electricity to the mines on the Witwatersrand in 1894. This concession was ceded to the Rand Electric Works a year later. The Rand Central Electric Works proceeded to erect the first commercial power station at a site later to be known as Brakpan.

South African mining companies realised that the power generated by steam engines for street lighting was inadequate for their needs. They joined forces to build a small "power stations" to supplement existing supplies of electricity. The Simmer and Jack mines were awarded the rights, in 1897, to supply electricity to five nearby mines owned by Consolidated Goldfields Group. A subsidiary company, the General Electric Power Company Ltd was established to deal with this concession, a year later in 1898.

The General Electric Company Ltd commissioned a power station at Driehoek (near Germiston) in 1899. The use of electricity by the mining companies was restricted to illuminating work areas and driving small equipment. However, as the exploitation of gold deposits became more complicated, the power requirements of the mining companies increased. As the gold-mining industry recovered from effects of the Anglo-Boer War, an adequate supply of cheap power became essential.

The notion of a central electricity undertaking gained the support of businessmen, engineers and others. This culminated in the establishment of the Victoria Falls Power Company Limited (VFP) on 17 October 1906. This company was registered in Southern Rhodesia (now Zimbabwe). The VFP intended harnessing the power of the Victoria Falls to generate the electricity requirements of expanding industries of the Witwatersrand and Southern Rhodesia. For technical and financial reasons, this idea was abandoned. Three years after the establishment of the VFP, it was renamed to Victoria Falls and Transvaal Power Company Limited. The renamed company was still known as the VFP and based its entire operation on the exploitation of the coal deposits in the Transvaal Colony.

Shortly after the Anglo-Boer War, expert opinion recommended that large centralised power stations would supply more reliable and cheaper electrical power than small-dedicated power stations. The VFP bought out the Rand Central Electric Works and the General Electric Power Co Ltd in 1906. A subsidiary company, the Rand Mines Power Supply Company was formed by the VFP in 1908. This company was to supply electricity and compressed air to the Rand Mines Group and the Herbert Eckstein Group.

By 1915, four thermal power stations Brakpan, Simmerpan, Rosherville and Vereeniging, collectively had a total installed capacity of more than 160 megawatts. A system control center was established at Simmerpan. This has grown to be the National Control Centre, which directs Eskom's entire transmission network today. The rapid expansion of the

POWER

VFP earned it, at one stage, the status of the largest power supply undertaking in the British Empire. The VFP also pioneered long-distance transmission of high-voltage electricity under the severe climatic conditions of the Witwatersrand.

The Power Act introduced on 28 May 1910 by the Transvaal Colonial Government, limited the future existence of the VFP. The Act authorised the operational expansion of the VFP, but provided for the State's expropriation of the company, or any other electricity undertaking, after a period of 35 years. The State viewed the provision of electricity as a public service to be placed under its authority.

The Government Gazette of 6 March 1923 announced the establishment of The Electricity Supply Commission (Escom), effective from 1 March 1923. Dr Hendrik, Johannes van der Bijl, a leading research scientist appointed by the Smuts government as a "Technical Adviser on Industrial Development to the Department of Mines and Industries", was appointed first Chairman of Escom. The Commission was made responsible for establishing and maintaining electricity supply undertakings on a regional basis. Electricity was to be supplied efficiently, cheaply and abundantly to government departments, railways and harbors, local authorities and industry. The Commission met for the first time on 20 March 1923 in Cape Town. The Commission's headquarters opened in Johannesburg on 1 May 1923.

The erection of Malieveldspruit hydro station was a temporary measure undertaken by Escom to ease the electrical power demands of the gold mines in the eastern Transvaal (Mpumalanga today). This station was replaced by a hydro station in the Sabie River, which came into commercial operation in mid-1927. The Sabie River gorge hydro station was the first station designed by Escom Engineers. The year 1929 closed with Escom enjoying power sales of approximately 800 million units.
A steam locomotive nicknamed "Kitty" was manufactured by the Kitson Company of Leeds England in 1879. "Kitty" celebrated her 120th birthday in 1999 and is the first steam locomotive to be declared a national monument. She became the first locomotive to see a century of service. From 1920 to 1958 she worked on the one and half-mile line between Jupiter station (on the Driehoek - Kazerne line) to Rosherville Power Station hauling coal. Since then to the mid 70's she hauled light loads to the central stores and workshops a Rosherville. She is now a working exhibit at the South African National Rail and Steam museum (SANRSM) at Randfontein Estates.

By 1919 the South African Railways and Harbours Administration (SAR&H) had decided to electrify the Natal main line and the Cape Peninsula suburban lines. Construction of the Colenso Power station was commenced in 1922 and completed in 1927 when it was taken over from the SAR&H by ESCOM. Congella and Salt River power stations at Durban and Cape Town respectively were built by ESCOM between 1927 and 1951 mainly to serve the SAR&H. wn

"There lies before the Electricity Supply Commission a great task and a great opportunity. It will be our endeavor to play our part as those who follow where others lead, but as pioneers; to foresee the needs of a country fast developing, and by wise anticipation be ever ready to provide power without profit, wherever it may required."

Dr HJ van der Bijl

Municipal Prepaid Meters Scam

In recent years South African electricity consumers have been faced with a number of problems related to the accuracy of their meter readings and subsequent billing on their municipal accounts. These problems, having been widely publicized in the media and lead to equally widely publicized court rulings, have escalated during a period where national electricity prices are on the increase.

The combined effect of billing irregularities and escalating power prices has motivated many consumers to convert the method by which their consumption is metered from post-paid to prepaid metering and billing. While prepaid metering and billing does not shelter the consumer from price escalation, it most certainly does eliminate some of the root causes of billing irregularities, namely human error and interim readings.

While conversion to prepayment is greatly desired by most, consumers are unsure as to how to go about the conversion process and are often reluctant to approach their municipality because they have the perception that all interactions with municipal services is complicated, troublesome, confusing and very frustrating.

This unfortunate situation has been eagerly exploited by a small group of scam artists.

PrepaidMeters.co.za, a private prepayment sub-meter management and vending company, has reported that it recently encountered a number of cases where individuals masquerading as municipal or City Power employees are offering consumers to facilitate the post-paid to prepaid conversion process. The company reports that the number of cases where consumers have fallen prey to this scam have been increasing in recent years with most cases being encountered within the City of Johannesburg region where City Power is the main supplier of electricity.

"It is in the interest of electricity consumers and our customers that we have approached the media to assist in making public the nature of the scam. It is our hope that as a result of this story, fewer consumers become victims of this scam and the scam artists will find it is increasingly difficult to take advantage of people and will ultimately cease this kind of activity." states Sean Wheller, Chief Executive Officer for PrepaidMeters.co.za.

The scam starts with a seemingly authentic individual, in municipal or City Power clothing, presenting with seemingly authentic municipal or City Power forms and documents, approaching the consumer. The individual speaks to the consumer about their current billing with the municipality and seems interested in listening to the customers problems. When the customer is identified as having problems with a post-paid electricity bill the individual recommends that the account be converted from post-paid to prepaid billing.

Everything seems authentic, the individual seems knowledgeable and is presenting a means by which the customer will be able to convert the account without having to go through the frustration of having to engage the municipal system directly. All the customers' needs, wants and fears are addressed and overcome. The customer is then given a hand written bill written on a triplicate pad and is asked to complete some details and sign it. The original copy is left with the customer as the reference.

At this point the consumer parts with cash as per the stipulated amount and is told that in a few days somebody will be there to install the prepaid meter and after that the customer can make purchases from the regular retail channels and will no longer receive any electricity billing on their following months municipal statement. Everyone is happy and the customer is waiting for the prepaid meter installation.

As promised, a few days later a person arrives to install a prepaid meter. The customer expects this and therefore let's everything go ahead as previously discussed and is often so impressed with the turnaround time that the solution is rapidly recommended to other people in the area.

The customer is advised that the meter has been loaded with a number of free kilo Watt hours (kWh) and that it should last a number of days so there is no immediate need to go purchase a top-up.

Unbeknown to the customer the prepaid meter is installed with a bridge which has effectively by-passed the prepayment meter and as such the number of kWh on the meter Customer Interface Unit or Keypad LCD will depreciate by very slowly. This is a design of the scam as it gives the individual enough time to work on customers in the area and make use of other satisfied customers in the area as reference, so increasing the number of people the individual can catch in a period of time.

At this point the customer has no idea that the meter is bridged and is also not aware that while they have a prepayment device installed that the device is actually property of the municipality or City Power that has been stolen from stock. Furthermore, the prepaid meter was never registered on the City of Johannesburg Prepayment Vending system.

It is only when the number of kWh starts to run low that most customers visit a retail point to purchase an electricity top-up to discover that the prepayment meter is not registered on the vending system and that they cannot purchase a token for the meter. They are advised at the retail point to contact the municipality to fix the problem.

Municipal Prepaid Meters Scam

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In most cases when the customer reports the problem they are told that this is not possible as there is no record on the municipal systems and that the post-paid account has not received a final reading and is not marked such that there will be no more actual or interim readings.

In some cases customers prepayment devices reach disconnect and show 0.0 kWh by to the customers surprise the power is not disconnected. Some customers just leave it that way and do not report what is obviously a problem, taking the attitude that it is the municipality's problem. Others report the problem and encounter the facts.

It is only at this point that customers learn and realize that they have fallen prey to a scam and are now faced with a very real legal problem because they have removed the original post-paid meter and essentially by-passed the billing system. Furthermore they are implicated in a case of municipal property theft whether that was their intent or not.

"Customers need to be made aware that everything to do with their billing at the municipality has to undergo a rigorous business process and that issuing of receipts cannot be done by anyone except via municipal or City Power customer service desk.", says Sean Wheller *"Customers should not be parting with money to any municipal or City Power employee at their premises as such transactions are not recorded on city systems and thus are untraceable."*

In addition to supplying private prepaid sub-metering equipment, management and vending services, PrepaidMeters.co.za has a department dedicated to assisting customers who require assistance in processes for application of new account connections, resolving billing disputes and conversion of accounts from post-paid to prepaid billing.

"Customers who do not wish to engage with the municipality directly, for whatever reason, need to be aware that there are other options available. Options that are safe, secure, and most of all responsible and accountable for their actions. Each month, our Municipal Liaison Department processes a large number of municipal related requests from customers in the Gauteng region. The company and the processes are all traceable." advises Sean Wheller *"Our company has good relationships with the correct people within the municipalities and is up to date with the municipal procedures. Our knowledge and experience with municipal services means that we are aware of the potential problem areas and are therefore able to pay attention to these areas in order to try to avoid issues. Ultimately, from our customers perspective, if problems do occur we stay with the case; working to provide satisfactory resolution and remain in contact with all parties."*

The moral of the story is never to deal with any person or persons that offer prepaid meters for cash on the premises.

Prepaid Meters need to be registered on a vending system. If the meter is a municipal meter then it will be registered on the municipal system, if the meter is a sub-meter, then it will be registered on the vending system of sub-metering company.

The legitimate way of acquiring a municipal meter is going to the respective municipal office and applying for a prepaid meter with the correct documentation and receiving correct references that correspond also with payments made for the prepaid meter. Alternately, make use of a reputable company who you can trust to extend a power attorney limited to your requirement that can act on your behalf.

Each municipality has its own processes, but generally speaking the application itself is not sufficient in many cases if the account is in arrears. Many municipalities will first ask the resident to clear any arrears from the post-paid account before the installation of a prepaid meter. This explains just some of the complexities that involve getting a legitimate and legal municipal prepaid meter.

At PrepaidMeters.co.za the Municipal Liaison Department has seen many unfortunate cases whereby residents pay cash just to avoid dealing with municipality.

Nick Botha the manager of the Municipal Liaison Department says: *"There is in fact no short-cut. You should be suspicious of anyone offering any form of short-cut related to any municipal services. Municipalities are large organizations and have specific and often complex processes. At times we see that even municipality employees don't know the processes, this occasionally opens the door for scams. My recommendation is never to pay cash for anything, unless it is at the municipal counter in their offices and they issue you a receipt and always ask questions, you have the right to know."* wn

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The use of National Scale Lightning Information

Global weather patterns around the world are changing and the frequency and intensity of severe weather events are increasing. The need for accurate weather monitoring and forecasting technology as well as early warning systems is more urgent than ever before to enable businesses and governments to make more informed decisions that will protect communities and save lives.

BY | JEREMY USHER **|** DR. CHOGLIN LIU **|** DR. STAN HECKMAN **|** DR. ELENA NOVAKOVSKAIA

Earth Networks Total Lightning Network (ENTLN), which detects cloud-to-ground (CG) and in-cloud (IC) lightning at national scales with high detection efficiencies and location accuracies, is an effective tool to enable early warnings of severe weather events. Furthermore, the data from the network can be used to generate precipitation estimates - similar to radar systems – to provide an effective proxy for traditional Doppler radar systems where those systems are non-existent. This next generation technology provides a cost-effective option to bring improved meteorological information around the world.

CORRELATION OF TOTAL LIGHTNING TO SEVERE WEATHER EVENTS

For several decades, studies have analyzed the relationship between lightning flashes and severe storm characteristics. Severe thunderstorms which generate lightning, high wind, hail and tornadoes, often times display characteristics such as high in-cloud (IC) lightning flash rates during the formation stage. Additionally, the greater number of strong updrafts during a severe thunderstorm results in more charging overall, leading to greater numbers of ICs and positive CGs (Lang and et al. 2000 and 2001). Thus it can be said that when there is an increase in in-cloud lightning activity, there is a strong likelihood of impending severe thunderstorm activity.

EARTH NETWORKS TOTAL LIGHTNING NETWORK (ENTLN) AND LIGHTNING CELL TRACKING AND ALERTING

The Earth Networks Total Lightning Network ™ (ENTLN) detects both IC and CG lightning at long distances with high detection efficiencies and location accuracies. Earth Networks uses this data within sophisticated post-processing algorithms to track storm cells. A lightning cell is a cluster of flashes within a boundary shown as a polygon, which is determined when the number of lightning flashes exceeds a defined threshold. (Figure 1) This polygon is calculated every minute. Storm cell tracking and direction can be determined by correlating the cell polygons over a period of time. By counting the flashes inside the cell, it is possible to estimate the lightning flash rate (flashes/min) as well as the cell's speed and its area (size of the cell).

Once a lightning cell is located and tracked, the total flash rates, including IC and CG, are calculated. By monitoring the flash rates and the rate changes, the severe storm cells or the ones to potentially become severe, can be identified. Figure 2 shows the schematic cell history, the total lightning rate has a sudden jump at t_0 and the severe weather follows at t_s after the rate peaks at t_p. In a microburst, the pattern may show up once, while in a super cell thunderstorm the pattern can repeat many times during the lifetime of the cell.

When a cell is identified and the total lightning rate jumps past the threshold, a dangerous thunderstorm alert (DTA) can be issued at ti. The threshold of total lightning rate may vary in different regions or for different types of storms. To simplify the study, a threshold of 25 flashes/min was chosen. Combining the information from the cells, such as the moving speed and direction and the size of the cell, a warning area ahead of the storm cell can be determined. The DTA can be displayed as an alert polygon which covers the distance that a cell will travel in 45 minutes with the speed demonstrated at the moment when the alert is generated (Figure 3). The alert polygon is updated every 15 minutes to reflect the updated path of the cell. The cell may reenergize and repeat the process again and trigger more alerts. Some cells may disappear quickly and some may keep going for hours while others may contain mostly CG flashes. These storms, however, are not usually severe in terms of high wind, hail or tornadoes even though the cloud-to-ground strokes can threaten human lives and cause serious property damage.

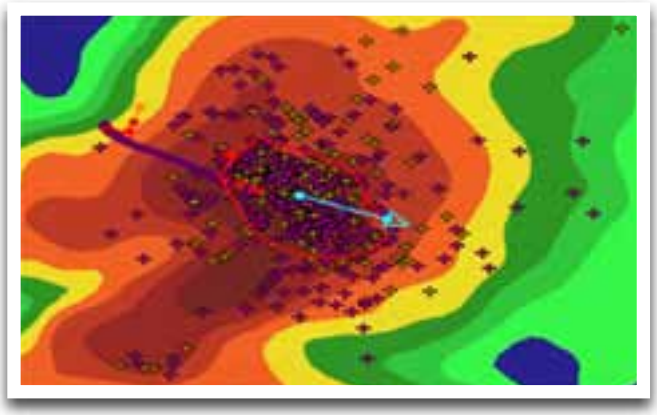

Figure 1: *Defining a lightning cell. The curve behind the polygon indicates the path of the cell, and the arrow shows the moving direction of the cell.*

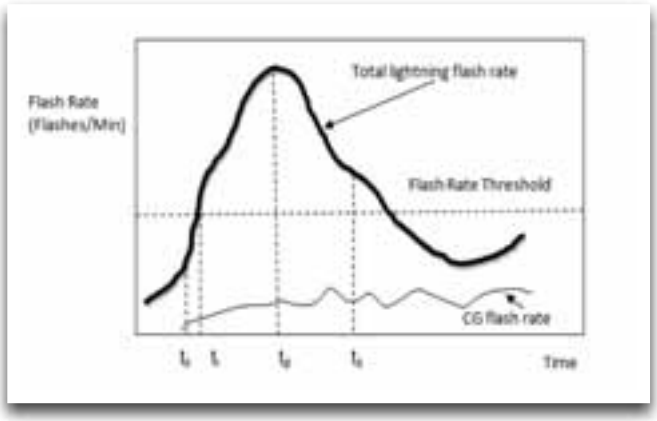

Figure 2: *Total lightning rate graph with t_0 = jump time; t_p = peak total lightning rate time; t_s = time of severe weather; t_i = issuing time of Dangerous Thunderstorm Alert (DTA); $t_s - t_i$ represents the lead time of the alert.*

Figure 3: *An alert polygon can be created for the area 45 minutes ahead of the moving cell.*

The use of National Scale Lightning Information

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LIGHTNING FLASH RATE AND MAXIMUM RADAR REFLECTIVITY

Investigation of the relationships between the total lightning flash rate and the radar reflectivity inside the lightning cells has unveiled statistical models that can be used to create a proxy radar map from total lightning data for convective storms.

When plotting the lightning flash data on top of the radar reflectivity map, one can see that most of the lightning activity occurs in the areas with high dBZ values (>30dBZ) (Figure 4). The lightning flash rate for a location is calculated by counting the number of flashes in the area within an 8km radius over a period of 6 minutes.

To study the relationship between lightning flash rate and radar reflectivity, the composite radar maps, which have the maximum dBZ reflectivity from any of the reflectivity angles of the NEXRAD (U.S. National Weather Service) weather radar, are used. For each composite radar dBZ reflectivity map with certain scan intervals, a lightning cell map is generated by using the lightning cell tracking system. The median lightning flash rate in each lightning cell (polygon) and the median radar reflectivity value in the corresponding polygon are recorded as a sample (Figure 5). Since all the samples are collected from the lightning cell polygons, this ensures that only the convective storms were considered in the study. From the samples, the statistic variables such as mean and modal can be calculated. The statistics clearly indicate a logarithmic increase in maximum radar reflectivity with increasing total lightning flash rates. The relationships vary in different climate regions and seasons.

PULSERAD: AN ACCURATE AND PRACTICAL PROXY FOR RADAR

To quantify the relationships between the lightning flash rates and the dBZ values of the composite radars, three climate regions were chosen within the continental United States. The three regions include mid-latitude east, subtropical and mid-latitude west. The seasons are divided into the warm season, from June to September, and the cold season for the rest of the year. Applying the statistical model to each climate region in the different seasons, the lightning flash rates can be converted to the relative dBZ values, which in turn can be used to create the simulated radar map, known as PulseRad℠ (Figure 6). Additional climatic regions and associated correlations can be easily developed for any region of the world.

As highlighted earlier in this article, a high lightning rate or a sudden jump in total lightning rate is usually the precursor to severe storms. Likewise,

Figure 4: *Lightning activities corresponding to high dBZ values*

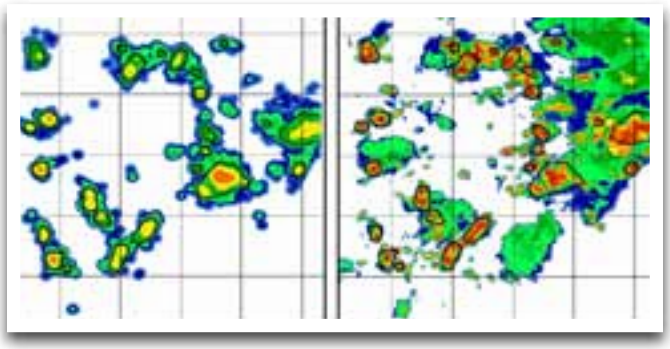

Figure 5: Comparison of lightning rate to radar dBZ values in the lightning flash cells (left); and corresponding radar cells (right)

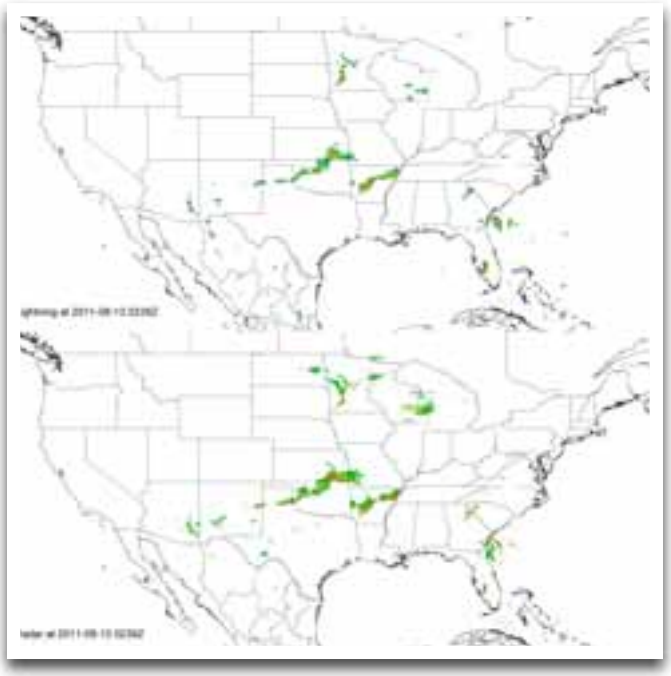

Figure 6: PulseRad (top) and Doppler radar (bottom) comparison.

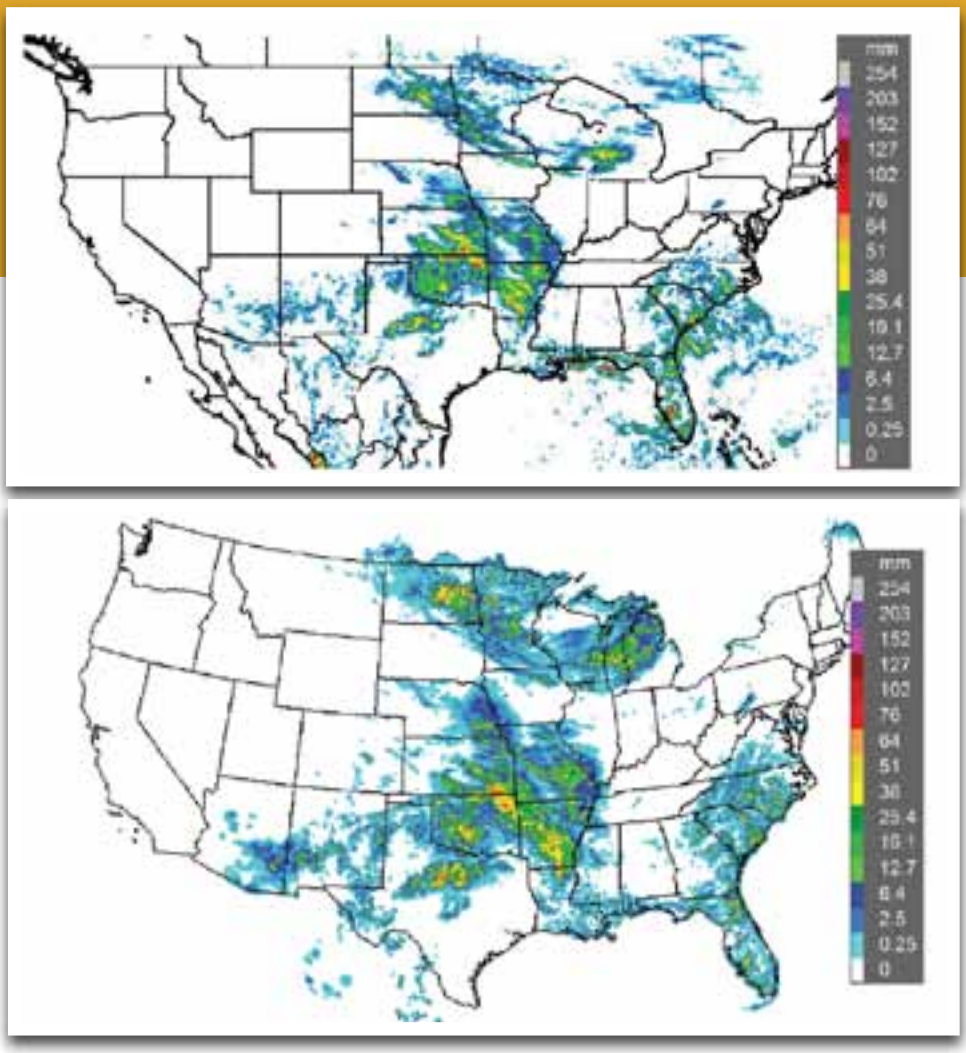

Figure 7: *24-hour precipitation estimate visualizations for 8/13/2011, from PulseRad (top) and NWS (bottom), Courtesy of NWS Advanced Hydrologic Prediction Service*

the high dBZ values or sudden increase of dBZ values in the PulseRad system can be used as an indicator for intensifying storms. Like regular Doppler radar maps, the PulseRad map can be used for surface precipitation estimates (Figure 7) and flood warnings during convective storm seasons. Furthermore, by using historical PulseRad data, it is possible to monitor drought conditions in areas with limited coverage of traditional surface weather monitoring systems as well.

Many geographical regions have similar climates and lightning characteristics, thus the statistical models can be adjusted and applied. As long as ENTLN total lightning data is available, PulseRad can be created for any region with a known climate. A regional or national implementation of additional sensors within the Earth Networks Total Lightning Network provides the data necessary to establish PulseRad coverage for a desired area.

This analysis confirms the correlation between the logarithmic scale of the total lightning rate (dBR) and maximum radar reflectivity (dBZ) in convective storms. By converting the dBR to dBZ, a proxy radar map (PulseRad) can be created utilizing data from the Earth Networks Total Lightning Network. PulseRad is the first practical radar alternative capable of coverage on the national and continental scales required for weather nowcasting in areas that lack radar coverage.

THE VALUE OF NATIONAL SCALE TOTAL LIGHTNING INFORMATION

There is a strong correlation between lightning data from the Earth Networks Total Lightning Network (ENTLN) and severe storm activity as well as surface precipitation estimates from convective storms.

The detection of both IC and CG flashes provides the necessary data required to enable storm cell tracking, advanced severe weather warning products, and an affordable radar alternative. Dangerous Thunderstorm Alerts (DTAs) and PulseRad can deliver improved visibility into severe storm events that will help save lives, protect assets and improve operational risk management for governments, businesses, and consumers where an Earth Networks Total Lightning Network is deployed. wn

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Examples of Polynomial Equation Solution by numerical factorisation

BY | W A (BILL) BRADING | CENG UK | FSAIEE | FIET

A CUBIC

$x^3 - 4x^2 - 16x - 35 = y$ Solve for y = 0

This will factorise into a linear term and a quadratic $(ax+b)(cx^2+dx+e)$
where ac = 1 and be = 35 = (7)(5)
Let x = 10 then y = 405 = $(3^4)(5)$ so if a = 1 then (x-7) = (10-7) = 3 is a possible linear term and the quadratic = 405/3 = 135 = (x^2+3x+5).
This can be shown to be a solution.

$$(x-7)(x^2+3x+5)=0 \quad \therefore \quad x=7 \quad and \quad x=\frac{-3\pm i\sqrt{11}}{2}$$

A FOURTH DEGREE

$10x^4 - x^3 + 16x^2 - 7x + 6 = y$ Solve for y = 0

This will factorise to $(ax^2+bx+c)(dx^2+ex+f)$ where ad = 10 and cf = 6
Let x =10 then y =100536 = $(2^3)(3)(59)(71)$ = (213)(472) being numbers whose first digits multiply to 10 and last digits to 6 as a possibility. Creating product terms from these numbers gives $(2x^2+x+3)(4x^2+7x+2)$. Replacing the 7 in the second term by -3 and adding 1 to the 4 gives $(2x^2+x+3)(5x^2-3x+2)$ as a solution that multiplies correctly.

$$10x^4-x^3+16x^2-7x+6=0 \quad \therefore \quad x=\frac{3\pm i\sqrt{31}}{10} \quad and \quad \frac{-1\pm i\sqrt{23}}{4}$$

A FIFTH DEGREE

$6x^5 - 5x^4 + 6x^3 - 22x^2 + 36x - 45 = y$
Solve for y = 0

Putting x =10 as before makes y = 55415 which factorises to (17)(123)(265)
where the linear term derived from the factor 17 could be 2x-3 = 20 -3.

We try $(2x - 3)(x^2 + 2x + 3)(2x^2 + 6x + 5)$ but since the coefficient of x^5 is 6 the last bracketed term should be $(3x^2 - 4x + 5)$ which multiplies correctly.
Solving the bracketed terms gives the results:

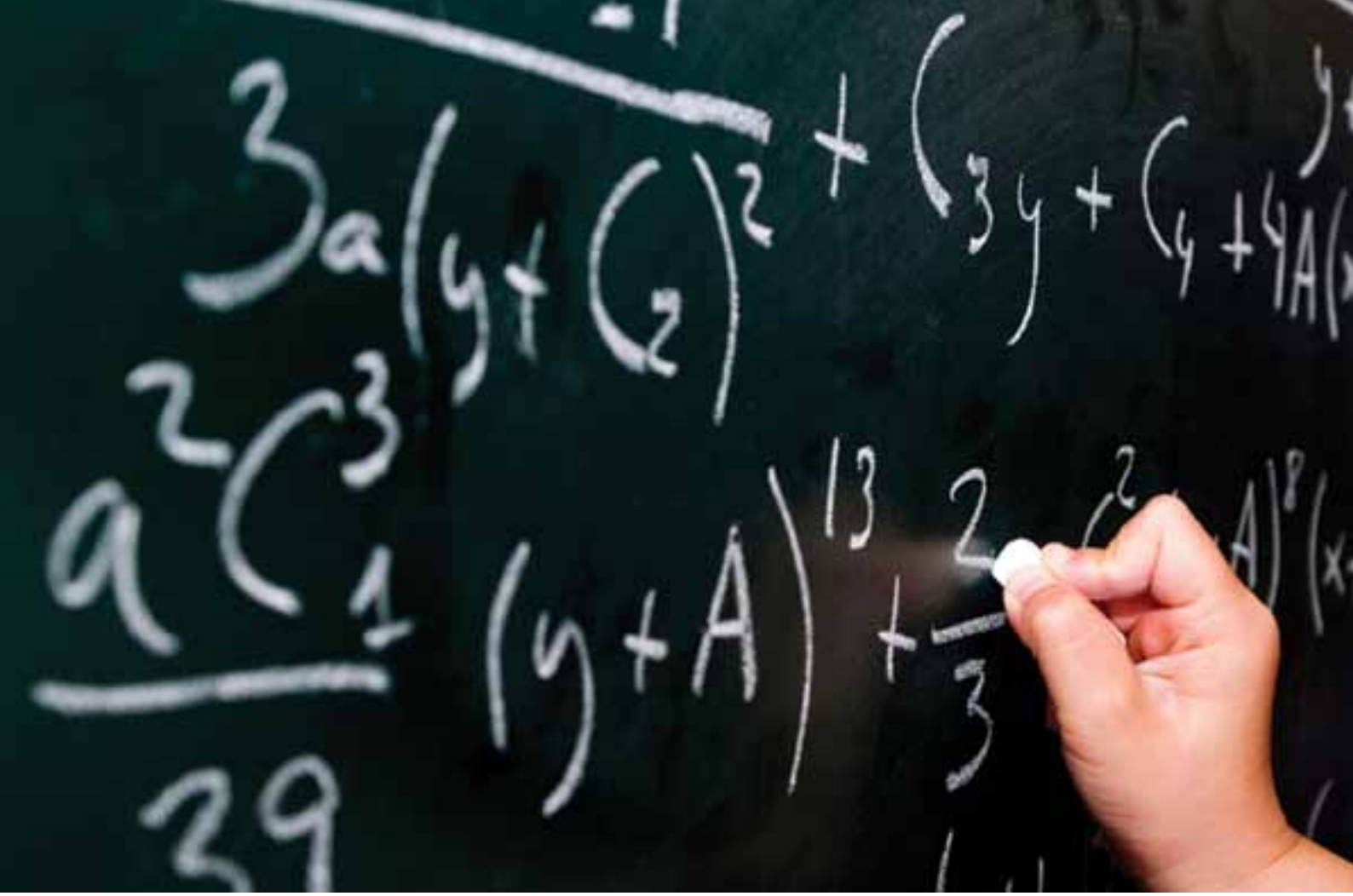
$$x=\frac{2\pm i\sqrt{11}}{3}:\ -1\pm i\sqrt{2}:\ \frac{3}{2}$$

A SIXTH DEGREE

$x6 + 5x^5 + 10x^4 - x^3 - 25x^2 - 36x - 14 = y$
Solve for y = 0

With x =10 y = 1596126 factorising to (89)(122)(147) leading to an equation in three quadratic terms.
$(x^2 - x - 1)(x^2 + 2x + 2)(x^2 + 4x + 7) = 0$
Solving these gives the six results:

$$x=\frac{1\pm\sqrt{5}}{2}:\ -1\pm i:\ -2\pm i\sqrt{3}$$



So far all polynomials have had integer coefficients. Consider now coefficients that are rational fractions. Example:

$2x^4 + 1.5x^3 - 13.75x^2 + 13x - 3 = y$

We try multiplying by 4 to eliminate the decimal fractions:

$8x^4 + 6x^3 - 55x^2 + 52x - 12 = 4y$

With x = 10 $4y = 81008$ $y = 20252 = (2^2)(61)(83) = (122)(166)$

$(122)(166) \rightarrow (100 + 25 - 3)(200 - 35 + 1) \rightarrow (x^2 + 2.5x - 3)(2x^2 - 3.5x + 1)$

Giving the results $x = \frac{-5 \pm \sqrt{73}}{4} : \frac{7 \pm \sqrt{17}}{8}$

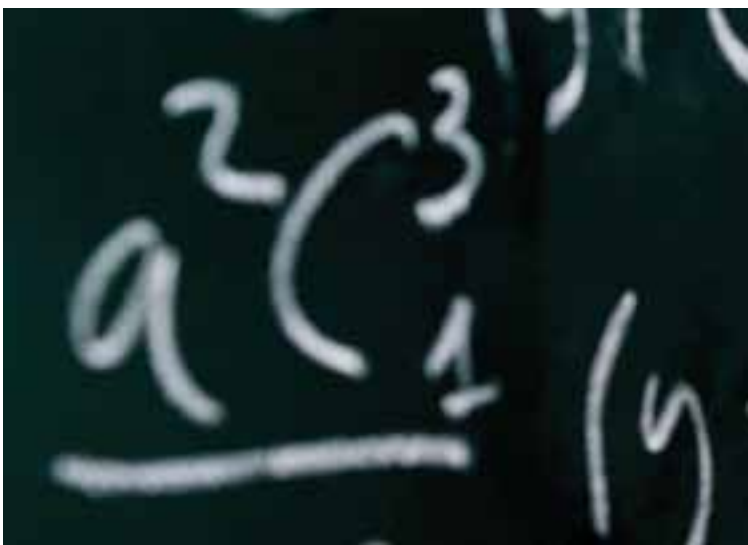
We must be prepared for the unfortunate fact that it does not work every time, as the following example will show.
This cubic was formed with randomly chosen coefficients:

$7x^3 - x^2 - 9x + 3 = y_1$ Solve for $y_1 = 0$

Putting x = 10 as before
$y_1 = 6813 = (9)(757) = (x - 1)(7x^2 + 5x + 7) =$
$(x-1)(7x^2 + 6x - 3)$

This solves to give the three results as x = 1: and $\frac{-3 \pm \sqrt{30}}{7}$

However if the cubic is changed to $7x^3 - 2x^2 + x + 3 = y_2$ where the coefficient of x has been increased by 10 and that of x^2 decreased by 1 giving the same sum for x =10 it becomes impossible to factorise in this way. The algebraic solution is very much more complex involving cube roots and trigonometric functions. WN



SA Engineers Concerned About Skill Shortage

The survey, of nearly 800 South African engineers, found that the confidence level of respondents on whether the current skills shortage in their profession will be adequately addressed by the government in the short to medium term was just 40%.

According to Gerhard Joubert, Head of Group Marketing and Stakeholder Relations at PPS, the financial services provider focused on graduate professionals, the results of the survey are alarming. "The skills shortage in South Africa across a number of critical professions has been widely discussed and initiatives have been put in place to address the issue so it is concerning that engineers do not believe that these will be sufficient."

Last year the Engineering Council of South Africa (ECSA) launched a national initiative to tackle the chronic shortage of engineering skills, in line with government's plan to develop 30 000 engineers by 2014 ECSA said currently one engineer services over 3 000 people in South Africa compared with 227 in Brazil and 543 in Malaysia.

One of the core concerns among engineers as to why the skills shortage remains difficult to resolve is on the standard of education in South Africa, with respondents giving a confidence level of just 41% on whether the current education system is providing the

One of the core concerns among engineers as to why the skills shortage remains difficult to resolve is on the standard of education in South Africa...

South Africa's engineering professionals remain very confident about the future of their profession, but one of the biggest concerns they face is the shortage of new skills, according to a quarterly survey conducted by PPS.

necessary skills for the creation of potential engineers.

Joubert says that while the survey reveals a number of challenges for the engineering profession, there was some positive news with engineers giving a confidence level of 84% on the future of their profession over the next five years.

On whether they would encourage their children to enter their profession, 74% of engineers surveyed said they would, the second highest figure among all seven professions surveyed.

"This survey suggests that while engineers do have a number of concerns about the future of their industry, in terms of whether they will be able to attract sufficient new graduates to keep up with demand; they remain extremely confident about the opportunities available to new entrants."

He notes that engineers also gave a confidence level of 76% on whether they will remain in South Africa for the foreseeable future. "This is a positive figure, as the majority of those surveyed are confident of remaining in the country. However, the fact that nearly a quarter are considering emigrating is a concern that needs to be addressed, particularly in light of the fact that the profession does face a shortage of skills. Joubert says other results on more general issues also suggest reasons as to why some engineers may be considering emigrating.

"Confidence on whether unemployment will improve over the next five years was just 41%, while confidence in the standard of education over the next five years was 44%.

Confidence in the future of the healthcare system over the next five years also scored badly with just 43%. 91% of respondents said they do not believe that the National Health Insurance initiative is the solution to fix the country's ailing health system.

"Engineers are a vital component to the South African economy and it is crucial that we take these results seriously to ensure we retain their key skills. As a result, it is important that Government looks at the issue of skills shortages and whether enough is being done to promote the profession among young South Africans," concludes Joubert.

OTHER RESULTS FROM THE SURVEY

- Confidence that the Government can deliver on its proposed infrastructure spend was 48%
- Confidence that the status of their profession will improve was 55%
- Confidence that their profession can maintain ethical business standards was 71%
- Confidence in their ability to earn an income that keeps up with inflation was 73%
- Confidence in the economic outlook for South Africa over the next 12 months was 62%
- Confidence in the outlook for local equity / share markets was 63%
- Confidence in crime rates improving over the next five years was 43% wn

Article courtesy of PPS. Visit www.pps.co.za for more information.

Surviving the skills shortage

Recruitment professionals in all industries are increasingly being called on to find people with specialised skills. But, industries like electrical are wracked by severe people shortages and the right skills can be hard to find.

BY | LYNN MALCOLM

According to industry recruitment specialist, Bev Campling, globalisation and an increasingly technology driven society has contributed to severe skills shortages. In addition, more international companies are operating on our shores and local companies are increasingly expanding across our borders taking valuable skills with them. Considering these factors, it is little wonder that company executives are placing a high emphasis on finding the right staff for their companies.

"Gone are the days when line-managers were assigned the task of employing their own staff and simply advertising positions in the local newspaper. A far more scientific approach is required by company executives these days and this service is being offered to the industry by just a handful of professional recruitment companies," Bev says.

PROFESSIONAL RECRUITERS

She continues that the advantage of using a professional third party recruitment specialist is the vast contact base at the disposal of the recruiter. This allows them to use their contacts to spread the word and contact individuals who are not necessarily in the job market or actively looking for jobs. It also means that companies need not only select from the pool of unemployed or unhappily employed jobseekers, but can find the right staff wherever they may be.

Other tools at the disposal of recruitment professionals include specialist websites that can be searched to find potential candidates, social media networks that can be used to provide powerful and immediate means to connect with candidates, as well as technology that enables background checks including work history validations and qualification checks.

THE RIGHT FIT

Personality profiling software is another weapon in the arsenal of the professional recruiter when it comes to finding the perfect fit for candidates and employers. These profiles give clients a good idea of the type of person they are looking at hiring with regard to personality, aptitude and attitude and whether the person can be expected to fit in to their work environment.

"When one considers that we offer our clients lengthy guarantees on all candidates placed, it is easy to see why we do such thorough work upfront before submitting candidates for the job. Although it may take a day or two longer than recruiting the old fashioned way, we find our customers appreciate the extra care and attention. "In this industry it has become a struggle to find and retain people with the right skills. It's a case of adapt or die and smart transport company executives have come to realise that finding and retaining good staff is one of the most important aspects of their businesses," Bev concludes.

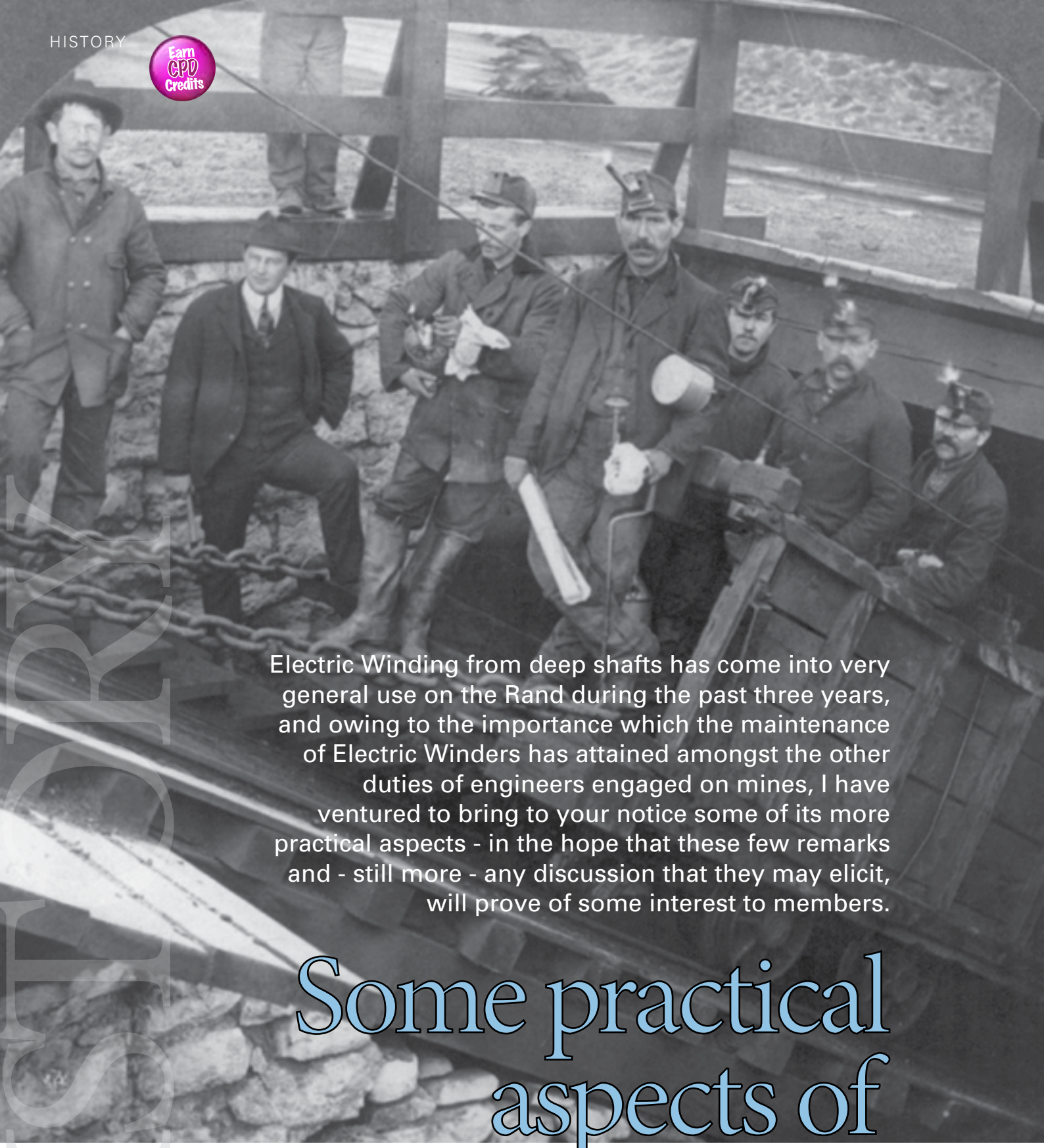
TIPS FOR MANAGERS

Herewith tips on recruiting staff effectively:

- Work with a professional recruitment company that is prepared to take the time to find good staff.
- Establish a relationship with a recruiter and work with them to shortlist candidates and find the right person
- Allow enough time to find the right candidate. The right person in a job will catch up a backlog in no time. The wrong one may never.
- A shotgun approach whereby many different recruitment companies are given the same job specification does not work
- Do not get tempted to take the first most suitable candidate. Rather employ a temp if needs be and wait for the right one.
- Offer market related earnings and be prepared to negotiate.
- Maintaining a motivated, happy workforce in order to retain good staff once you have found them. wn

Bev Campling
Bion Search and Selection

Earn CPD Credits



Electric Winding from deep shafts has come into very general use on the Rand during the past three years, and owing to the importance which the maintenance of Electric Winders has attained amongst the other duties of engineers engaged on mines, I have ventured to bring to your notice some of its more practical aspects - in the hope that these few remarks and - still more - any discussion that they may elicit, will prove of some interest to members.

Some practical aspects of Electric Winding

WRITTEN BY | E.T EWING M.I.E.E. (MEMBER)
COMPILED BY | ALAN MEYER

Firstly, with regard to costs.

By way of a practical example you have before you the total winding costs relating to a vertical shaft from which an average of 45,000 tons of rock per month are wound from one level, the depth of wind being 3,825 feet. In addition to rock, an average compliment of 900 men per shift, together with the tools, timber, material etc., pertaining to them have been handled. The shaft is served with two winders, one being of the Ward-Leonard type, and the other a plain three-phase machine, both of 1,400 h.p. rating.

Both engines handle rock, men and material daily, but in general the bulk of the rock winding is done by the three-phaser, while the men and materials are handled by the Ward-Leonard.

The comparative economy of the two types of engine has been very fully discussed in Mr Renner's recent paper, and the costs given below are not separated for the two types, but as the two engines are mechanically identical, it may be well to repeat some figures given in the earlier discussion referred to, viz., that the overall efficiencies during winding time only are 0.601 for the Ward-Leonard, and 0.512 for the three-phaser.

Safety devices may be divided into two classes, viz., those which provide against a failure of the power supply, and those which, as far as possible, render harmless mistakes on the part of the driver. The first class usually consists of a solenoid placed across the stator supply leads in the case of a three-phaser, or across the exciter bus bars in the case of a Ward-Leonard engine.

A considerable variety of the second class exists, and they are generally worked from, or in conjunction with, the over winding gear on the depth indicator. This may be of the dial form or more often consists of two vertical screws rotated by chains driven from the drum shaft. The position of two nuts on these screws indicates the position of the cages in the shaft. In the limiting position the travelling nuts release a trigger, the power is cut off, and the brakes applied.

Failure on the part of the driver to reduce speed when nearing the bank is taken care of in several ways. One very excellent device consists of a ball governor chain driven from the drum shaft, which throws forward a catch to engage the upcoming nut on the depth indicator screw, which represents the rising cage.

Figures for steam winding costs, which are strictly comparable with some known electric winding costs, are naturally very difficult to obtain. Further, as the general trend of engineering opinion on the Rand seems to be in favour of electric winding, such comparative figures do not possess the interest that they would have had a few years ago when the case for electric winding was being put together by its advocates. It is safe to say that such costs as engine repairs, maintenance, drivers' and cleaners' wages, and stores, are not very different in two cases, but that in the first and last items under any ordinary conditions a slight advantage is to be conceded to the electric winder. The question, however, really turns on whether the total boiler house costs can be brought down to such a low point that the required quantity of steam can be supplied to the engines at a less cost than that of purchased electric power.

SIX MONTHS' WINDING COSTS AT ONE SHAFT

Depth of wind	3,825ft
No. of Trips (Material)	3,186
No of tons hoisted	260,727
Total no. of Trips	79,558
No. of Trips (Men)	28,050
Total Cost per Trip	30.76d

Total Costs	£			Pence/Ton
Cost of Purchased Power	4,317	3	8	3.973
Engine Drivers' Wages	1,238	12	6	1.139
Banksmen, Onsetters Wages	853	12	4	0.786
Native Wages	961	1	7	0.885
Repairs & Maintenance	996	3	5	0.917
Stores	2271	14	5	0.249
Rope Renewals	1,560	0	0	1.436

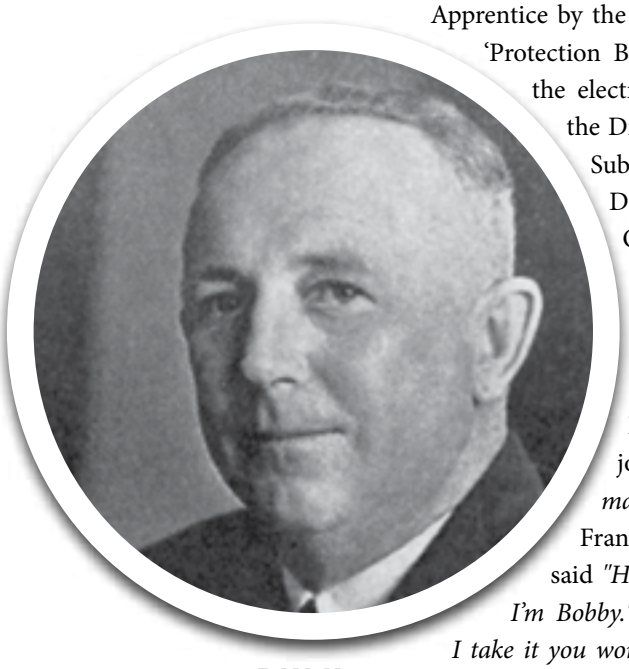
Total Cost as above per Ton Hoisted, 9.39d.

Reminiscenses of the Legendary Bobby Kane, Johannesburg City Electrical Engineer

AS RECALLED BY JOHN DAVIES
CONSUMERS ENGINEER FOR 15 YEARS

He was a really a 'Down to Earth' person, very friendly, and very 'practical' and he had a terrific sense of humor... He had 'come up' the hard way, starting as an Apprentice with "The Department", shortly after the time of Noah and "The Flood"!

Bobby Kane was the City Electrical Engineer when I first came to the Department during the 1960's.



R.W. Kane
1956 SAIEE President

FRANK'S BIG BOOB WITH THE CITY ELECTRICAL ENGINEER!

As I stated above, Bobby Kane had one hell of a sense of humour. This is clearly illustrated in the following story… There was an Apprentice by the name of Frank working in 'Protection Branch' which maintains all the electrical protection devices on the Distribution Reticulation and Sub-Stations etc: as well as the Departmental Telephones. One day, Frank was driving back from 'up town', when Bobby Kane knocked on his van window and asked if he was going back to 'The Department'. Frank (a very jovial young chap) said *"Sure mate, hop in!"* When seated, Frank stuck out his hand and said *"Hi! I'm Frank"*. B.K. said *"Hi! I'm Bobby." "Nice to meet you Bobby, I take it you work at the Department?"* said Frank. *"Oh Yes"* said B.K. *"Been there long?"* asked Frank. *"Oh yes"* said B.K. *"I served my time with the Department, just like you are doing"*, to which Frank replied: *"Gee, that must have been a long time ago! I bet you are quite high up in the Department by now?!" "Oh yes"* said B.K. *"Quite high up"*.

As they were passing 'Surtey's, a clothing store, Frank stopped the van (double parked!) and said, *"I just want to pop in here and pick up a parcel. I shan't be long Bobby… If the cops come along just toot the horn!"* So there was the City Electrical Engineer of Johannesburg stuck illegally parked in one of his own vehicles in the middle of the City of Johannesburg!

Frank was soon back, however, hopped into the van *"Any trouble Bobby?" "No, none at all"* said Bobby. When they got back to The Department, Frank dropped B.K. off in the yard. *"Cheerio Bobby"* said Frank, sticking out his hand... *"Nice meeting you Bobby", "Cheerio Frank"* said B.K., *"Thanks for the lift"*.

The scene now changes to a few weeks later… Gerry Dawes, the head of Frank's Department says to Frank *"Put your jacket on Frank, and go to the City Electrical Engineer's office, his Departmental Telephone is giving trouble so bring it back here"*. So off Frank goes to the wall-to-wall carpeted Management Suite, and knocks on the door of the 'The Holy of Holies', (his knees also knocking!!)... *"Come in"* says a voice from inside. When Frank enters B.K. looks up from his large mahogany desk, sees

Some practical aspects of Electric Winding

continues from pg 47

Electric winders are as a rule fitted with more automatic safeguards than steam winders, and inherently these safeguards may be said to be simple and very reliable. The main point is to be quite certain of their reliability at all times, and with this object any devices of this nature should be operated daily as part of the routine examination.

While on this subject, one is compelled to deplore the misguided ingenuity which leads designers to pack automatic relays, field resistances, and gear of this nature, the daily care and examination of which is highly important, into the smallest possible space inside an iron case. Inaccessibility for inspection is a fertile source of trouble in electrical as well as in organic machinery.

The design of a suitable winch for these auxiliary haulages does not present any serious difficulties, but the cost of installing and maintaining cables to serve them is a more important matter. A few years ago this would have seemed outside the range of practicability on the score of costs, but when one regards the fact that a complete system of tracks, air mains and water mains, with numerous branches, are now taken into every stope face, and maintained and extended with the changing outline and that these operations involve a large underground staff of pipe fitters etc. with well equipped and lighted shops, it seems that the change from air to electric haulage in the stopes is a natural one, and that the wide margin of economy available is well able to carry the extra cost of cabling.

The question really turns on the cost, reliability and simplicity of the cabling system to be adopted.

The flat mines to which reference is made, are in many respects similar to coal mines in their general working methods, and it's understood that excellent apparatus and methods have been evolved for supplying electric coal cutters in the coal mines of other countries, and the safety of the unskilled worker is very carefully provided for.

Amongst our many members there may well be some special experience of this class of work available, and I would venture to suggest that information on this topic would be of very general interest at the present time. wn

© Excerpt from The Transactions, | The South African Institute of Electrical Engineers | Vol III – Part 5 | June – September 1912.

Reminiscenses of the Legendary Bobby Kane, Johannesburg City Electrical Engineer

continues from pg 48

Frank, and, with a broad grin splitting his face, wiggles his fingers in a wave and says *"HI! FRANK!!!"*

A sequel to this, a few months later, at a very important meeting of all the Country's City Electrical Engineers in our Board Room and, being the host, B.K was in 'The Chair'. I had been called in as Minute Secretary, so I sat next to him. At the end of the meeting I whispered to him *"Tell them about FRANK"* (I knew that he would really enjoy doing this)… So with a few embellishments he did so, and brought the roof down!!!!

THE COCKTAIL PARTY AND BOBBY KANE: OUR "BIG SECRET" !!

One of the City Council's largest Electric Cable suppliers was giving a Cocktail Party one day during working hours and I had wangled myself an invitation. As I rounded a corner, who should I bump into, head on, with no escape, but Bobby Kane!! We had both "Sneaked Away", and as he passed me, he poked me in the ribs, gave me a cheeky grin and a 'conspiratorially-wink', as if to say *"Keep It a Secret… Don't you split on me, and I won't split on you!!!!"*

BOBBY KANE'S METEORITE

In the head office Canteen, there was no "Apartheid' and one could find oneself in the food queue standing next to one of the 'The Big Nobs'. One day I was standing next to Bobby Kane and he said *"Well, young man, what are you doing in your spare time these days? "* So I told him about my digging a swimming pool out of hard rock! A few weeks later I came across a funny looking stone that looked as if had been subject to great heat and I thought that it might have been a piece of a meteorite. The next time I was next to B.K. in the food queue I showed him this little piece of stone, knowing that he was an authority on rocks and minerals. He laughed *"Good heavens no! That's a piece of common Klipfontein Organic Rock"* (or something sounding like that, anyway). *"Lots of it knocking about"* he said. So that was that!

A few days later, my intercom rings - *"Kane here, come to my office will you?"* As I was on my way to his office, I was trying to think of anything that I had done wrong recently that would upset the Top Management, it must be something pretty awful I'd done to be summoned by the City Electrical Engineer himself! ! When I eventually find myself sitting in front of his huge mahogany desk, he leans down and opens a drawer, sticks in his hand and plonks something under my nose. *"Now THAT!"* he says *"IS a meteorite!!!!"* It was, incidentally, about the size of a packet of cigarettes but it felt as heavy as a Double- Decker bus!

He opened another drawer and showed me a book on rocks and minerals. *"If you're interested,"* he said, *"perhaps you'd like to borrow this and glance through it?"* This was the sort of man he was... all folks were his equal, no social divisions whatsoever. What a man!!!!

PLAYING SNOW BALLS

During one very severe winter there was a very heavy fall of snow that laid several inches deep on the ground. When I entered the yard there was a snow-ball fight in progress. Need I say it … Bobby Kane was one of the main participants, thoroughly enjoying himself!!!

BOBBY KANE'S HOME WORKSHOP

On one occasion I had to visit Bobby at his home, which was near the Wanders Cricket Grounds. It was in a time when only the City Electrical Engineer could sign certain important Contract Documents anf Bobby was on leave. This was no rushed affair and I was invited and accepted to share a cup of coffee with him. Afterwards he said, *"The Electricity Department can wait, come and look at my Workshop"*. So this we did, and for the next half hour he demonstrated his gemstone cutting and polishing machines… A man of many talents.

CONCLUSION

As I said at the start… What a man. The above are only a few things that I remember. There are surely lots more stories that can be told about this remarkable man. I wonder if any of your other readers can recall any of them? wn

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Looking Back On My Apprentice Days

After matriculating in the Philippolis High School in 1947, I started working as an apprentice electrician on the then S.A.R & H (South African Railways & Harbours) in Bloemfontein.

BY | BOKKIE BOSHOFF **|** PR.ENG (RET)

In those days an apprenticeship, at least on the Railways, was 5 years after which you were an artisan. No trade test was necessary and there was no option of a trade test to qualify in a shorter time. I started working for 7 pennies *(just more than 5.8 cents)* per hour. I stayed in the railway hostel for which I paid something more than £4 *(about R9)* per month which was deducted from my wages before it was paid to me. There was a store room behind our workshop which also served as a pay office. At the end of each month we queued in front of a small window in this store room where our pay was counted out on a counter where everybody near enough could see what you received. At the end of my first month, I received £4-10sj. and a few pennies *(just more than R9)* while I used to earn between £5 and £6 per month as a school boy *(I never received pocket money but worked for what I had)*.

I was assigned to an Electrician with whom I worked and who taught me the trade and every six months I was assigned to a different electrician in another section so that I could get conversant with the full spectrum of the trade.

During my apprenticeship, I also spent 6 months in the drawing office and 6 months in the electrical test and research laboratory. During which period I, inter alia, assisted in the commissioning tests of the first substations at the newly built Jan Smuts Airport. I remember that there was a standby plant at one of these substations to supply the landing lights, control tower etc. in the event of a power failure. This standby plant was driven by a diesel engine, a cylinder of which was connected to a compressed air cylinder via a valve. This was kept in the closed position by means of a lever with a weight on the end which was supported by a no-volt coil. In the event of a power failure the weight was dropped, opening the valve and letting compressed air into the diesel to turn and start the engine. This very modern installation was supposed to ensure the full load of the emergency circuits to be on within something like 5 minutes after the power went off. Imagine such a "sophisticated" installation to be considered acceptable nowadays.

I also had to attend classes one day per week at the technical college, I was started with NTC 111 since I was in possession of a matric certificate with mathematics. This enabled me to obtain my National Engineering Diploma by the time I completed my apprenticeship.

Shortly after completion of my apprenticeship I was appointed as laboratory assistant in the test and research laboratory in Langlaagte, Johannesburg. We worked all over the country, travelling by train to wherever something had to be tested or some unusual problem on any electrical equipment had to be investigated and attended to.

This, to me, was an extremely interesting and rewarding work, and a valuable experience. Since I grew up in a house where we seldom went on leave and then only to nearby places, I also enjoyed the travelling. After about 2 years, being away from home so often, it became too much for a young married man. I resigned and moved into the municipal sector where I attained my Government Certificate of Competency.

I worked approximately 3 years each in Welkom and Ceres Municipalities and then moved to Vanderbijlpark Municipality where I spent the next 29 years of my working life, first as deputy and the last 11 years as town electrical engineer, until my retirement at the end of 1990. I have never been ashamed to say that I started as a Railway appie. On the contrary, I have always been very grateful for the training and opportunities I received there. wn

You said...

Dear Editor,
We have published a book titled "The Consumer Protection Act made easy" which is now in its 2nd edition.
This is a book that every company must have and we would like to ask if you would be interested in letting your members know about it?
The book currently sells for R180 in bookstores, but we are offering it for R50 per copy for orders of 10 or more.
Kind regards
Lily Melville
L&N Events | Tel: 012-8071379

ED - Thank you for your letter and for offering our members this great special - if any one are intrested, they will contact you directly.

Dear Minx

Whilst looking for something entirely different on my computer, I stumbled across this a copy of the Minutes of the 1966 Annual General Meeting of the A.S.E.E.(S.A.) that substantiates the establishment of the 1965 Electra Exhibition at Milner Park, the birth of the Rand Easter Show. This is truly a historic document.

It also mentions a lot of 'Old Timers' who were well known in the Electrical World at that time... I wonder how many of them are still alive and kicking like me today?

Incidentally, for those who do not know this... The ASEE (S.A.) became the SAIETE namely, The South Africa Institute of Tecnician Engineers, (I was President 1978/79)... it was then finally absorbed into the SAIEE in the early 2000's.

Kind Regards
John Davies.

ED - Thank you for your letter and some interesting facts Mr Davies. Let's hope the 'Old Timers' will reply to your letter. wn

Send your letters, compliments, complaints, opinions to minx@saiee.org.za

Jokes

"Hello, Bob? It's your father again. I have another question about my new computer. Can I tape a movie from cable TV then fax it from my VCR to my CD-ROM then E-mail it to my brother's cellular phone so he can make a copy on his neighbor's camcorder?"

HEARING AID

An elderly gentleman who was nearly stone deaf, had the latest state-of-the-art hearing aid fitted, which allowed him to have his hearing 100% restored. After 6 months he went back to his doctor for a check-up, and the doctor said: "Your hearing is absolutely perfect, your family must be really pleased that you can hear again?" The gentleman replied, "Oh no, I haven't told them yet. I just sit around and listen to their conversations ... I've changed my will four times!"

COMPLAINTS

A lady complained of foul language used by Municipal Electricians working outside her house, and the City Electrical Engineer demanded a 'Written Report' from the workmen concerned. The Report read as follows:-

a. Murphy was up the ladder pouring hot molten lead over an electrical joint at the top of an electricity pole.
b. Paddy was steadying the ladder at the bottom of the pole.
c. Accidentally, Murphy spilt some of the hot molten lead out of his ladle and it went down the back of Paddy's neck.
d. Whereupon Paddy looked up and said: "Please be a bit more careful Murphy!"

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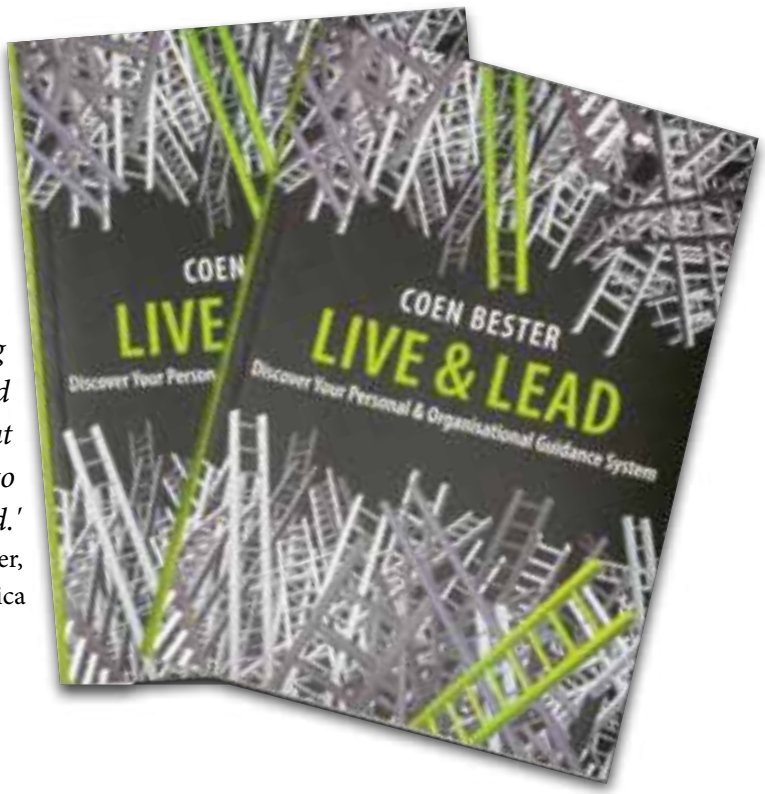

'Coen started his first company at a young age and through applying the principles described in this book mentored and nurtured his staff to build a successful company. His approach is practical, implementable and logical. It is all about being positive, doing the right things, living your values and working on your strengths. This book confirms that there is a bright future for anyone who is prepared to learn and be guided.'

Alien Swiegers, Chief Operating Officer,
Deloitte Southern Africa

Please don't put this book down if you think that it may not be for you because you don't think of yourself as a leader. The one thing that keeps people from becoming better at leadership is this exact belief. You may simply have not bought into or accepted this idea yet. For some undiscovered reason, we so easily accept the leadership of others, but don't really buy into our own. Hang on to the book; I will convince you otherwise.

On the other hand, if you do see yourself as leader, I humbly invite you to consider an approach to leadership that could be of value in assisting you to develop your own personal philosophy of leadership. Unless your leadership is grounded in your own authentic leadership beliefs, you will remain vulnerable to the curved balls that the world throws at leaders. We cannot afford to lose one more leader to the challenges posed by uncertainty, hopelessness, greed, power and sex.

An investment in leadership is an investment in yourself. So whatever you decide you are, read this for your own sake. Life is short; we should not allow a single day to go by without having had, or having brought joy.

About the Author

Coen Bester spends most of his life in fast-growing business; either as angel investor, mentor or non-executive. He has successfully founded, grown and exited his own business along the way. His passion is the mentoring of next-generation leaders and he has spent the last ten years researching and consulting in this field. His academic career includes two engineering degrees and one business degree.

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13-14	Finance Essentials for Engineers	Tony Lydall	2

DURBAN

Athlone Room, Durban Country Club, Durban

DATE	COURSE	PRESENTER	CPD
AUGUST			
13-14	Finance Essentials for Engineers	Tony Lydall	2
OCTOBER			
22-23	Presentation Skills for Engineers	Michelle Haffner	2

JOHANNESBURG

DATE	COURSE	PRESENTER	CPD
AUGUST			
7	Electric Power Cable Tutorial	Dick Hardie	1
14-15	Presentation Skills For Engineers	Michelle Haffner	2
22-23	LV Variable Frequency Controls	Chris Conroy	2
29-30	Integrated Industrial Thought	Dr Roger Silberberg	2
SEPTEMBER			
11-12	Electromagnetism – Transformers	Viv Cohen	2
18-19	Finance Essentials For Engineers	Tony Lydall	2
26-27	Microsoft Excel	Jade Scott	2
OCTOBER			
10-11	Technical Report Writing	Malcolm Haffner	2
18	Electric Power Cable Tutorial	Dick Hardie	1
23-25	Power Systems Harmonics	Prof Piet Swart	3

SAIEE

REVIVE
Electrical Transformers

Specialists in Design, Manufacture, Repairs and Servicing of Transformers and Mini Substations

Revive Electrical Transformers is a leading transformer manufacturer and repair company in South Africa and is known for its **High Quality, Cost Effective & Low Loss** transformer designs

Scope of work and range of products:

- Distribution Transformers from 16KVA to 2.5MVA
- Substation Auxiliary Transformers of various ratings
- Mini Substations of various ratings and specifications
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- Combined Neutral Earthing Resistors and Compensators with Auxiliary Transformer (NECRT)
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All transformers are **Fully Compliant** to the following standards & Specifications:

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- International: ISO 9001, ISO 14001 OHSAS 18001, IEC 60076

Accreditations held at Revive Electrical Transformers:

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- OSHAS 18001:2007 – Health & Safety (MOODY International)
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- Member of the South African Institute of Electrical Engineering (SAIEE)
- Member of Alberton Chamber of Commerce
- Member of Engineering Council of South Africa (ECSA)
- CIDB level 6EE
- SABS & Eskom Approved Manufacturer of Distribution Transformers in South Africa





Contact Details:

20 Linroy Street, Steeledale, Johannesburg, South Africa

Tel: +27 11 613 1508 / +27 11 613 1533 — **Fax:** +27 11 613 1510 — **Email:** revive@global.co.za — **Web:** www.ret.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 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 for Members, and between R1027 and R1113 for Senior members depending on age. Most of this will be recovered through the ECSA discount.
- SAIEE members receive 11 issues of the **watt**now 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 comfirmed 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 fees

Rates as from 1st January 2012

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.

18A Gill Street | Observatory |T 011 487 3003 |F 011 487 3002
www.saiee.org.za

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

Calendar of events

AUGUST 2012

2-3	Customer Experience Management Africa Summit	15 on Orange Hotel, Cape Town	www.kineticevents.net
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

3-6	Hydro Power Africa Conference and Exhibition	International Convention Centre, Cape Town	www.hydropowerafrica.com
3-6	Solar Energy Africa World 2012	International Convention Centre, Cape Town	www.spintelligent.co.za
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
28	SAIEE Annual Golf Day	Royal Johannesburg & Kensington Golf Club	geyerg@saiee.org.za

OCTOBER 2012

2-3	MVNO's Industry Summit	Southern Sun Hotel, Cape Town	africa.mvnoindustrysummit.com
8-9	2nd Annual Smart Grid And Smart Meter Summit	Abu Dhabi, UAE	www.fleminggulf.com
16-18	Broadband World Forum 2012	Amsterdam, Netherlands	www.broadbandworldforum.com
19	SAIEE Annual Banquet	Wanderers Club, Illovo, Johannesburg	www.saiee.org.za
23-25	Africa Electricity 2012	Gallagher Convention Centre, Johannesburg	www.africaelectricity.com
28-30	Retirement Expo	Coca-Cola Dome, Johannesburg	www.retirementexpo.co.za

NOVEMBER 2012

6-8	Power-Gen Africa	Sandton Convention Centre, Johannesburg	www.powergenafrica.com
22	SAIEE National Student Project Competition	University of Stellenbosch	www.saiee.org.za
23-25	The Green Expo	International Convention Centre, Cape Town	www.thegreenexpo.co.za
28-30	Solar & Energy Saving Products China Sourcing Fair	Gallagher Convention Centre, Johannesburg	www.tradeshow.globalsources.com

JANUARY 2013

24-25	SAIEE Renewable Energy Conference	SAIEE House, Observatory, Johannesburg	www.saiee.org.za

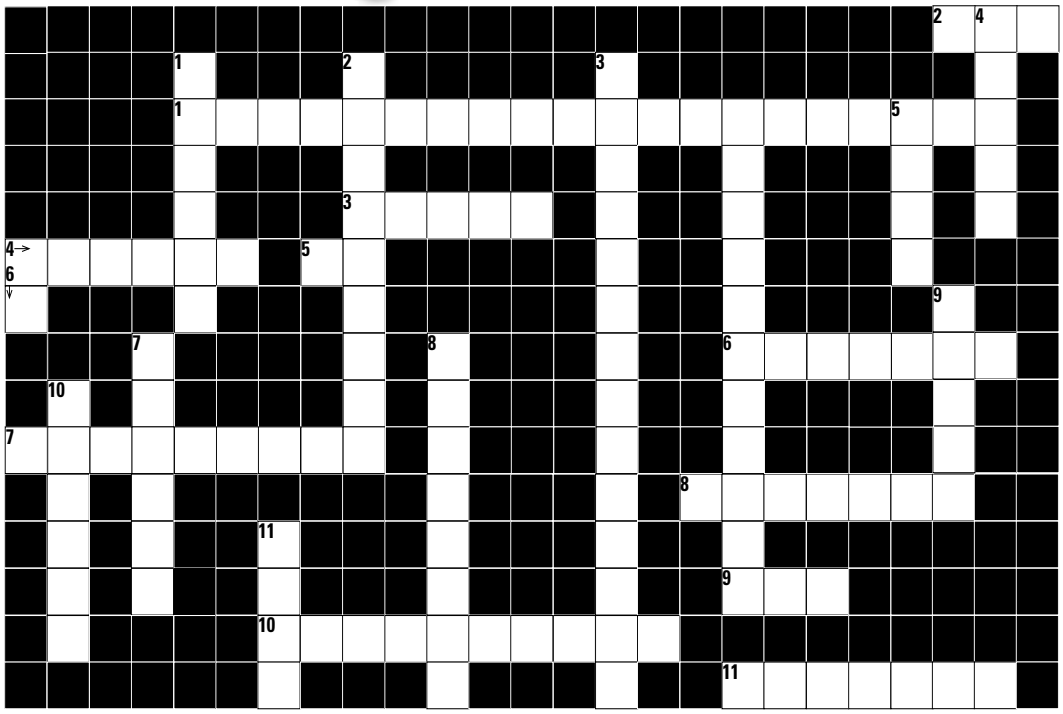
Have some fun and stand a chance to win R1000. Complete the July issue crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, July Crossword Puzzle, P.O. Box 751253, Gardenview, 2047* or email it to *minx@saiee.org.za*. The completed crossword puzzle should reach us by no later than **31 August 2012**. The winner of R1000 will be announced in the September issue of the **watt**now magazine.

win R1000

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

ACROSS

1. An image or idea that is owned and retained by legal control. (12,8)
2. Arithmetic Logic Unit, abbr. (3)
3. Each dot in a bitmapped image that represents a colour or shade. (5)
4. Non-printable horizontal and vertical lines to aid in the position or selection. (6)
5. Megabyte, abbr. (2)
6. The creator of the very first Personal Computer. (2,7)
7. An irreversible process that combines all layers and reduces the file size. (10)
8. A series of dotted lines indicating a selected area that can be edited. (7)
9. The name of the first computer virus. (3,5)
10. The default colour of this is white. (10)
11. Who is the creator of the first computer virus? (4,7)



DOWN

1. Commands that can be significantly alter an image's appearance. (6)
2. Temporary storage area providing by your operating system. (9)
3. A bitmap object. (11)
4. A selection within in an image on which objects can be stored and manipulated independantly. (5)
5. See 11 Across.
6. Gigabyte, abbr. (2)
7. A geometeic arrangement of different colour dots on a rectangualr grid. (6)
8. Action of removing the effect pf a fringe or halo from an image. (8)
9. Who is the creator of the Apple Computer? (5,6)
10. See 9 Across.
11. See 9 Down.

CONGRATS

May issue Crossword Winner: Andrzej Dabrowski from Pretoria

ACROSS 1 Facebook **2** Worldwide Web **3** Ethernet **4** Cloud Computing **5** ADSL **6** Arpanet **7** Al Gore **8** Kline **9** Satellites **10** Timothy Berners-Lee

DOWN 1 Six Degrees.com **2** HTTP **3** Charley **4** TCP **5** Emoticons **6** Fibre Optic **7** IANA **8** FTP **9** IP Address **10** Ray Tomlinson

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. **watt**now 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 **watt**now magazine. 7. Closing date for entry is 31 August 2012. 8. The winner will be announced in the September issue of the **watt**now magazine. 9. The Managing Editor's decision is final and no correspondence will be entered into.

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