

# wattnow

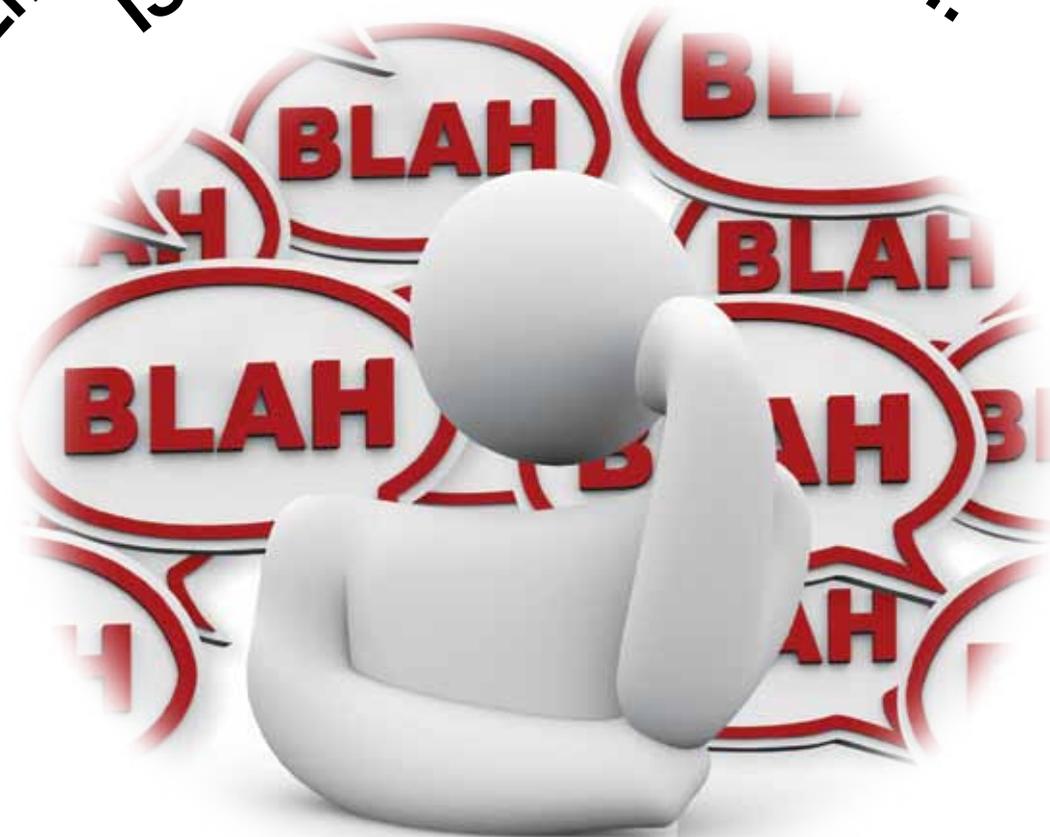


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THE OFFICIAL MOUTHPIECE OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | NOVEMBER 2011

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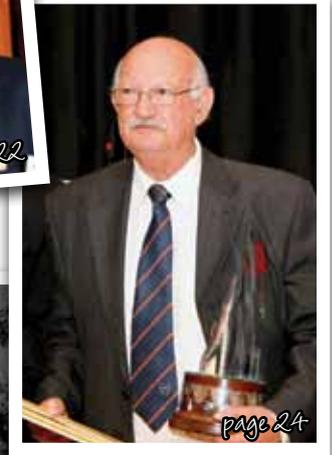
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of Circulations

FROM THE EDITOR'S DESK | MINX AVRABOS



May I present to you your freshly redesigned issue of the **wattnow** magazine.

This issue is packed with informative articles, current news and events and, the cherry on the proverbial cake, is that we even sport a crossword (pg 65).

This November issue features SAIEE's new head office. We take you through every step, from breaking ground to the official opening of the building on pg 32.

I was honoured to be a guest at this year's Annual SAIEE Banquet and was enthralled to rub shoulders with some of the remarkable achievers like Dr. Michael Grant, Lt. Col Bill Bergmann and Prof. Ian Jandrell in the room. Read more on page 24.

The January issue of **wattnow** will be sent off in the second week of that month, working toward the goal of having members receive their subscription at the beginning of each month. It is for this reason that we've decided not to print a December issue.

I have been advised by the Publication's Committee that we will award 5 prizes at the 2012 Annual SAIEE Banquet for the 5 best written articles published in the **wattnow** magazine. Therefore, I urge you, sharpen your pencils, do your finger excersises and start typing. Get your articles to me. The article deadline for the February issue is 7 December 2011.

I trust you will enjoy this issue of the **wattnow** magazine. Please send me any complaints, compliments or advice. Remember, this magazine cannot improve its content unless you as a SAIEE member participate in submitting articles and/or content.

I would like to take this opportunity to wish every SAIEE member a blessed festive season and a successful 2012. Travel safely.

Until next time, enjoy the read.



Visit [www.wattnow.co.za](http://www.wattnow.co.za) to answer the questions related to these articles to earn your CPD points.

Welcome to this first issue of **wattnow** magazine that is wholly produced and published by the SAIEE. In one way it is the fulfilment of a vision that started some years ago. In another it is the first step in a longer process towards the SAIEE serving its members and the community at large, originating and publishing useful and relevant technical books, magazines and handbooks in the future.

The SAIEE has always recognised the need to communicate to its members and has used various publications to achieve this. One of the first was the SAIEE Transactions which apart from recording the minutes of the various meetings, also documented the technical papers that were presented at monthly meetings from 1910. This, as well as the original “Red Book” 1st Edition 1940, and the “Blue Book” Edition 2 - 1951 of “Standard Regulations for the Wiring of Premises” were published by SAIEE at Kelvin House. When the Institute moved from Kelvin House to Observatory, its publisher Kelvin Publications became dormant for various reasons. Over the years the Transactions changed to become a vehicle to publish peer reviewed technical papers only and a more accessible magazine was created in addition to the ‘Transactions’ called Elektron, published by an outside company.



Some years ago, the SAIEE Transactions became the Africa Research Journal, to give it a broader base and is the only peer reviewed Southern African journal in the electrical profession. The SAIEE has edited and published this journal since 2006, and under the focussed attention of managing editor, Prof. Saurab Sinha and Editor in Chief Prof. Beatrys Lacquet it has grown from strength to strength.

We continuously see the rapid changes in technology happening around us. We live in a technologically driven world. However, behind this marvellous technology lies incredible complexity that requires a special competence. There is a recognised shortage of competent technical people worldwide and especially in South Africa. It is technology that enables economic growth and new businesses to be established and thrive. More importantly however it is also technology that can address social problems, enabling better medical service, education, communications and much more.

**wattnow** grew out of the perceived need to address an audience in addition to the SAIEE members. This audience being particularly the younger generation with a view to excite and attract them into a technical career path.

With the help of Crown Publications, **wattnow** came into being and went through several iterations to become what it is today. The goal has always been to produce a magazine that the members, their families and others look forward to receiving and reading. After the unwavering and above-and-beyond support of Crown Publications MD, Jenny Warwick, and her staff for almost 5 years, we have mutually decided that it is now time that the SAIEE take over the publication of **wattnow** and place it into our own company, SAIEE Publications (Pty.) Ltd.

The SAIEE has around 5500 members - engineers, technicians and technologists – the ‘Engineering Team’. This membership has vast and competent experience across all of the many facets of Electrical Engineering. Spreading this deep knowledge and experience as widely as possible is one purpose of SAIEE Publications via the Africa Research Journal and **wattnow** vehicles.

So here is this issue of **wattnow** published under the guidance of managing editor, Mrs. Minx Avrabos. It contains a broad expose of our newly opened building in Observatory, SAIEE House as well as several articles written by SAIEE members. It also contains the continuing professional development points scheme that caters for those members that live far from the large metro areas and helps them to earn the necessary CPD points necessary to maintain their professional status.

Read and enjoy this issue. Write to us with your ideas, complaints and other constructive feedback so that we can improve **wattnows** value to the entire Engineering Team and related community.

Viv Crone

ADDRESS BY THE MINISTER OF SCIENCE AND TECHNOLOGY, NALEDI PANDOR,  
AT THE OPENING OF THE NEW SA INSTITUTE OF ELECTRICAL ENGINEERS  
BUILDING, 6 OCTOBER 2011, OBSERVATORY, JOHANNESBURG



Programme Director; Andries Tshabalala: President of SAIEE, past presidents and business leaders, Distinguished guests; Ladies and Gentlemen:

Two years ago I had the pleasure of speaking at the Institute's centenary event.

At that time I was also taken on a tour of your premises, and I was impressed by your museum and your technical library. A library and a museum are visible signs of longevity, but here you are today moving into a new building and this can only be a sign of growth.

You need more 'tailored' space to cater to the activities of your 5,000 members. You chose not to move but to remain close to your roots. Your decision to remain here helps to maintain a science and technology hub that includes the Johannesburg Observatory.

Both Science and Technology and Higher Education and Training fund the training of engineers at our universities. Some engineering students, particularly those at universities of technology, struggle to complete their studies due to lack of workplace placement for the compulsory experiential training.

As a result, Science and Technology has started an initiative that assists university of technology students with placements for experiential learning.

We have partnered with non-profit organizations and managed to find experiential learning places for about 90 engineering students between February 2010 and now. Currently, there are only about 12 engineering organizations that are providing workplace experiential training.

More organizations need to offer workplace training, and I urge members of the South African Institute of Electrical Engineers to consider supporting this initiative by hosting students. Waiting for the decision on whether we have won the bid to host SKA in a number of months, let me say that the work that members of the Institute do in their various professional lives is very important for the development of space science and technology.

While I am confident that South Africa will succeed in its bid to host the Square Kilometre Array, I take courage from the contribution your members have made to our endeavors. I think in particular of Professor David B Davidson's work. He is a South African Research Chair in Electromagnetics for the Square Kilometre Array at the University of Stellenbosch. His contribution to the development of human resources in engineering electromagnetics is just what we need to prepare to host the Square Kilometre Array.

I wish the Institute and its membership well with its new building.

*Naledi Pandor*



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ACTOM



Dear valued member and advertiser, I am delighted to welcome you to the first edition of WATTnow published under the auspices of the SAIEE. Equally I am delighted to introduce you to our newly appointed Managing Editor, Minx Avrabos, who joined the Innes House Team in August 2011.

Our membership is growing annually by approximately 4% and we will be distributing this interest journal to approximately 6000 members in 2012, most of whom reside and work in Southern Africa and of these, 600 are members abroad. We have a vast responsibility to our members and this magazine is the main link of communication. So please use this mouthpiece to give the SAIEE your support in the way of feedback, advertorial support, of your time and expertise in providing articles of interest from your neck of the woods. Equally, it is our intention to provide our members with quality professional information and the convenient facility for registered engineer members to acquire Continuous Professional Development credits when renewing their registration with ECSA.

I am exceedingly pleased with the growth and development of our more than 100 year old Institute over the last few years and you will be able to glean this progress from reading this first edition published by the SAIEE Publications Company.

The tremendous efforts by many of our volunteer members and staff over the last 4 years, and more recently, over the last 12 months by the Building Committee, Professional team and contractors, in realising the new building, SAIEE HOUSE, has been very satisfying and I know I speak for Council and all our members. I would like to extend my sincere gratitude to everyone for the part they played in bringing this dream of a new head office to facilitate the growth and outreach of our noble Institute into the next millennium.

SAIEE HOUSE becomes our new Head Office and we look forward to even greater things to come when the whole Observatory site zoned "institutional" is developed to become the prime site for the advancement of science and technology in the South Africa. The aims and objectives of SAASTA and the SAIEE are very similar and together we will exploit and maximize the synergy between the two entities occupying this prestigious site - all to the benefit of South Africa and its engineering and economic progress. It is therefore fitting that the Minister of Science and Technology, the Honorable Naledi Pandor opened our new head office on 06 October 2011.

My gratitude also extends to Crown Publications. For nearly 6 years Crown has made a significant contribution to the SAIEE in publishing this journal and have received many accolades from the publishing industry during this time. I would like to specifically thank Jenny Warwick for her tremendous efforts and financial support during this time and also the erstwhile, highly regarded editor, Paddy Hardegan. The decision to revitalize the dormant SAIEE Publications Company brings about the change in line with our Restructuring Plan and I know and look forward to a healthy and congenial ongoing relationship with Crown Publications.

I hope you enjoy reading this first edition published by the SAIEE Publications Company and I eagerly await your response to our new Managing Editor.  
Enjoy a blessed festive season.

*Andries Tohabalala ..*



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Mr. Tshabalala, B.Sc. Eng. (Elec.); FSAIEE, started his illustrious career as a technical assistant, and with hard work and perseverance, worked himself up to the position of the Group Executive Director of ACTOM. ACTOM has assets valued in the billions and have a staff compliment reaching over 5000. His philosophy on life is: "Do unto others as you would like them do unto you – make friends". In his private time he enjoys watching wild life documentaries and will savour a glass of dry white wine with dinner. Mr. Tshabalala's hopes for South Africa is to see our country in a successful, stable condition and free from poverty.

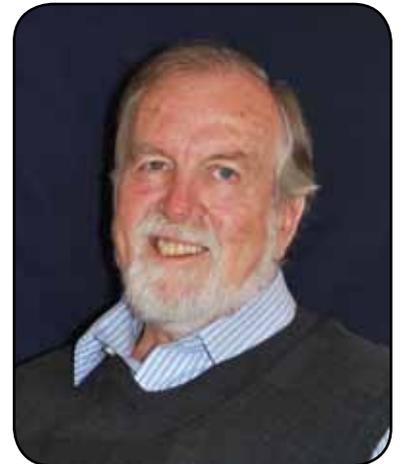
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Michael Charles Cary, B Sc Eng (Elec), B Comm (Admin), AEP (SBL), born on the 6th of September 1945, started his career as a Pupil Engineer at Eskom. His biggest opportunity came when he was appointed Managing Director of Rotek Engineering. During Mr. Cary's career, he transformed 5 companies from loss to profit. His life's philosophy is: "Do it right first time, do what you need to do to get the job done, do not engage in unnecessary verbal sessions". Although he has officially retired, Mr. Cary does consulting work for 2 companies, and is Chairman of the Board of a BEE Company. In his spare time he enjoys reading well-researched historical novels.

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Mr. Paul van Niekerk, [PvN] is a registered Professional Engineer, has a GCC and is currently the Executive Director of PIESA. He started his career as an Assistant Protection Engineer at the SAR&H laboratory in 1967, and started a Municipal career in 1971 which extended some 30 years, culminating in 2003 when he was instrumental as part of the team that were responsible for the conversion of City Power from Municipal Electricity into a corporate entity. Mr. Max Clarke, who was Town Engineer in Newcastle in 1971, had the greatest influence on Paul and his career. Mr. van Niekerk's life philosophy is: "To do the best that I can and to do it as soon as possible." To relax, Paul enjoys watching rugby as well as investigative crime series' on TV. He has a wide taste in music, but primarily enjoys the classics.



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### DR. PAT NAIDOO

B Eng, MSc, MBA, PhD,

Managing Director of his own company, Pat Naidoo Consulting Engineers Inc. RSA, made his professional best achievement of retiring at 50, a dream come true. Dr. Ian McRae, chief executive of Eskom, 1985 to 1994 had the greatest influence on Dr. Naidoo's life with Mr. Barack Obama being a person he would love to meet. His philosophy on life "Keep it simple" mirror's Dr. Naidoo's outlook on life without any strings attached, what-you-see-is-what-you-get with this enigmatic personality. His favorite past time read is the Harvard Business magazine and he enjoys watching BBC.

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### DR. ANGUS HAY

Dr Angus Hay, PrEng, CEng, MIET, FSAIIE, was born and educated in Johannesburg, South Africa, and has a BSc(Eng)Elec (1987) and a PhD in digital transmission (1998) from the University of the Witwatersrand. Dr Hay joined Neotel in 2006 as head of Strategy, later became CTO, and is today responsible for Strategic Business Development. As a postgraduate student in the early 1990s, he took part in the establishment of the Internet in South Africa. Dr Hay received the Institute's Young Achiever award in 1999. He is a Director of the Number Portability Company, and is Co-Chair of the Management Committee of the West Africa Cable System.

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Mr. Graeme Hopewell, B.Sc. Electrical Engineering (Wits), MBA (UCT), retired in 2003 as Deputy City Electrical Engineer of the Port Elizabeth Municipality. His best professional achievement was management of a project to provide internal wiring in houses in the former black townships of Port Elizabeth, which had been built without any provision for electricity as a power source. Starting in mid 1992, i.e. well before the birth of "The New South Africa", the project was designed to make use of the skills of previously disadvantaged workers as contractors. His biggest opportunity in life was when he was working as a consultant on the Port Elizabeth 2010 Stadium project for the Soccer World Cup. His hopes for the future are to see improvements in education in South Africa, especially in Mathematics, Physics and English.

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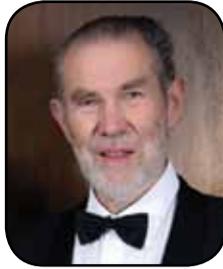




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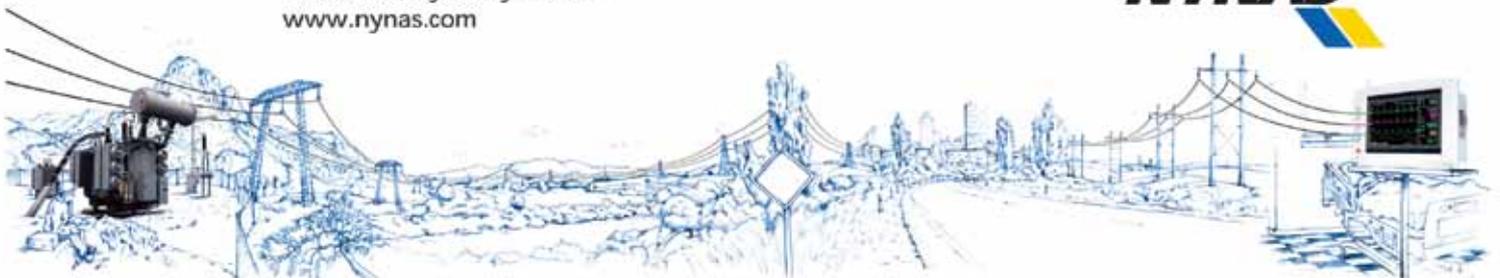
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|------------------|--|
| 1st Prize        | Stellenbosch University for the Sunnyside Apple Packer       |
| 2nd Prize        | Tshwane University of Technology for the AirBot              |
| 3rd Prize        | University of the Witwatersrand for the Automated Restaurant |
| Innovation Prize | University of Johannesburg for the BlitzBurger               |

A special thank you to our judges

Tobias Nittel: SEW-EURODRIVE - Food and Beverage Technology Field Manager

Stefan Molenaar: HG Molenaar - Managing Director

Chris Oliver: Festo Didactic - Sales and Development Engineer

Jacques du Sautoy: Nestlé - Automation Specialist

Andreas Keller: Festo - North-West Europe Sales Manager

**PNEUDRIVE  
CHALLENGE  
2011**

**SEW  
EURODRIVE**

**FESTO**



The PneuDrive judges from left to right: Tobias Nittel, Stefan Molenaar, Chris Oliver, Jacques du Sautoy and Andreas Keller

# WATTSUP

## SAIEE House Opening

The SAIEE (South African Institute of Electrical Engineers) proudly unveiled their new head office in Observatory, Johannesburg on Thursday, 6th October 2011. The SAIEE was honoured to have the Minister of Science and Technology, Naledi Pandor as the guest speaker at the opening ceremony. The Minister expressed her gratitude to the Institute for their decision to build the new office next to the old premises on Observatory Hill which offers a splendid 360 degree of Johannesburg.

SAIEE House was designed and built to compliment the 105-year old Innes House, which has served as head office for the SAIEE since 1986. SAIEE House will be the new home of the electrical engineering fraternity in South Africa and its 6000 members. Everyone in attendance received a commemorative coin at the momentous occasion. **wn**





# WATTSUP

## Annual SAIEE Banquet



*SAIEE Engineer Of The Year Award sponsored by Actom SA was awarded to Lt. Col Bill Bergman*



*Ian McKechnie  
MC*

It was an auspicious affair, with guests from the engineering fraternity rubbing shoulders with colleagues and old friends whilst being entertained by the Johannesburg Philharmonic orchestra. The SAIEE President, Mr. Andries Tshabalala and his wife, Fikile, welcomed guests as they arrived at the prestigious Wanderers Club in Johannesburg. We basked in the quirks of Mr. Ian McKechnie as MC for the evening as he had us in stitches with his knee-slappers. We had the honour in celebrating with Dr. Michael Grant who won the Young Achievers Award and who can look forward to a bright and rewarding career given his achievements thus far. Before reaching the age of 30 he graduated BSc Engineering in 2004 and between then and now has been admitted to the degree

of Master of Science in 2006 and Doctor of Philosophy degree last year. What is remarkable about the latter achievement is that it was done part time while he was employed in industry and involved with lecturing post graduate students. He has also authored or co-authored some 13 research papers/publications since 2005.

The SAIEE Engineer of the Year Award went to Lt. Col. Bill Bergman for being a member of the SAIEE who has energetically and voluntarily worked towards promoting electrical science and its applications to the benefit of the SAIEE, members and the Southern African community through his involvement in Institute affairs. This award recognises and honours Bill for his contribution.

The recipient of the President's Award, Prof. Ian Robert Jandrell has made significant and major contributions to electrical engineering through his leadership role in engineering education and development of the engineering profession, and through his leadership and major contribution both locally and internationally in lightning protection & high voltage engineering.

The SAIEE also recognised 33 engineers who have been members of the Institute for 50 years and presented them each with a 50 Year Membership Certificate. They are • Roger Airey • Arthur Bayman • Henry du Preez • Michael Dunn • Prof Hubert Hanrahan • Maurice Headland • Mark Hindle • Graeme Hopewell • Andy Johnston • Jack Rowan • Karel Spies • Derrick Willcock • Robin Wodley-Smith • Mario Barbolini • John James Barrie • Michael Lewis Brown • Barend Bartholomeus Joubert Coetzee • Philippus Petrus Lodewicus Conradie • Ian Macleod Cormack • Brian Charles Cuffley • Charles Hermann Marius de Beer • George Marie Dor • John Frederick Elphick • William Newell Holden • Dr David Harris Jacobson • Dietrich Maurer • Dr David Edwin Proctor • Alexander Rose • Dennis Michael Smit • Bernard Denis Thiel • Brian Frederick Torrance • Frederick Peter Poynter Turner • Prof Jacobus Daniel van Wyk • Paul Trenley Welch.

Mr. Harief Ebrahim, Current Head of Strategy and Operations in the Presidency: National Planning Commission enlightened us with a talk. The formalities were concluded with the singing of our national anthem and our heartfelt appreciation goes out to Gerda Geyer who organized this banquet. Another job well done. **Wn**



*The 2011 Keith Plowden Young Achievers Award sponsored by Powertech Transformers was awarded to Dr Michael David Grant*



*PRESIDENTS AWARD 2011 sponsored by Rotek Engineering was awarded to Prof Ian Robert Jandrell.*

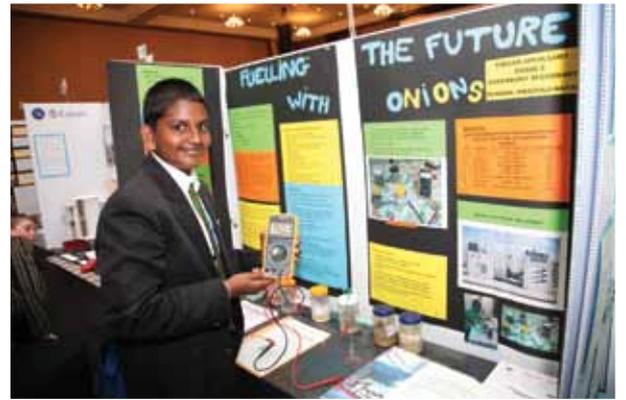


# WATTSUP

Annual SAIEE Banquet *continues from pg 27*



## Aspiring scientists achieve top honours in Eskom Expo for Young Scientists



After months of competition, nail-biting regional finals and intensive examination and appraisal by a panel of judges, South Africa's latest group of aspiring scientists were honoured for their achievements at the national finals of the Eskom Expo for Young Scientists on the 8th of October 2011.

Walking away with the top award as South Africa's leading young scientist was Palesa Masuku of JM Ntsime High School in Moses Kotane East, in the North West Province, who will soon be winging her way to an international science fair where she will have the opportunity to compete internationally against some of the world's best young achievers in science, technology, engineering, mathematics and innovation.

Emerging from a pool of 725 finalists, comprising grade 6 to 12 learners, Palesa scooped the award for her project entitled Marula Fruit, which was also a joint winner in the Eskom Best Female Project, and is focused on using the fruit of the marula as an alternative source of energy. **WN**

## Southern Cape Centre visit Mitchell's Brewery in Knysna



A group of people from the Southern Cape Centre of the SAIEE recently visited Mitchell's Brewery in Knysna as part of the centre's ongoing process of arranging interesting visits for its members that can also earn CPD points. The invitation included the following tantalising promise: "... a visit where you will be given a tour which includes an insight into all aspects of brewing our delicious nectars".

And so it happened. The tour started with an explanation being given on the history of Mitchell's Brewery and of the various processes involved in brewing the varieties of beer from the basic ingredients. This was followed by a tour where we could view the plant and chain of individual processes involved. The visit ended with a tasting of samples of the four beer varieties on offer, ranging from a light lager to a dark stout.

Brewing of beer is an age old tradition dating back many millennia. It has evolved into what can be considered a science, art and a craft where a brew master manages the processes that can conjure up unique tastes sought after by beer drinkers. The basic ingredients of beer are simple: water, a fermentable starch source such as malted barley that gets converted

into alcohol, a brewer's yeast to produce the fermentation and then hops to provide the flavouring.

Mitchell's Brewery has had an interesting history since its inception in 1983 in Knysna by Lex Mitchell, having changed ownership a number of times. It remains very much a real family business with several branches across the country and is claimed to be South Africa's second biggest brewery. Those who made the visit certainly enjoyed the outing (and the beer, naturally). **WN**



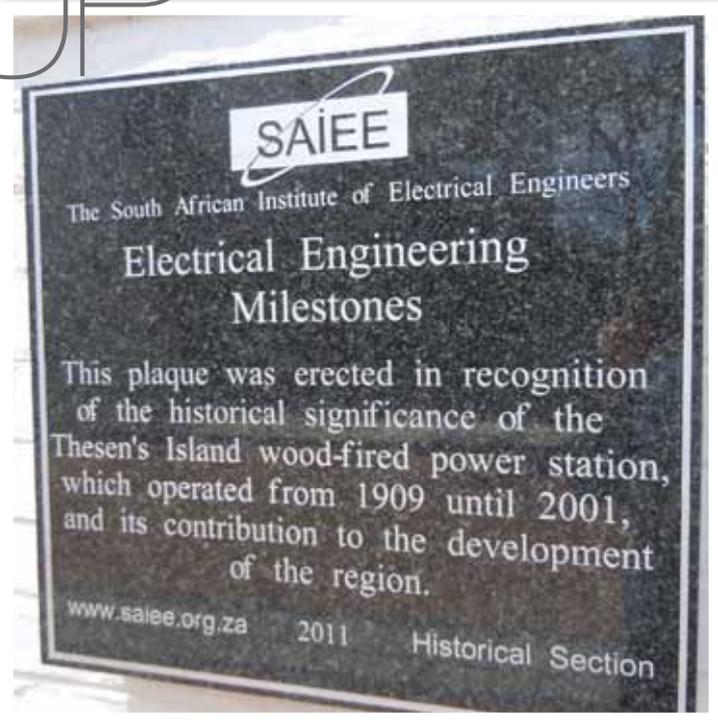
# WATTS UP

## SAIEE Plaque unveiled at the new Turbine Hotel, Knysna

On Wednesday 26th October an SAIEE Historical Section plaque was unveiled at the Turbine Hotel on Thesen's Island, Knysna. This boutique hotel was built to incorporate as much as possible of the old Thesen's wood-fired power station, and the plaque is in recognition of the historical significance of the building and equipment contained.

In the opening address, Les Stuart explained the motivation that led to this event, and complemented the owners, Geoff Engel and Dandre Lerm, for their remarkable vision for this hotel, and architect Mike Louw for translating that vision into reality in such a sensitive and comprehensive way. The result is a truly unique combination of modern up-market guest facilities, set within the boundaries of a century-old power station building, with all the furnaces, boilers, turbines and generators preserved in position. A measure of the importance of this historical power station is the fact that the plaque is only the fifth in the country to be erected by the Institute.

Southern Cape Centre chairman, Willem du Toit, informed the visitors of the activities of the Historical Section's activities at the Institute, and more specifically the engineering museum in the old Innes House in Observatory.



In his response, hotel owner Geoff Engel expressed his appreciation, and outlined some of the challenges and achievements encountered during the project, particularly in respect of power conservation.

Finally, the plaque was formally unveiled by the Knysna mayor, Georlene Wolmarans, who felt that the Turbine Hotel and Thesen's power station represented an additional tourist attraction for the town.

The function was rounded off with refreshments and snacks in the delightful upstairs bar of the hotel. **wn**



*Turbine Hotel Entrance*



*Southern Cape chairman Willem du Toit and Knysna Mayor, Georlene Wolmarans*



*Hotel owner Geoff Engel with the mayor.*



The prestigious annual *eta* Awards are sponsored by Eskom and are aimed at recognising excellence by individuals and companies in the field of energy efficiency. To find out more about how your company can enter the *eta* Awards, visit [www.eta-awards.co.za](http://www.eta-awards.co.za)

**WINNERS**



## A SMART DEVICE THAT COULD HELP SA ACHIEVE ITS ENERGY SAVING TARGETS

Knowledge is key to inspiring the behavioural change that is so crucial for South Africa to achieve its energy saving targets. When people have visibility of their household's energy load with instant insight into the fluctuations in consumption when appliances are switched on and off, they are not only empowered but also inclined to change their habits to cut consumption. This is according to Paroshen Naidoo from Utililabs, a Midrand-based

company that has won in the 2011 Eskom *eta* Awards Innovation Category for its smart Utility Load Management System. Naidoo says that a 10% reduction in consumption can be achieved in the residential sector purely through behavioural change. However, a lack of understanding of how and where to apply energy saving tactics in the home means a lot of people aren't motivated to try. Many studies across nine countries show that when people have real-time insight into their household's consumption levels, and can immediately see how usage drops when they unplug an

appliance, they become more conscious of the impact of their energy usage behaviour. "With our smart system, municipalities and their customers become active partners in managing the demand for power and in alleviating the burden on the national supply," says Naidoo. One of the devices forming part of the end-to-end system is the Eddi (Electricity Demand Display Instrument). Eddi is a clever, plug-and-play device that monitors and accurately displays a household's electricity consumption in real-time. It is non-invasive and fits into any three-pin plug socket.



## ENGINEER GETS NOTICED FOR INNOVATION IN ESKOM ETA AWARDS

Betty's Bay engineer, Russell Witthuhn has earned a place in the finals of the Eskom *eta* Awards, for his unwavering and self-motivated ambition to create an efficient vertical wind turbine that could survive the harsh weather conditions in South Africa's coastal regions. His Tri-Aero Blade Turbine, which can generate one kilowatt of power in an hour in a stiff breeze, is the end product of almost two years of research, testing and development. Built with robust galvanised steel and power-coated, the innovative wind turbine is designed for efficiency and to withstand the tough wind and rain that thrash the coastline. His journey to deliver the first marketable version of the Tri-Aero Blade Turbine this year began when he sought to find a simple, clean and reliable alternative to electricity for his own home which is located in an area often afflicted with power outages. Not satisfied that any existing wind turbine products could offer an appropriate, reliable or long-lasting solution, he set about making his own. Witthuhn through trial, error, endless experiments with various materials, and many a stormy night outside testing his wind turbine, developed a solution that he considers is perfectly-suited to South African needs. It's "tough as nails", easy to install, requires very little maintenance, and can be adapted for use in individual households to supplement the electricity supply, in low-cost houses to generate power for lights and appliances, or in micro wind farm settings.

## DRAINING POOL PUMP ENERGY COSTS

Meinhard Fourie, an energy expert from Cape Town, was a runner-up in the Innovation category of Eskom's 2011 *eta* Awards for an energy-saving pool pump motor. There are approximately a million swimming pools in South Africa and this number is expected to grow at 3% per year. The size of pump motors installed ranges from 0.55kW to 1.1kW. Generally a swimming pool has to filter for 10 to 12 hours a day. This translates to approximately 0.6GW of installed capacity in South Africa;

enough to meet the electricity demand of 500 000 average households. As a result Meinhard started investigating the development of an energy efficient swimming pool pump motor some two years ago. Various prototypes were built and tested until a suitable solution was found to satisfy the South African market from both a cost and energy perspective. Meinhard installed his pool pump on a pool and has achieved a saving of approximately 3kWh per day without



compromising on run times. This will be especially beneficial to pool owners running chlorinators. This is an extremely innovative approach to pumping solutions which has the potential to cost effectively meet a much broader application.

# WATTS HOT



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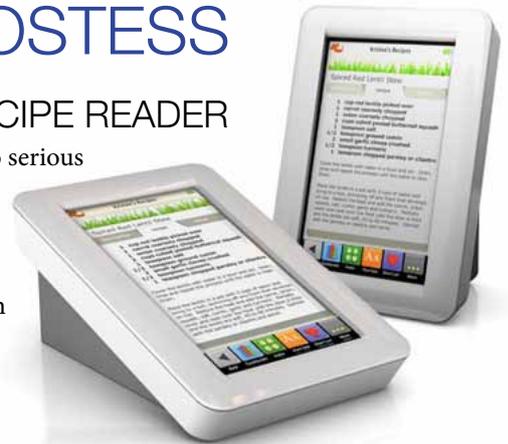
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# In the beginning...

For some years after its establishment in 1909 the administrative functions of the fledgling South African Institute of Electrical Engineers were handled on a voluntary basis by its elected individual members.

BY I MAX CLARKE

This arrangement endured until the statutory umbrella organisation, the Associated Scientific and Technical Society (AS & TS), came into being in 1920. It had been agreed that AS & TS would provide secretarial and related services to the various member Learned Societies that had been established in the years leading to this development and that these services would be funded by each Society on a pro-rata basis. The staff was housed in the Johannesburg Club building at 100 Fox Street.

It was not long before the building was named “Kelvin House” but by the mid-1930s the organisations had outgrown the available facilities and a new building was called for. After due process this was erected on the corner of Hollard and Marshall Streets and was occupied in 1937. It was initially known as the New Kelvin House, and AS & TS continued to provide the secretarial and administrative facilities required by each member organisation.

In 1990 the Observatory site was vacated by the National Institute of Telecommunications Research, a wing of the CSIR which had used the buildings

since the Union Observatory had relocated to Sutherland in 1971. It was decided that AS & TS would move from Kelvin House to the Observatory site and at that time the SAIEE took the decision to establish its own administrative facilities. To this end the Institute purchased the north-east corner of the Observatory site on which Innes House is located, from the AS & TS, and took ownership of the property. This became the first SAIEE-owned headquarters building and it housed all secretarial and administrative staff from June 1990. It could not accommodate Council and Committee meetings which had to be held in rooms hired from AS & TS in the main buildings as required each month.

Interestingly, the “outbuildings” of the SAIEE property were allocated to the Historical Interest Group, a handful of enthusiastic retired members who had – in May 1979 – decided that steps needed to be taken to save items of historical significance to electrical engineering in South Africa from scrapping and destruction. With the blessing of the Institute Council they formed the Historical Interest Group (HIG) and started to collect interesting



*The problem*

and valuable artefacts and books that were donated by various persons and organisations. Amongst other things these included original prototype Wadley inventions and a significant collection of library books from the late Dr G D Walker which formed the nucleus of a new SAIEE Library. Many of the larger technical items – and numerous smaller ones - could not be housed on the Innes House site and through the good offices of members were located in various spaces and “rooms” around the City. Mainly because of the regular election of new councillors, this was largely unknown or forgotten by most members of the SAIEE Council.

In the interim, as a result of the work being done by the members of the HIG the Council decided that the “group” should become a fully fledged “section” of the Institute and at the 5th July 2003 Council meeting it was resolved that the Historical Interest Group be formally changed to a Section and that it would be known as the Historical Interest Section, shortened to Historical Section or “HS” for everyday usage.

One of the spaces that had been made available to store artefacts was a disused chamber in a part of the AS & TS buildings on the Observatory site. With the demise of AS & TS the site and buildings had been taken over by SAASTA, a part of the National Research Foundation, and were earmarked for a science development and training centre. In January 2007 SAASTA unexpectedly announced that

they had received funding for the partial re-development of their buildings and that the space used for the storage of the SAIEE historical artefacts was now to be incorporated into the new working areas. The Institute was asked to remove the items in a week in order not to interrupt the building work that was about to commence!

Urgent meetings took place with senior office bearers of the Institute and it was agreed that temporary storage would be provided on the SAIEE site in the form of a hired 12m shipping container, to be located between Innes House and the outbuildings. The container was delivered and positioned on site on Tuesday 23rd January 2007, and by the end of the week all artefacts had been removed from the SAASTA storeroom and placed in the container.

The January 2007 Council meeting took note of the developments and asked the HS to investigate alternative storage arrangements and report back.... The seed was sown for what was to become the new headquarters of the SAIEE. The planning committee agreed that a new building should be erected on the Observatory site and that all administration and office facilities would be moved out of Innes House to allow this to be developed primarily as a library and display area for the HS. An architect was duly briefed with details of the requirements, plans were approved after much deliberation, tenders were invited, construction began, and as the saying goes..... the rest is history! **wn**



*The Solution arrived*



*The problem is loaded*



*The problem has left the building!*

FROM THE PEN OF MR. PAUL VAN NIEKERK  
SENIOR VICE PRESIDENT | CHAIRMAN - BUILDING COMMITTEE



# 102

## years on...

While most companies grow concerned as they expand with age, this was not the case with the South African Institute of Electrical Engineers (SAIEE). The SAIEE had grown to such an extent that Innes House could not accommodate the monthly sub-committee meetings.

**t**he Historical Section (HS) is the predominant sub-committee, which is responsible for recording and preserving the rapid development of electricity and the electrical engineering fraternity in South Africa. The result of all HS's work produced the need to hire a shipping container in which artefacts were stored, but this was not a sustainable solution.

The process to find new accommodation for the SAIEE started in earnest in 2007 when various surveys were conducted amongst the members to establish whether we should stay on the current site in Observatory, move to more central premises or if we should rent premises.

It was during this time that architect, Luigi Salemi, was approached and asked to prepare sketch plans to determine the viability of building the new 'headquarters' for the SAIEE. There were several changes made to the building to ensure that the new SAIEE House would not detract from the imposing Innes House.

At the same time various committees, comprising SAIEE Council Members, were appointed to investigate all alternatives. One of the deciding factors to remain in Observatory was that SAIEE would be part of "The Academic Spine" of Johannesburg which stretches from East to West. This "Spine" includes the University of Johannesburg campuses, the University of the Witwatersrand, SAASTA, Innes House, SAIEE House and ECSA at Bruma Lake.

In April 2010, shortly after the first Office Bearers meeting, the newly elected President Dr. Angus Hay appealed to Vice President, Paul van Niekerk to take on the responsibility of chairing the newly appointed Building committee. Paul was under the impression that, being an Office Bearer, the responsibilities were to chair one of the SAIEE committees and therefore accepted Dr. Hay's request without realising what a challenging assignment is waiting henceforth: "To put it mildly, the SAIEE Council is rather a conservative group of Engineers, and being tasked to be responsible for the biggest financial decision that the SAIEE has made in its 100 year history, which affects thousands of members, was a daunting task."



*the trucks arrived....*



*...some of the equipment to be used....*



*... the earthmovers arrived...*

The Building Committee members are:

Paul van Niekerk (Chairman)

Angus Hay (Ex officio)

Stan Bridgens

Les James

Max Clarke

Allan Meyer

Ian McKechnie

Jane Buisson Street

The Building Committee's first task was to formally appoint the Architect, Principal Agent, Project Manager and Quantity surveyor to proceed with the design work.

Upon the recommendation of the Building Committee, the SAIEE Council agreed to appoint Mr Luigi Salemi of Vox Humana Architectural Responses as the Architect. Luigi did the initial feasibility study and produced several plans for the project by 2010. He knew precisely what SAIEE's

requirements were, their values and culture as well as an appreciation of the historical significance of Innes House and the Observatory Site. Luigi was later appointed as the Principle Agent and Project Manager in terms of Joint Building Contracts Committee (JBCC).

In consultation with Luigi the Professional Team was appointed:

- **Geoff Drake** as the Quantity Surveyor;
- **Marilyn Coney** as the Structural Engineer;
- **Bill Bergman** of Bergman and Fisher Associates as the Electrical Engineer;
- **Keith Trowbridge** as the Civil Engineer;
- **Michelle Mace** of Scarab Designs as the Interior Designer; and
- **Hermann Strydom** as the Safety Officer.

After adjudication of the tenders, Paul reported back to Council in September

2010 and requested to appoint Biltworx as the primary contractor. During October 2010 the legal documents were signed and work began on the site.

Despite numerous challenges, we persevered and the new SAIEE Head Office building was completed. With much sweat and tears the project came to an end within budget and prides itself with outstanding workmanship and to the satisfaction of the Council members.

The building will accommodate the SAIEE secretariat staff and the archives and this will allow the Historical Section to develop a museum at Innes House.

In addition, the new building boasts a beautifully designed ultra modern 50-seat Council Chamber, an entertainment area, catering facilities and committee rooms, which will also be used for in-house training. **wn**



*... the preserving of the tree...*



*...Stan's office....*



*.... and there was progress.*

introducing

# SAIEE House

Design work on the new headquarters for the SAIEE began in February 2008, arising from the need to accommodate accumulating archive material and a shortage of office space. Subsequent to this, the brief grew to include an on-site Council Chamber - a meeting place primarily for monthly council meetings - that would at the same time, serve and communicate the image of the SAIEE.

t

his is the first building in the 100-year-old Institute's history that was commissioned by the Institute itself.

Other headquarters have been rented or were existing buildings adapted into offices, as is the case with the building used for its offices on site (Innes House) before development.

## THE SITE

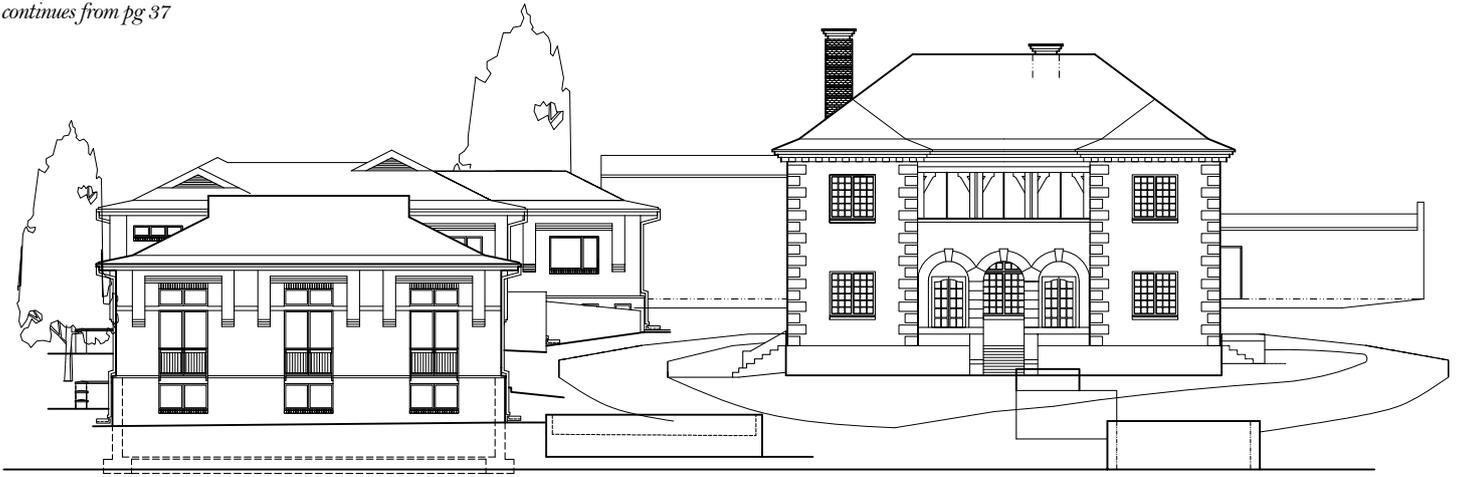
Located on a north-facing slope of one of Johannesburg's highest ridges, Observatory, the SAIEE acquired the site as a result of the subdivision of the greater SAASTA site, in the early 1990's. This greater compound includes, amongst other important buildings, the older telescope buildings built for one of the most important observation points in the Southern Hemisphere, from where much of the Southern Skies were mapped by the Chief Astronomer, Robert Innes in the early 20th Century.

Innes lived on the north-east corner of the site, in a house built for him and his family, in 1906. Eighty years later, the subdivision occurred and the house, by then commonly named Innes House, became the head office of the SAIEE. Though not officially a national monument, the house is one of the best-preserved examples of the Architect, Herbert Baker's work and part of our national heritage. It is a noble 100-year old double-story pavilion-type building, dominating its immediate site and the approach from Innes Street. Its plan



Innes House





*West Elevation*

Whereas Innes House stands proud on its site, SAIEE House is reclining on the site, respectful of the original building and simultaneously embracing it.

is organized around a large double-volume area at its heart, which is reflected on the north façade with a series of three equal sandstone arches topped by a white-painted timber “loggia” on the first floor, which has subsequently been unobtrusively enclosed with glass. Innes House dominates this corner of the site, which is the lowest part of the complex, and is not separated from the remainder of the site by a fence or barrier of any sort. The relationship with the main observatory building to its south-west, and higher up the slope, is vital, as this is part of the “memory” of the site. It was therefore agreed to locate the new building on the east side of Innes House, so as not to disturb the relationship between the existing buildings.

A second building on site, an outbuilding that had been added to and modified over the years, is located behind Innes House and constitutes the majority of the space available for Archival storage. It also contains a small meeting room. This building was to be retained as archives but the storage area was insufficient.

### **THE DESIGN CONCEPT**

The initial design was substantially modified after Conservation Architect, Jonathan Stone deemed the first design being too

“competitive” with that of Innes House. He recommended extensive changes to an alternative design which would remain largely unchanged. The result of this radical shift in approach, attributed a more “regressive” character to the new building. Whereas Innes House stands proud on its site, SAIEE House is reclining on the site, respectful of the original building and simultaneously embracing it. The principal element of the design is not the positive built fabric, but the “void space” at its heart - a semi-courtyard to the east of the old building, open to the sky and open to Innes House, across which a dialogue takes place between the old building and the new. The new building faces the stately east façade of Innes House across this courtyard. The new building is then arranged around this dialogue space: entrances (with their approach ramps and steps), offices, meeting rooms and amenities are all organized around this courtyard. The building is more spread-out over the site, its roofline dropped, stepping up as the slope allows, and everywhere its ridgelines are lower than the strong white cornice element wrapping all the way around the eaves of the Innes House. The result is a more “horizontal” building as opposed to the “verticality” of the existing Heritage Building.

### **THE PLAN**

The slope allows for varied access to the building on different levels. There are three levels, but at its maximum the building is only two floors, as these floors step down/up, following the slope. The top floor, about half a floor higher than natural ground level at the top, is reserved for the office requirements and the daily functions of the building. The intermediate (ground floor), which is the more public floor, is half-buried at the highest point of the slope, and half a story higher than the natural ground level at the lowest point (Gill Street side).

The main indoor meeting space - the Council Chamber itself - is located at the northernmost part of the ground floor facing Gill Street, and its street façade echoes the three stone arches on the north elevation of Innes House with three large glazed doors with fanlights above, opening onto three balconies. Being half a floor higher than the street, it is elevated proudly and gives SAIEE House a distinct face, in harmony with Innes House but confidently new and different. This Chamber Room is the gathering place for the Institute, capturing its identity and projecting it to the public towards the street. Michele Mace of Scarab Projects designed the interior of

the Chamber. Below this Chamber Room is a semi-sunken lower level, with windows under the three balconies allowing the natural light to enter .

The foyer is an entrance area for those visitors using the building occasionally, and lies between the courtyard at the heart of the building and the Council Chamber. This is a transition space, an “inside-outside” area, roofed and enclosed with sliding-folding glass doors on two sides, which mediates between the “interior” of the Chamber and the “exterior” of the courtyard. The ample glass on the outer walls, the tiling layout and a low ceiling draw the eye to the outside again, offering views of Innes House. This foyer is a space to linger in, while awaiting or following a meeting or Council sitting. It is served by a circular-shaped bar, which further invites one to mill about. The main electrical distribution board is displayed in this foyer space as a showpiece, behind glass doors, as a contemporary artifact, and serves to remind us that this is the Headquarters of the SAIEE. From this foyer, there is a circular staircase that descends behind the circular bar and leads to the semi-sunken basement, which will be used for future functions of the Institute. The remainder of the ground floor houses amenities serving the visitors, service rooms and a substantial archive area, half-buried into the slope for housing documents and artifacts which the Institute has been accumulating over the years.

Off the foyer and past the courtyard, a tiled steel staircase connects the ground floor to the upper level, passing three double-height windows that face Innes House across the pond in the courtyard. This pond makes the courtyard an inviting space to linger in, with a low wall to sit on, and the foyer space generously opens up onto it via the sliding-folding doors, allowing the sound of the

three gushing fountains to enter and echo within the building.

Besides soothing the mind with its play of water at the entrances, the pond is an attempt to mitigate the courtyard’s temperature. It will cool down the ambient temperature of the courtyard by evaporation, as the west façade is particularly prone to severe summer afternoon solar radiation. All western glazed doors and windows are double-glazed against the sharp afternoon summer sun to further control the ambient temperature on the inside. The building, being particularly determined by its context (limited width, proximity of Innes House) is necessarily of an east-west orientation, with only the Council Chamber receiving a fair amount of welcome north light and better-controlled solar exposure.

The upper floor is for daily use and houses the offices and related amenities. A certain amount of flexibility is allowed for, by building dry walling between some offices. Rooms are arranged around a single L-shaped corridor, which opens alternately onto an open-plan office area, the reception area and the staircase, from where it is again possible to gaze across the courtyard at a higher level through the double-height windows. At the end of the corridor there is an access to the tiled roof of the foyer, which is a quieter retreat space. In fact it is an elevated place from which to survey the courtyard. A Holly Oak tree was preserved on site at the foyer entrance, and is estimated to be about 90years old. Originally the foyer had a sloping roof but the design had to change during construction, as the preservation of the tree would have become impossible due to the roof geometry. Thus a concrete slab had to replace the pitched roof which is the origin of the idea of the roof terrace, whose slab had to be cut back to accommodate the main branch of the





tree at the first floor level. This oak now provides for a fair amount of greenery on this raised terrace.

## **MATERIALITY**

On the exterior, building materials join in the effort to understate the new building and to reinforce Innes House as the protagonist of the site. Attempts at matching its brick colour choice of roof material and colour, yet retain distinctness, all contribute to this effort. Brickwork consists of the two-toned pediment and upper walls similar to that of the combination of brickwork on Innes House. The new building's pediment rises from the ground in dark brown brick, which steps up with the building according to the slope. Atop this, red brick walls are stepped in 150mm from the darker brick face.

This provides for a wider base endowing a sense of solidity to the whole structure, which settles into the slope. Whereas the junction of dark brick to red brick in Innes House is subtler, in the new building a strong horizontal separation is provided, to accentuate the horizontality and the sense that the building "reclines". A light-coloured cement coping - a horizontal line running along nearly the entire perimeter of the building, achieves this effect. From the upper reaches of the walls, corbelled-brick elements above windows crown the windows, just underneath the eaves. These draw the eye up to the ridge, the nearby airforce tower, telescope buildings and the sky.

The roof material is also in red sheet metal to match the profile of the existing Innes House. Its profile is also broken into two pitches, one steeper than the other, to echo that of Innes House. Following the building profile, the roof form steps up the slope with the building. Its finishing details (emerging roof timbers, gutters, ventilation-louver elements) are in the green-grey tones, to distinguish it from white used on the existing buildings on site. This colour is repeated on the window frames.

The green-grey colour palette hinted at on the exterior details and in particular the window frames, is recalled on the inside, unifying the inside and outside of the building. On the interior, the decision was to aim at a completely contemporary look: a younger, fresher approach, rather than to try to match Innes House's interiors. This is in tune with the changing demographics of the Institute's nearly 6000 members, the average age of which is decreasing.

The Council Chamber itself is a high-ceilinged, generous space, a long and wide "shoebox" with a flat floor, a decision to offer the greatest flexibility of furniture arrangement inside. Tiered flooring was considered but deemed to hierarchical, whereas the Institute's Council is a democratic body. However, the Council President's position is highlighted by the central placing of the flat, stainless steel laser-cut version of the SAIEE coat of arms above his seat, in the middle of an

expansive stone-clad "riven" wall on that end of the room.

Elsewhere materials and furnishings, from paint colour to wall tiles to kitchenettes, aim at a contemporary feel and finish. Colours are in the grey-green range, interrupted in places by flashes of colour e.g. red trim on the Council Chamber table and white on counter tops.

The outside driveway was also requested by the Conservation Architect to be as green as possible, resulting in the choice of the permeable grass-block paving, laid to allow grass to grow through the concrete blocks. Most of the necessary parking is on lawn subdivided into parking bays, in an attempt to maintain the areas of lawn around the building intact as per the original setting of Innes House prior to the development. The driveway is a one-way circular route around Innes House and a new face-brick carport was built to partially hide a disturbingly high brick wall of the outbuilding behind. A new entrance off Gill Street was included, and a number of new small indigenous trees were planted to fulfill the planning requirements and in response to an increasing environmental awareness both on behalf of Town Council and the Institute.

## **A NOTE ON SUSTAINABILITY**

The site and context limited the possible orientation of the building, as well as its ideal bioclimatic design. However, some steps

were taken under these circumstances in an attempt to attain a more environmentally-friendly building, minimizing energy consumption during both construction and on the long-term, as well as by reducing the maintenance costs by considering it from the early design stage:

- The use of double-glazing on western windows and glazed doors exposed to the sun; double and single composite windows with laminated Solarvue film to reduce radiation entering the building and low-E application internally to keep heat in during winter.
- Substantial (double) roof insulation: above the ceiling boards and under the roof sheets, which protect the interior environment from excessive cooling/heating with the ambient temperature.
- A VRF Mitsubishi heat-pump recovery multi-split air-conditioning system, which is very flexible and allows for individual control in the different rooms (heating/cooling) or centralized control. Its functioning is determined by the specific use and occupancy of the building, and re-uses heat generated by the occupants and the latent heat of the building itself.
- Motion-sensor switches to lights in the offices and bathrooms that automatically switch off when there is no one in the room.
- Energy-saving compact fluorescent lamps to some lights, and energy-savings LED lamps to other lights, provided by Osram at a generously-discounted cost.
- A heat-pump, placed outside above the main air-conditioning unit, thus recovering any further heat expelled, using thermal energy to heat water in an energy-conversion process. There is no electrical geyser in the building.
- The use of face-brick on the outside (paint is one of the most environmentally-harmful construction elements of the industry) and, wherever possible, the use of water-based paints on the interiors.
- The use of MAPEI cementitious waterproofing products as opposed to bitumen-based products, for tanking of

basements and pond, and waterproofing of balconies and terraces.

## ELECTRICAL INSTALLATION

The consulting engineering firm of Bergman Fisher Associates (BFA) took on the project to design the electrical installation for the new office building for SAIEE. One of the objectives was to design the installation to be energy efficient, wherever possible.

Furthermore, the aesthetics of the building were to be considered and were of major importance and this was achieved with the close co-operation of the Architect and Interior decorator.

When one enters the new building at the Council Chamber foyer, the first thing that one notices is that the main distribution board is very visible behind a glass door. This was done deliberately so that its impact on whoever comes through the main door will immediately recognize that this building houses the SAIEE and that electrical engineering is our business!

BFA prepared the tender documents and tenders were called for from a number of electrical contractors. The tender was awarded to the electrical contracting company Elcom Electrical, who then became a sub-contractor to the main building contractor. Once the contract was awarded certain electrical suppliers came forward and donated their products either in full or partially by giving a substantial discount on their products. These firms are Eaton Electric (South Africa) who donated all the circuit breakers, main isolators and contactors mounted in the three distribution boards, Osram Lighting who supplied the LED luminaires at a discount price and Schneider Electrical who donated the control system equipment for the lighting and power to i.e. the projector and screen controls in the Council Chamber and the lighting in the main foyer. Amongst its other functions, the Schneider controller for the lights can automatically set the lighting for a specific occasion so that the lighting ambience of the area can be changed to suit.





introducing  
**SAIEE House**

*continues from pg 41*

In line with the concept of energy saving, all luminaires installed are either of the light emitting diode (LED), compact fluorescent and T5 fluorescent types. No incandescent lamps have been installed. Furthermore, the water for the kitchens and basins in washrooms is heated by means of a heat pump rather than the conventional hot water cylinder with an element and thermostat.

The lighting in the washrooms is controlled by means of movement sensors, which switch on the lights when a person enters the washroom and switch off after the washroom is vacated. Movement sensors are also installed at the switch in individual offices. This will switch on the lights when a person enters the office and will stay on for a short while when the office is vacated. If the incumbent in that office prefers to work with the lights off, these can be switched off manually.

The building is equipped with air-conditioning. The units installed were chosen by the air conditioning engineer to be energy efficient.

One of the stipulations from the SAIEE Building Committee was that emergency power was to be provided as the area in which SAIEE is situated, is subject to power outages. These outages can have a disastrous effect on the day-to-day running of the institute. It was decided to install a 50kVA automatic standby diesel alternator set adjacent to the building at the North East corner of the site. Due consideration was given to the possible noise factor, because of the close proximity of neighbours and to size the generator to be able to cope with only essential circuits. The generator set purchased is of the ultra silent type with a maximum noise level of approximately 50db. In order for only essential circuits to be connected to the standby set, the distribution boards had to be split into essential and non-essential sections. In the event of a mains power failure the generator set will automatically start and as soon as it is up to generating speed a changeover switch will operate and power will be restored to the essential circuits. The air-conditioning units which are operating at the time, will switch off and stay off whilst

the standby generator is in operation. In order to overcome the problem of losing data on computers during that short time between the mains power failing and the standby generator coming into operation, most essential desktop computers have been equipped with uninterruptable power supplies (UPS's). Only one air-conditioner was considered to be essential and this is the one in the server room, which is necessary to maintain a constant temperature for the server and other electronic equipment.

Because the SAIEE site has now become an independent property from SAASTA, all the buildings including the existing Innes House have now had their main electrical power supplies diverted and altered to be fed from the main distribution board in the new building. Wire ways were provided during the building stages to accommodate future wiring for audio and audiovisual presentations and for security sensors and keypads.

Johannesburg City Power has provided power to the site at a meter cubicle mounted on the Innes Street boundary wall. **wn**

## DESIGN TEAM

No design undertaking is possible without the involvement and collaboration of a design team who has greatly helped in the realization of this project. I thank all those who worked with me for their effort and mention in particular the following:

STEVE BAYLISS | Town Planner | VBH Town Planners  
 BILL BERGMAN | Electrical Engineer | Bergman & Fisher Associates  
 MARYLYN CONEY | Structural Engineer | Marylyn Coney cc.  
 GEOFF DRAKE & SUE ROWE | QS's | Geoff Drake & Associates  
 JONATHAN STONE | Architect (Conservation) | Jonathan Stone Architects  
 NICK WHITCUTT | Architect | Nicholas Whitcutt Architects  
 RENALDO GOODALL | Arch. Technologist | Nicholas Whitcutt Architects

MICHELE MACE | Interior Designer | Scarab Projects  
 JOEP JOUBERT & HERMANN STRYDOM | OHS | Pinnacle Safety  
 KEITH TROWBRIDGE | Civil Engineer | THS & Associates  
 RICHARD WELSFORD | Fire Safety Consultant | Dynamic Fire Solutions  
 MERVYN AEREBOE | Mechanical Engineer | Madd Consulting Engineers  
 MONETTE STREEFKERK | plans runner to Jhb. Council | Monetteco

# Tie A Yellow Ribbon Around The Old Oak Tree

WRITTEN BY | JANE-ANNE BUISSON-STREET

As with all buildings, one of the first activities to be done is to clear the existing vegetation. While the area identified for the new building was not heavily vegetated, Luigi had always envisaged removing as few of the trees as possible. Unfortunately the surveyor deemed otherwise.

**t**he majority of the trees were indigenous and amongst them was a well-established evergreen exotic tree that was just on the boundary of what needed to be removed. This tree was one of the taller ones as well as the tree with the 'most presence'.

And so began an electronic debate amongst the Architect, the Structural Engineer, the Building Committee and the Office Bearers as to what should be done with this no-name tree, move it, remove it or leave it where it was.

The cost of moving the tree proved to be prohibitive and after a weekend of poring over tree books and websites we managed to determine that the tree was a variant of a Holly Oak. Obviously if this tree was lopped as well, we would not be able to replace it with anything that would make such an architectural focal point. We were not alone in our quest - as dawn broke one Monday morning there was a yellow ribbon around our old oak tree.

Moving the tree proved to be extremely costly and was ruled out as an option. Luigi submitted a plan, which included cutting the first floor veranda to allow for the girth of the tree. A similar arrangement was made for the ground floor, which made allowance for the tree's roots. After conferring with the rest of the Professional Team a decision was taken to do what could be done to save the tree.

Just as well, where else can we mount the Foundation Stone and hide the time capsule? **wn**



The Elcon Electrical team is proud to have been the electrical contractor for the new building of the South African Institute of Electrical Engineers.

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# Contaminated diesel fuel poses a serious risk in standby generators

While standby generators are the most effective form of providing power in the event of outages or load shedding, one of the most neglected, but essential elements of generator operations, is ensuring that the diesel fuel in the standby tanks is uncontaminated.

BY I RON MATTIG



It's a known fact that in SA, the quality of diesel fuel is questionable at best, but the situation with standby generators is exacerbated because of their infrequent usage. Standard maintenance procedures generally exclude testing and resolving fuel integrity, yet fuel is the root cause of most genset failures.



Statistics have shown that 85 % of engine failures in gensets are fuel related.

Diesel, like milk, deteriorates over time, forming bacteria and sludge, which poses a severe risk to a reliable operation. This sludge results in plugged filters and fuel system damage, ultimately leading to engine failure.



*Samples of contaminated fuel drawn from standby tanks - precisely what you don't want in your genset tank*

This is especially the case with new generation engines, its precision injectors and pumps demand high quality fuel to run these engines, as the manufacturer intended. Anything less is guaranteed to cause premature failure.

Once a contaminant accumulates in the tank, it will continue to pollute the fuel that passes through it. In the past, tank cleaning was a generally neglected maintenance item. It was only attended to in extreme circumstances due to the cost, waste factor and down time that accompanied this procedure.

“All these factors are exacerbated with gensets because they stand idle for long periods of time meaning that the diesel deteriorates faster than frequently used engines making them more vulnerable to failure,” explains Ron Mattig, MD at Clear Fuel Technologies and fellow SAIEE Member.

His recent presentation to members of the Durban Branch of the SAIEE on maintaining and monitoring fuel quality in stand-by environments

was, according to those who attended, indeed an eye opener. His company supplies the range of Algae-X Fuel Conditioning and Decontamination Technology, which has been delivering solutions to combat poor quality fuel for more than 11 years in Southern Africa, through a network of approved distributors.

It offers a complete range of products and services including a mobile diesel tank cleaning and sampling service. They bring the mobile tank cleaning equipment on site to determine the quality of the fuel, and if required, carry out a tank cleaning service. This is a cost effective, simple procedure, without any of the previously mentioned negatives.



*Tank service crew cleaning a skidpan tank*

The process doesn't only involve the extraction of water and debris, which is currently offered in the market, but it also includes the additional vital requirements of comprehensive fuel and environment remediation. These comprise:

- Removal of tank bottom / free water, debris and solid contaminants.
- Removal of bio-film build up (accumulation on tank walls and if applicable, baffles / supports).
- Removal of entrained, and more importantly, emulsified water.
- Elimination of all microbe / bacterial growth and foreign activity from the entire fuel



*The before and after results of the fuel.*

environment, without the use of toxic biocides (not just the visible microbe components on the water interface).

- Remediate the actual fuel integrity, by reversing the natural and accelerated deterioration process that occurs in diesel fuel.

In addition to this service, a range of maintenance and monitoring systems are offered, which continually maintain and monitor quality of fuel in the tanks. In the event of severe contaminant levels being detected an alarm is triggered, thus allowing for a pro-active response. Systems are available to handle tank sizes from 100 litres to 1 000 000 litres.



*A STS maintenance and monitoring system*

In closing his presentation, Mattig made the following analogy: As with people who require clean contaminant-free water to survive, diesel engines require clean diesel to perform as their manufacturers designed them to. **wn**



On the brink of a revolution:

# Digital Terrestrial Television

In March 1972 the South Africa Broadcasting Corporation published the specification for the PAL-I system as the standard for analogue television in South Africa. Analogue Television networks have delivered news and entertainment to South African homes for almost 40 years . This is about to change as Digital Terrestrial Television (DTT) networks are being switched on across the country, as the Government moves to implement the Broadcasting Digital Migration Policy.

BY I GERHARD PETRICK

## ANALOGUE TELEVISION

In analogue television, each service or television channel requires its own transmitter and it's own 8 MHz chunk of spectrum. In order to deliver 6 television services, for example, in a particular coverage area  $6 \times 8 = 48$  MHz of spectrum would be required.

*Figure 1*

## WHAT IS DTT

*Figure 2* - In Digital Terrestrial Television several content channels are digitised, compressed and multiplexed into one transport stream that is broadcast to the

home from specialised digital terrestrial transmitters. A DTT capable receiver is required to receive and decode the digital transmission.

In digital terrestrial television the content to be broadcast is digitised (or encoded) and compressed. Compression techniques reduce the amount of information to be transmitted without introducing a noticeable degradation in picture- or sound quality.

DTT allows for digital content streams of several services to be combined to form a multi-channel stream. This multichannel

stream, also referred to as multiplex, is then transmitted to the home from a network of digital terrestrial transmitters across the country. More than 20 television channels (in standard definition) can be delivered in an 8 MHz spectrum.

In addition DTT networks allow for the use of synchronised transmissions and deployment of the same 8 MHz frequency block, at several transmission sites, in the same coverage area. Digital networks thus achieve a much better spectrum efficiency than that of analogue television networks. This greater spectrum





efficiency will result in the release of some broadcast spectrum for re-assignment to other services once migration is completed.

*Figure 3 & Figure 4*

In order to receive DTT services each home will require a good antenna and a DTT capable receiver. Whilst consumers across the globe want a television set with the digital receiver already integrated, some homes might, as an interim step, choose to acquire a Set-Top Box receiver. This will receive the digital services and allow for the display of these signals on the existing analogue television set in the home.

### **PROGRESS TOWARDS DTT IMPLEMENTATION IN SOUTH AFRICA**

Technology trials with DTT commenced from the Sentech Tower in Johannesburg in March 2000. These trials allowed broadcast engineers to gain hands-on experience of setting up the new systems and transmissions.

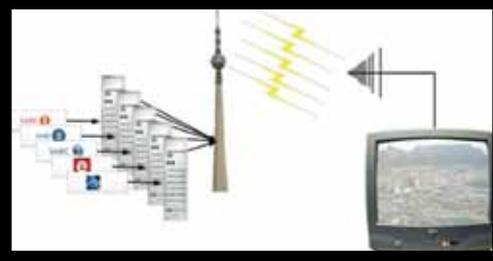
In 2005 South Africa defined its requirements for DTT and started with the frequency planning to accommodate two national multiplexes, and an additional two metro-based multiplexes for mobile television.

In 2006 these spectrum requirements were submitted to the International Telecommunications Union (ITU) and coordinated with neighbouring countries.

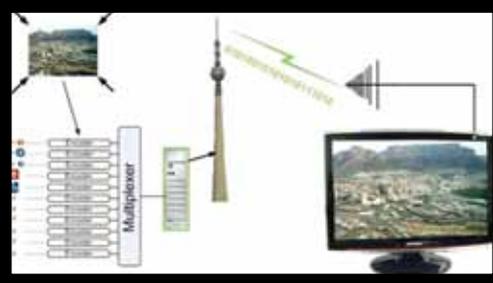
The Minister of Communication announced the establishment of a Digital Migration Working Group in May 2005. This was to develop recommendations, and contribute towards the development of a national strategy for the migration of broadcasting systems from analogue to digital. The DMWG conducted its work in four working groups namely: Policy, Content, Technical and Economic.

# Digital Terrestrial Television

continues from page 47



**Figure 1** | In Analogue Television each content channel requires its own transmitter and a separate frequency for transmission at each broadcast tower in the country



**Figure 2** | In Digital Terrestrial Television several content channels are digitised, compressed and multiplexed into one transport stream that is broadcast to the home from specialised digital terrestrial transmitters. A DTT capable receiver is required to receive and decode the digital transmission



**Figure 3** | DTT reception via an external set-top box receiver interface to an analogue television set



**Figure 4** | DTT reception on a digital television set with an integrated digital receiver

These working groups were chaired by reputed industry experts. A broad consultative process was followed, and input and views on all aspects associated with South Africa's migration to DTT collated. The working groups studied literally every aspect associated with the migration to digital including, amongst others, the need for a subsidy for needy homes, the requirements for the Set-Top Box receiver and Conditional Access. Industry stakeholders developed consensus positions, and provided clear and unambiguous recommendations, whilst noting conflicting views and areas lacking consensus. The final DMWG report was submitted to the Minister of Communications in November 2006.

It took until September 2008 for the subsequent Broadcasting Digital Migration Policy to be published. To a large extent the policy draws on the input from the DMWG, but unfortunately does contain some aspects which seem illogical. It appears to contradict the recommendations made by the DMWG, to be poorly researched, and ignorant of the implications and the unintended negative consequences for the broadcast sector, and ordinary South Africans.

In November 2008 the commercial launch of trial broadcasts commenced in Johannesburg, Durban and Cape Town. Broadcasters collaborated with each other, as well as with local receiver manufacturers, and tested inter-operability of locally manufactured set-top boxes tuned to networks established and operated by different signal distributors. The South African Bureau of Standards started work in parallel on a minimum performance standard for a free-to-air set-top box receiver. The set-top box (STB) would allow South Africans to view DTT services on existing analogue television sets available in the home.

Progress towards migration stalled in 2010, as lobbying by Japanese and Brazilian interest groups for the minority ISDB-T standard for DTT caused widespread

confusion and concern across the region. In order to demonstrate the superiority of the most advanced digital terrestrial television standard known as second generation Digital Video Broadcasting for Terrestrial (DVB-T2), the M-Net and e.tv trial transmission in Gauteng was switched to DVB-T2 in September 2010. Sixty homes in SOWETO were equipped with DVB-T2 receivers to gain insight into how South African consumers would interact and experience DVB-T2, and to prove that the technology was commercially available and mature. Numerous dignitaries from across Southern Africa and beyond visited the homes of trial participants and received first hand feedback on their experiences.

Following a year of intense debate and lobbying, SADC Ministers responsible for Communications in November 2010 adopted DVB-T2 as the standard to be implemented in the region. Angola remains the only SADC country still pursuing ISDB-T. The South African Minister of Communications confirmed DVB-T2 as standard for the country in January 2011. This standard choice allows South Africa and the region to leapfrog a technology generation, and to exploit the numerous features of the most advanced digital terrestrial broadcasting technology, without having to deal with any legacy issues.

Subsequent to the Minister's announcement, the South African Bureau of Standards commenced with the revision of the free-to-air set-top box specification to reflect the additional requirements for DVB-T2 reception, whilst also adopting the transmission specification for DVB-T2 as the national standard.

Broadcast signal distribution company Sentech has started the roll-out of transmission infrastructure for Digital Terrestrial Television in South Africa with government funding. Whilst the basic transmitter infrastructure is already in place, providing signals to around 60% of the South African population, some upgrades are still required to ensure DVB-T2 transmission capability.

## THE INTERNATIONAL SUCCESS

Digital broadcasting, whether by satellite, cable or terrestrial infrastructure, is dominated by the DVB family of standards. According to Screen Digest, DVB-T/T2 receiver sales dominated world sales figures with 57%, followed by sales of ATSC receivers in the United States of America, receivers for the Japanese Brazilian ISDB-T, and the emerging Chinese DTMB standard.

Figure 5

The Screen Digest report of 2010 confirms that DTT world-wide is dominated by being free-to-air. This has facilitated the production and sales of low-cost, free-to-air receivers, with intense competition and downward price pressures on receivers.

Although DVB-T/T2 services are dominated by free-to-air services, and according to Screen Digest the total 2009 world-wide receiver sales exceeded 150 million units, migration to digital terrestrial television has not happened overnight. A review of how long it has taken to migrate in several European countries is shown in Figure 6.

The data shown in Figure 6 needs to be contextualised against the significance of terrestrial television viewership in each respective country. In many of the countries the dependence on terrestrial services is very low, and viewers rely on satellite transmissions for access to television services.

It is sobering to consider that it has taken 6 years for migration to be done in Germany, where only about 10% of the population view terrestrial television.

In South Africa terrestrial television viewing dominates, and the time-lines for Spain and the UK, in which terrestrial television viewing is also dominates, may be most appropriate to consider. It has taken Spain 10 years to migrate and is likely to take the UK, where 74% of the homes view terrestrial services, around 14 years. It would seem unlikely that South Africa would achieve a successful transition to digital in much shorter time-lines.

In addition to the availability of a wide variety of low cost DTT receivers, a further key driver for uptake of DTT was the availability of high quality content on DTT.

Although the envisaged subsidy scheme for STBs in South Africa is likely to assist with the uptake of digital reception in South Africa, access to new, high quality and compelling content, is likely to be by far the single biggest incentive for migration.

South Africa is unlikely to see a substantial uptake in DTT unless consumers find the new content offering compelling and attractive. If viewers only receive the same old channels which can already be accessed via analogue television, consumers will remain reluctant and slow to respond, even if DTT receivers are given away for free.

## WHEN WILL DTT SERVICES LAUNCH IN SOUTH AFRICA?

The Parliamentary Portfolio Committee on Communications received updates from all DTT stakeholders on their progress with DTT implementation in late September 2011. The desire to launch services in April 2012, and switch off analogue television by December 2013 was articulated.

Whilst significant progress had been made, a number of key issues have emerged that would put an April 2012 launch date at risk. A review of the time it has taken markets with much higher income levels to migrate, suggest that making a December 2013 analogue switch off date would be very challenging if not impossible.

## CLARITY ON THE SUBSIDY SCHEME FOR NEEDY HOMES

Several presentations have been made on the envisaged subsidy scheme for needy homes. The basic approach would implement a means test and award a coupon for the DTT receiver subsidy to a qualifying individual or home. Details on how the means test and the coupon system would be implemented and administrated remain sketchy.

Implementing the means test, and disbursing subsidies for more than 5 million television households, is a huge undertaking. Whilst these activities are not show-stoppers for an April 2012 launch, they may certainly delay large volume production, retail orders and, ultimately, availability of receivers in the home.

## AVAILABILITY OF RECEIVERS

Revision of the free-to-air set-top box specification has been expedited and consensus has been reached on most of the DVB-T2 changes required. However, the STB Control mechanism seems to have become a mayor stumbling block. Whilst some parties heavily advocate the inclusion of this mechanism, others have raised concerns that implementing a mechanism that would encrypt all television services in South Africa, would impact on individuals' rights to access to information, and add huge costs and complexities, whilst delivering little benefit.

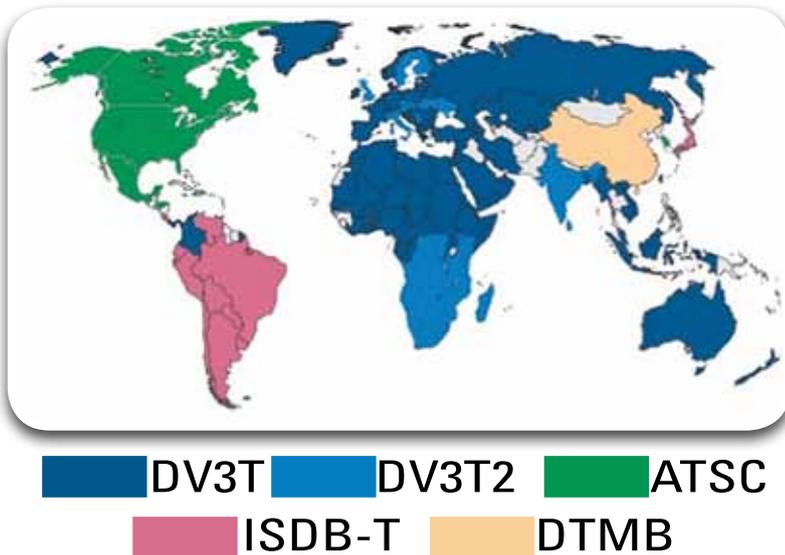


Figure 5 | DTT Deployment data

# Digital Terrestrial Television

*continues from page 49*



The end result is that the specification for the free-to-air set-top box had not been finalised in September 2011 and manufacturers could not commence with production. Given these delays, South Africans are unlikely to see DTT STBs on the shelves in April 2012.

## CLARITY ON NEW CONTENT SERVICES

The DTT regulations, published by the Independent Communications Authority of South Africa (ICASA), allow for the licensing / authorisation of digital incentive channels. This process of channel authorisation seems to be based on an analogue regulatory mind-set that would take weeks if not months to complete and not allow for the flexibility on turnaround time demanded by a digital multi-channel environment. As outlined above, the availability of attractive new content services will be the single biggest reason why South Africans would take up digital. Without clarity on what new content channels would be available and when, the migration process is not likely to gain any momentum. ICASA stunned the sector by announcing in Parliament its intention to withdraw the current DTT regulations and start afresh in September 2011. The previous consultations on the DTT regulations took more than 15 months to finalise, and saw litigation against the regulator. It is highly unlikely that any withdrawal, or revision of the regulations that have been in place for more than 19 months, would be completed by December 2011 or go unchallenged.

## SOUTH AFRICA IS AT THE BRINK OF THE DIGITAL REVOLUTION

This revolution may take the form of mass protests against poor and slow service delivery, unilateral switch-off of access to television through STB Control or the premature switch off of analogue television, addition costs imposed on the home and general dissatisfaction with poor content and one sided news reporting.

It should transform people's lives, provide access to information and services beyond their expectations, and strengthen the moral fibre of society. It should explode the creative potential of local talent, nurture the local manufacturing industry, spur innovation, jobs and economic upliftment, and create greater diversity, freedom of expression, openness and accountability in our society. This digital revolution also has the potential to see people dancing in the streets, celebrating their country, cultural diversity, democracy and success.

*It is time to put our shoulders to the wheel, and make this revolution happen. **wn***

COUNTRY	START OF DTT	ASO	YEARS
United Kingdom	1998	2012	14
Sweden	1999	2007	8
Spain	2000	2010	10
Finland	2001	2007	6
Switzerland	2001	2007	6
Germany	2002	2008	6
Belgium	2002	2010	8
The Netherlands	2003	2006	3
Italy	2003	2012	9
France	2005	2011	6
Denmark	2006	2009	3
Austria	2006	2010	4
Greece	2006	2012	6
Norway	2007	2009	2
Portugal	2008	2012	4
Ireland	?	?	?

**Figure 6 1** Analysis of how long the transition from analogue broadcasting has taken from the start of DTT transmissions to the switch-off of analogue television (ASO) as presented by Phil Laven, DVB Project office

### About the Author:

*Gerhard Petrick is a former Councillor of the Independent Communications Authority of South Africa, he is registered with ECSA as Professional Engineering Technologist – Electrical, with the Society of Broadcast Engineers as Senior Broadcast Engineer and is a Senior Member of the South African Institute of Electrical Engineers (SAIIE). He writes in his personal capacity.*

*Email: Gerhard.petrick@gmail.com*





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POWER

# Introduction to surge arresters

Surge arresters are protection devices used as part of insulation coordination of a power system in order to prevent lightning and other system generated overvoltages (such as those produced during power switching operations) from damaging equipment and generating high touch potentials.

BY | SILAS MOLOKO | SAIEE POWER SECTION

## The Mpumalanga province and the highlands of Maloti Mountains have the worst case scenarios of lightning density that ranges from 12 to 14 flashes/year/km<sup>2</sup>.

The concept of surge arresters was first conceived in the telecommunications industry, contrary to common belief. Telecommunication networks preceded power systems with the advent of telegraphs in the early 1800s. The first arresters were manufactured in around 1860 [1]. When discussing surge arresters, it is often prudent to first understand the characteristics of typical overvoltages found in power systems. Surge arresters, when correctly selected and applied can be used to limit most (but not all) of these overvoltages.

### SYSTEM OVERVOLTAGES

There are two measures that are regulated on distribution power systems and they are voltage and frequency. Power is generally at a specific system voltage (400V/230V, 3.3kV, 6.6kV, 11kV, 22kV...) and frequency (50Hz) [2]. These system voltages change from country to country. Our system voltages in South Africa are similar to Britain and most of Europe.

A disturbance in system voltage due to inherent system problems, operational or forces of nature, may lead to a condition of overvoltage or undervoltage on the system. Our interest, in this article, is on overvoltage conditions and how surge arresters are used to protect equipment against them. There are various overvoltage conditions that can appear on the system, as shown in figure 1. The voltage irregularities in figure 1 can be caused by the following occurrences on the system:

- lightning;
- general power switching activity and switching reactive equipment like VAR compensators (capacitor banks);
- system faults such as single phase faults; and
- system resonance. [3]

### LIGHTNING

Lightning is considered to be one of the most spectacular works of nature. For a long time it was a subject most people feared and only the brave dared to study. It was often linked

to superstition in most cultures. I remember all the stories I was told growing up of how lightning is used by witch-doctors to kill people. It was often said that a man with a big axe hangs off the edge of the lightning ready to strike the bewitched. These stories though are dying a slow death in this era of the information age. The facts about lightning are widely known and are taught early in school curriculum. It is well known that lightning is nothing but a discharge activity that occurs between earth and clouds and between oppositely charged clouds. It is a by-product of the precipitation process that takes place during cloud formation. The magnitude of the discharge is what causes disturbance and destruction of electrical equipment. A typical lightning strike can generate currents in the order of 5 to 200kA. South Africa has one of the highest densities of lightning strikes. There is four times the world average number of deaths caused by lightning in South Africa [4].

The Mpumalanga province and the highlands of Maloti Mountains have the worst case scenarios of lightning density that ranges from 12 to 14 flashes/year/km<sup>2</sup>. These figures are derived from a study conducted by the CSIR in the 1980s that produced the lightning density map shown in figure 2. There measurement point only covered 40% of the country. Recent studies conducted with better instruments and covering a larger area have revealed that the lightning is much more severe than previously thought. The South African Weather Service in conjunction with CSIR has a website [5] that shows lightning activity around the country. The WeatherSA website is a useful tool if you want to confirm that your system faults were caused by lightning.

### LIGHTNING DENSITY MAP.[5]

A typical lightning strike consists normally of a flash with several strokes. Figure 3 shows a picture of a lightning strike and several strokes can be seen within the flash. The multiples of strokes in a lightning flash means that there are several discharges which results in multiple amplitudes in a strike.

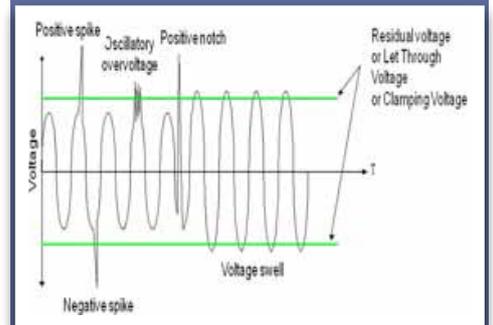


FIGURE 1: TYPES OF OVERVOLTAGE[3]

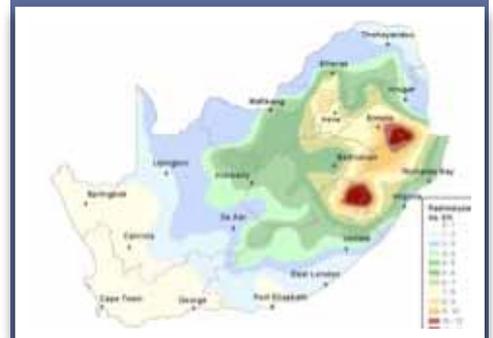


FIGURE 2: LIGHTNING DENSITY MAP.[5]

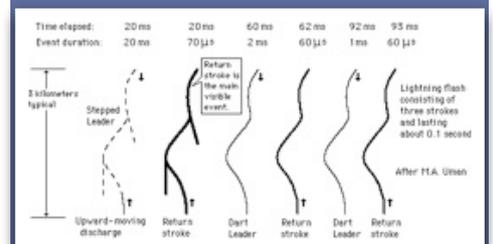


FIGURE 3: LIGHTNING STRIKE [3]



FIGURE 4: DEMONSTRATION OF LIGHTNING PROPAGATION

# Introduction to surge arresters

continues from pg 53

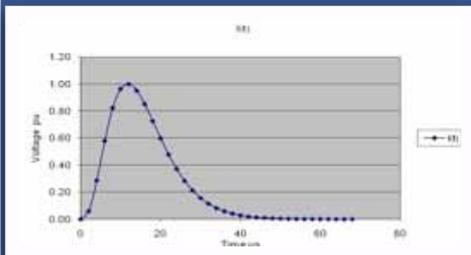


FIGURE 5: 8/20µs TRANSIENT WAVEFORM

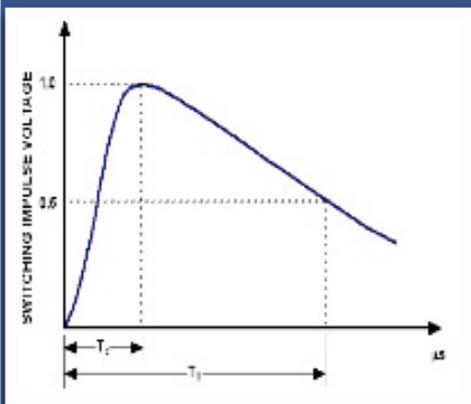


FIGURE 6: SLOW-FRONT WAVEFORM (30/60µs)

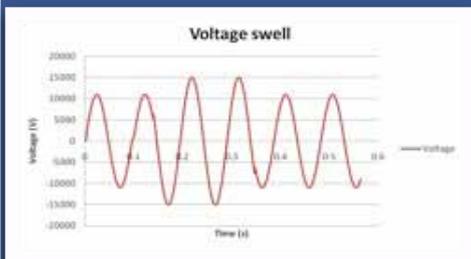


FIGURE 7: EXAMPLE OF TOV [3]

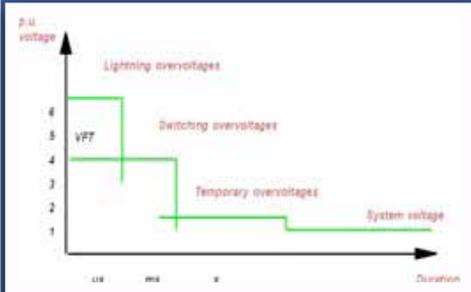


FIGURE 8: SUMMARY GRAPH OF OVERVOLTAGES

## LIGHTNING STRIKE [3]

There have been years of studies conducted on lightning. Lightning generates transient electromagnetic field which can induce significant overvoltage on adjacent power equipment, in particular overhead power lines. The figure below show the transient propagation in case of a direct lightning strike. Though the direct lightning strikes are most severe to electrical systems, the most common transients are caused by lightning flashes close to the overhead line. These are referred to as induced transient overvoltages.

## DEMONSTRATION OF LIGHTNING PROPAGATION

The waveform synonymous with lightning current is the 8/20 µs depicted by figure 5.

## SWITCHING

Switching loads and sources is unavoidable menace that, most often than not, result in transient overvoltages on the system. The overvoltages are slow in nature (slow-front) compared to lightning generated overvoltages, however, they have a high energy i.e.  $E = P \times t$ . The wave form is similar to lightning but with a longer rise time and a sharp damping, typically represented 30/60µs. Having said that though; switching reactive circuits, like capacitor banks, can result in fast-front surges to the degree of lightning surges.

## SLOW-FRONT WAVEFORM (30/60µs)

Possible sources of SOV can be summarized as follows:

- line energisation and de-energisation;
- fault occurrence, clearing and reclosing;
- switching of inductive and capacitive currents; and
- load rejection.

Line energisation and reclosing are the predominant sources of SOV. Fast three-phase auto reclosing gives rise to the highest magnitudes due to the presence of trapped charges on the line. Normal load switching i.e. resistive load (power factor >0.7) does not cause major problems on the system. The overvoltage factor is in the range of 1.2 to 1.5.

## TEMPORARY OVERVOLTAGE (TOV)

A TOV is an oscillatory phase-to-earth or phase-to-phase overvoltage at a given location in a system, of relatively long duration and that is undamped or only weakly damped.

## EXAMPLE OF TOV [3]

In a typical system, the most severe temporary phase-to-earth TOVs are caused by unbalanced ground faults. A single-phase to ground fault can give rise to an earth fault factor of 1.4 on the healthy phases of an effectively earthed system. For a non-effectively earthed system, such as in distribution systems, this fault factor can be as high as 1.73 i.e. for phase-to-phase insulation, load rejection is important and its magnitude is assumed to be  $1.4 \times U_{max}$  (phase-to-phase). The overvoltage factor for Ferranti-effect gets to as high as 1.05 for a line approximately 300km and 1.16 for a line 500km. Ferroresonance overvoltage factor is not as high as the previous. It often only affects sensitive equipment connected parallel to a capacitive load.

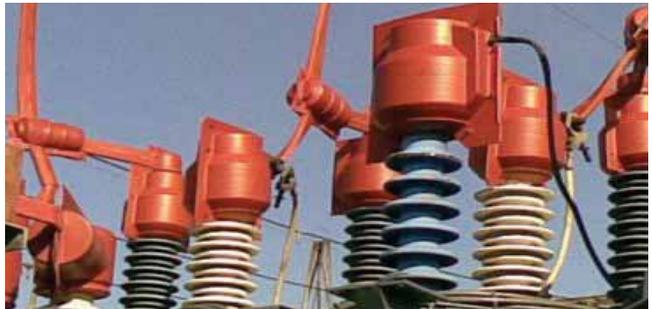
## CONCLUSION

Both transient and frequency overvoltages, their source and behaviour, have been discussed. The severity has also been highlighted. The graph below gives the summary of these overvoltages. **wn**

## REFERENCES

- [1] *The Surge Protection Resource Center for Power Systems*, [http://www.arresterworks.com/history/pdf\\_files/crystal\\_valve\\_brochure.pdf](http://www.arresterworks.com/history/pdf_files/crystal_valve_brochure.pdf), last accessed 19 January 2011.
- [2] *IEC Standard Voltages*, IEC 60038: 2009
- [3] *Bisnath S and Pillay T (eds.), The Planning, Design and Construction of Overhead Power Lines*, 1st ed., Johannesburg, Crown Publications CC, February 2005.
- [4] *South African Weather Service (SAWS)*, <http://196.25.43.195/Pressroom/2006/2006Jan13LightningDetectNetwork.pdf>, last accessed 19 January 2011.
- [5] *South African Weather Service*, <http://www.weathersa.co.za/>, last accessed 19 January 2011.
- [6] *Insulation Coordination*, IEC 60071-1: 2006

Look out for part 2 in our January issue - available from 9 January 2012



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# I've never been ashamed to tell everybody that I was an ISCOR "appie".

BY | GEOFF CARTER | PR TECH ENG | BSC HNDT MSAIEE

I am a millwright. During the course of my career I have come across Iscor trained millwrights in some very senior management positions. The mines, SAR&H, ISCOR, Scaw Metals, were but a few of the training facilities available in my day. They produced excellent artisans and there was no shortage of skills. The excellent work that these artisans produced was to be found in the sub stations of the councils, the hoist rooms of the mines and the mills of the steel plants. They ran like clockwork and you could eat your lunch off the floors.

My generation are 'toppies' now. We have aching joints, stiff backs and it is sometimes a little hard to get out of bed in the mornings.

And I am sad.

In the first instance, I am sad for the fact that there is nobody as good as us to take over our work.

In the second instance, I am sad for the generation of youngsters who have been led to believe that they are good enough. Lied to by a succession of professional politicians and gravy train passengers who themselves have nothing but their own self serving interests at heart. They have created expensive organisations and bodies whose sole reason for being is to provide the minimum of training and the maximum revenues to those who run them. The certificates that are

handed out aren't worth the paper they are written on.

We are now being led to believe that the government will produce 30 000 artisans in the next few years.

Just exactly who in the government will do this? Have any of them passed a trade test and do any of them have the slightest idea of the standard required?

In my opinion just another empty irresponsible promise in order to ensure the longevity of somebody's political career.

The political inheritance of the young is one of promises of unfulfilled "rights" and unenforced duties.

The unions and others have seen to it that the youth expect everything to be handed to them on a plate. The right of entitlement encourages an attitude that as long as you attend school you will be handed a diploma after a period of time. If the diploma is not forthcoming, then burn the school down and murder the teacher who refused the diploma. As long as you are at work, you will be paid, irrespective of your value to the boss who pays you.

How does the government expect to train an ill disciplined youth? I have seen what these youngsters are capable of. Many of my older

I did my time in D block under the tutelage of men like Ronnie Mathys, Basie Kruger and "oom" Buck Buchanan. What they taught me has kept bread on the family table for 30 years.

black colleagues have told me of the fear they have for these hordes of marauding thugs who in some cases are their own children.

I for one have no interest in assisting with training youngsters like these. They have an appalling work ethic and from my perspective have no inclination to accept the discipline required to produce the kind of artisan that this country requires. The empty promises being made to these youngsters are going to jump up and bite us all.

If these apprentices are allowed to belong to unions etc the plan is doomed from the start. Some ambitious politician will see an audience and step onto the stage. Once again we will not have the ability to weed the weak out and retain the strong. The moral stance of those weeded out will no doubt ensure that those chosen will run the gauntlet of hate and destruction fostered by the empty promises being made to the weak.

I would like the government to explain to me what they are going to do to ensure that those of us who can train apprentices will be given an environment free of political and social manipulation and young people disciplined enough and willing to learn. Until that is guaranteed, they have no hope of producing even 3 half decent artisans. I am not optimistic. **wn**

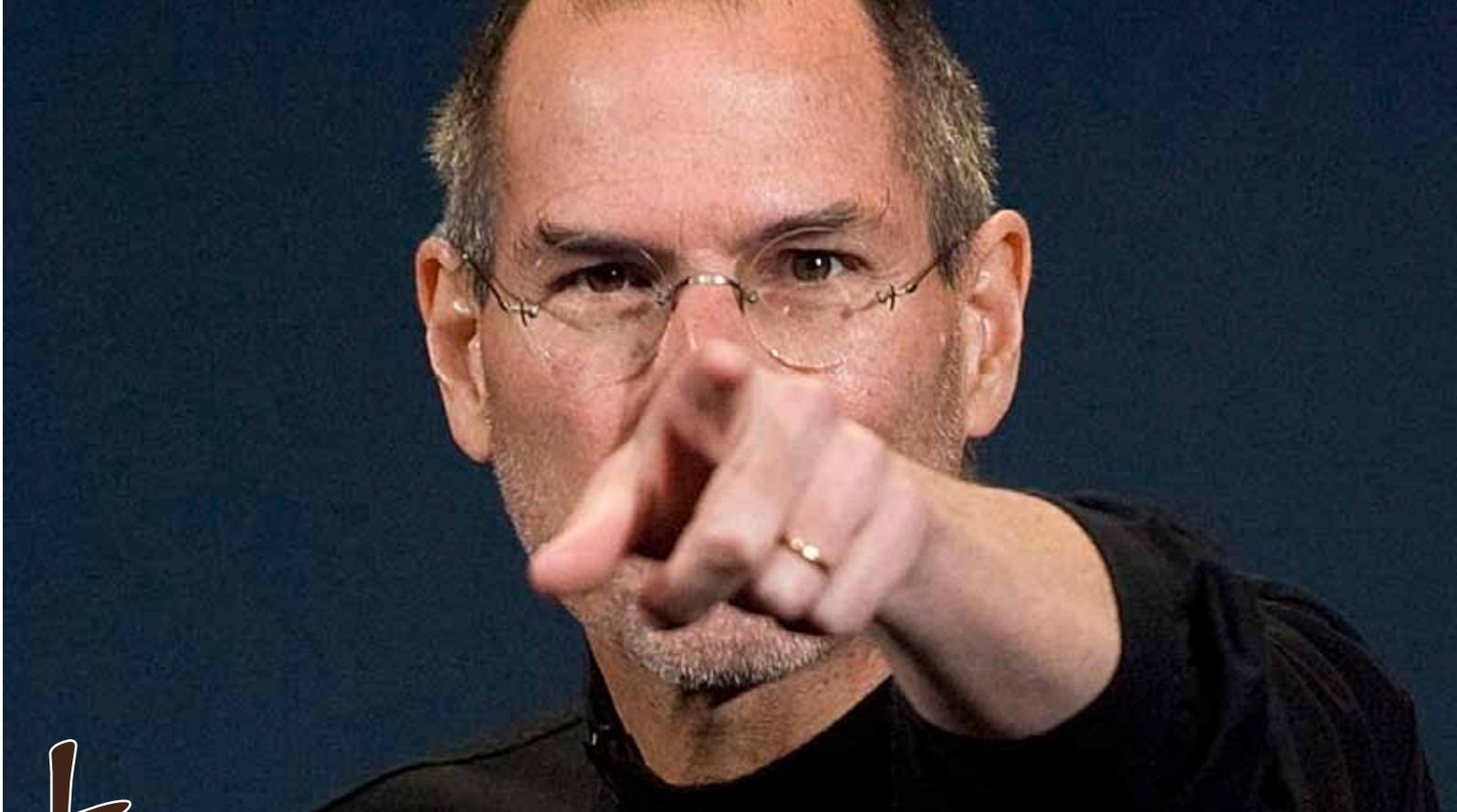
*iscor appie*



# 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.





**t**he 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 Brendon Viljoen on the number below. He has a database to match the profiles of mentors and mentees.

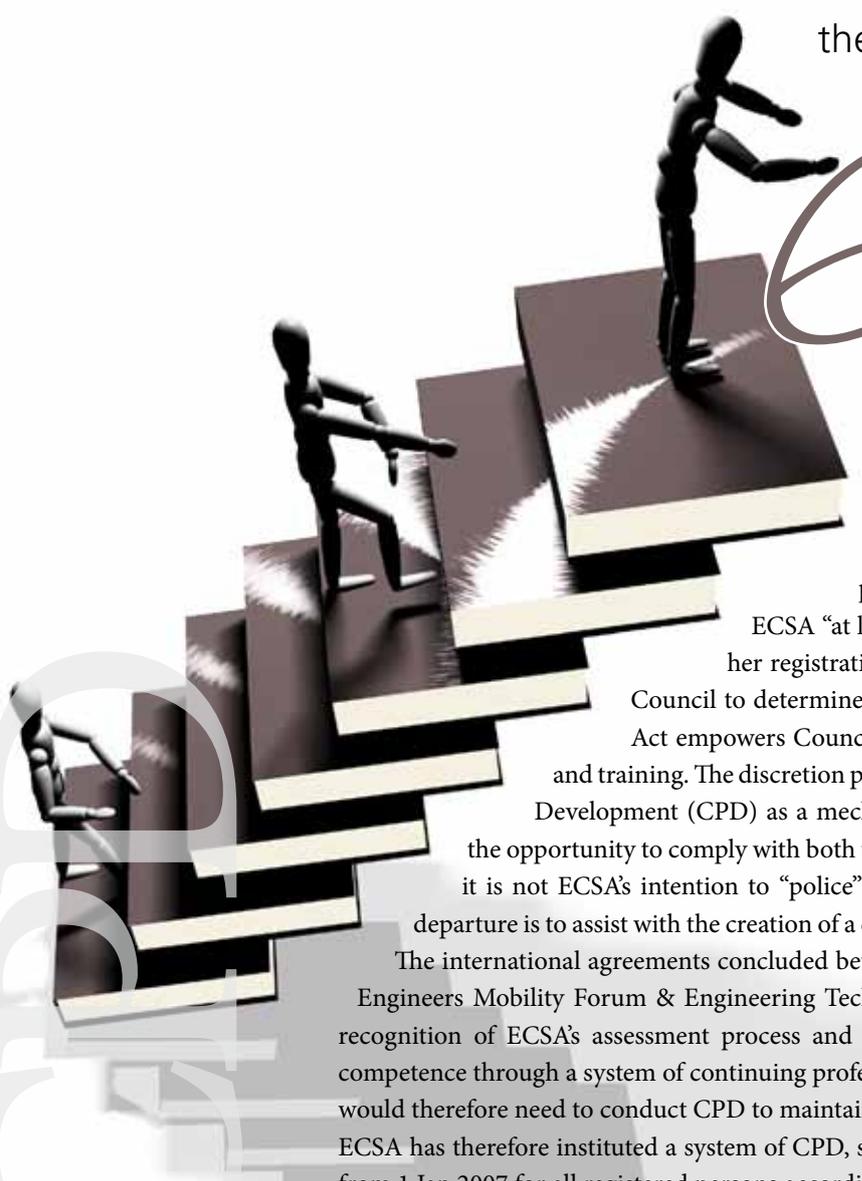
#### **Prospective SAIEE Mentors**

*If you feel you that you have the time and interest to help mentees, please contact Brendon Viljoen on 011 487 9042 or [brendonv@saiee.org.za](mailto:brendonv@saiee.org.za). In addition you gain CPD credits, for when you are required to re-register. **wn***



# Have you earned your credits this month?

ECSA is responsible for regulating the practice of engineering in South Africa. Registered persons are required by their Code of Conduct to practice strictly within their area of competence and to maintain and enhance this competence. They therefore have the responsibility to keep abreast of developments and knowledge in their areas of expertise in order to maintain their competence. In addition to maintaining their own competence, they should strive to contribute to the advancement of the body of knowledge with which they practice, and to the profession in general.



ECSA is charged by the Government in terms of the Engineering Profession Act, 2000 (Act 46 of 2000) (hereinafter referred to as “the Act”) to serve and protect the safety and health of the public by establishing and maintaining minimum standards of practice, knowledge and skills of registered engineering persons in the country as well as to establish and maintain standards of professional ethics among them.

Section 22(1) of the Act imposes a duty on a registered person to apply for the renewal of his/her registration with ECSA “at least three months prior to the prescribed expiry date of his/her registration”. Subsection (2) of this section confers the power on the Council to determine conditions for renewal of registration. Section 13(k) of the Act empowers Council to determine conditions relating to continuing education and training. The discretion provided for in the Act to make use of Continuing Professional Development (CPD) as a mechanism to determine renewal of registration, gives Council the opportunity to comply with both the renewal of registration and CPD requirements. However, it is not ECSA’s intention to “police” each and every registered person’s career. ECSA’s point of departure is to assist with the creation of a culture of CPD for the South African engineering profession.

The international agreements concluded between ECSA and other international engineering bodies i.e. Engineers Mobility Forum & Engineering Technologists Mobility Forum have as a requirement for both recognition of ECSA’s assessment process and continued registration of individuals, the maintenance of competence through a system of continuing professional development. South African registered professionals would therefore need to conduct CPD to maintain their International registration.

ECSA has therefore instituted a system of CPD, starting in 2006, which was linked to renewal of registration from 1 Jan 2007 for all registered persons according to the policy set out in this Document.

# SAIEE CPD Courses

## Power System Harmonics

On the 27 – 29th September 2011 the SAIEE held a Power System Harmonics Course at the Corporate Conference Centre in Dowerglen Edenvale that was presented by Prof. Piet Swart who has years of experience in Theoretical and Practical training both in the Tertiary, corporation and public fields. There were 11 delegates that attended the course with great excitement, the presentation was well received and enjoyed by all attendee's, who received 3 CPD credits for attending the event.

This course consisted of three parts: Revision of relevant Power Systems Theory, An introduction to Power Systems Harmonics and Practical methodology and theory of Harmonics Mitigation. This course deals with both the intimacies and practicalities of Power System Harmonics and is intended for everyone who



has encounters with harmonics and as a stepping stone for those who wish to specialize in Power Quality and Harmonics analysis and mitigation. It furnishes a bridge between University/Technicon training and the practical realities of modern Electric Power Systems. The three components above must be engaged in consecutively over three days and an option exists for extending the course to a fourth component, namely the design and testing to satisfaction of a complete passive harmonic filter network. The course is presented in the Mathcad Mathematical format. Copyrighted source materials in the Mathcad Format are available to interested delegates after the course for continued experimentation and insight.



## Technical Report Writing

On 26 – 27th October 2011 the SAIEE held a Technical Report Writing Course at the Corporate Conference Centre in Dowerglen, Edenvale that was presented by Malcolm Haffner who holds a BSc Honours degree in Atmospheric Sciences from the University of the Witwatersrand and a Post Graduate diploma in Education. After an 11 year stint in teaching, Malcolm opened his own business running leadership and team-building programmes for schools and young people. In addition, he has also owned and run a number of other small businesses. Currently Malcolm is a partner in Re-engage Training. Re-engage Training reflects Malcolm's commitment to assisting people to achieve their full potential in the workplace and as individuals.

The course was very well received by all 23 attendees. The course is for those in the technical environment, needing to effectively communicate in writing and thus develop their relationships with colleagues and customers.

## Transmission Line Fundamentals



On Wednesday the 12th October 2011 the SAIEE held a Transmission Line Fundamentals course at the S.A. Museum of Military History in Saxonwold Johannesburg, that was presented by John Michel Smith who is a fellow member of the SAIEE who is an experienced University

Lecturer and has been engaged in in-house training for large corporations for several years. There were 23 delegates that attended the course, the presentation was well received by all attendee's who received 1 CPD credit for attending the event. **WN**

# SAIEE Membership

## What's In It For Me?

Members of the SAIEE now enjoy a wide array of benefits starting at a R950 discount on their ECSA registration fee which is due in April every year, provided you join the SAIEE before the end of March of the same year.

Upon joining the SAIEE there is a standard entrance fee of R650 and an annual membership fee of R756.00 for members, and between R924.00 and R1002.00 for senior members depending on age. Most of this will be recovered through the ECSA discount.

SAIEE members receive 11 free issues of the WattNow magazine valued at R330 along with the quarterly African Research Journal - our local research and development magazine.

However, the real rewards of being a SAIEE Member can be realized through attending our monthly lectures, debates, tours and site visits, which are mostly free and accompanied with refreshments at no extra cost. Members are awarded valuable CPD credits for attending these events & functions.

Being a member has significant career benefits, as

membership holds prestige and recognized status in the profession. SAIEE gatherings provide excellent opportunities for its members to interact with normally inaccessible senior leaders in the industry. Letters after your name indicate your membership grade and are a useful measure of 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 in gaining professional status through the Institutes large database of mentors. SAIEE members are awarded 1 CPD credit (Category3) for being a member.

Members are able to serve on organizing committees and gain valuable experience in doing so, while learning how to run formal meetings and practice technical presentations in a low risk environment.

### APPLICATION REQUIREMENTS FOR SAIEE MEMBERSHIP

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

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

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

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

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

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

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

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

# Membership Fees

*Effective January 2012*

Council at its meeting held on 02 September 2011 decided that subscription and entrance fees as from 01 January for 2012 should be as indicated below. Please note: In terms of Bylaw 3.2 annual subscriptions shall become due on 1st January each year. To encourage members to pay their subscription fee early, Council agreed to allow a discount if such fees are paid before 31 March 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)
<b>Student</b>	106	75	118	84	118	84
After 6 yrs study	684	486	760	540	760	540
<b>Associate</b>	684	486	760	540	760	540
<b>Member</b>	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
<b>Senior Member</b>	924	656	1,027	729	1,027	729
after 6yrs/age 40	1,002	711	1,113	790	1,113	790
<b>Fellow</b>	1,002	711	1,113	790	1,113	790
<b>Retired Member</b> (By-law B3.7.1)	423	300	470	334	n/a	n/a
<b>Retired Member</b> (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.**



# Hatch honoured with top safety award after breaking SA record

**W**atch has become internationally recognised as a preferred supplier of engineering, procurement and construction management (EPCM) services to mining operations worldwide, thanks to the company's proven track record of safety and service delivery excellence.

Hatch regional director for Africa - mining and mineral processing Lister Sinclair points out that the company, together with Kumba, now holds the South African record for mine safety, as it approaches 15-million lost time accident free man hours at Kumba Iron Ore's Kolomela Mine in the Northern Cape, South Africa. Kolomela is a newly-developed 9 Mtpa open-pit iron ore mine, located around 80 km south of Kumba's flagship Sishen operation. Hatch is the EPCM contractor for the plant and stockyard areas, and is scheduled to complete its scope of the project ahead of schedule.

"Hatch Africa and Kumba are heading towards a world-class safety record of 15 million accident free man hours, a feat which has

never been achieved in South Africa before. This achievement has been made possible through a committed and transparent working relationship between Hatch, Kumba and the various contractors under their control, and we have previously received recognition for our efforts on other projects, by being awarded the Anglo American's CEO safety award of the year," he explains.

Sinclair adds that Hatch has maintained its high standard of project management at the QIT Madagascar Minerals ilmenite project, where the company was contracted to construct a mine, treatment plant and associated infrastructure, including a new port. "Having achieved about 12,7-million lost time injury (LTI) free hours in Madagascar is an outstanding effort in a country where the workforce has minimal exposure to construction projects and related safety measures. As a result, Hatch was awarded the Rio Tinto safety award of the year."

Sinclair explains that Hatch Africa is playing a key role in one of the company's largest Canadian projects – the K3 mine in Saskatchewan, where

Hatch continues to set the standard as a global leader in the implementation and execution of project management in the mining industry, following a number of successful and high-profile contracts.



Lister Sinclair

two shafts, 1 100-m-deep and 6-m-wide, are being sunk. "This is an enormous project, and will involve erecting the tallest headgear in the world, which will accommodate winders to hoist 60 ton skips."

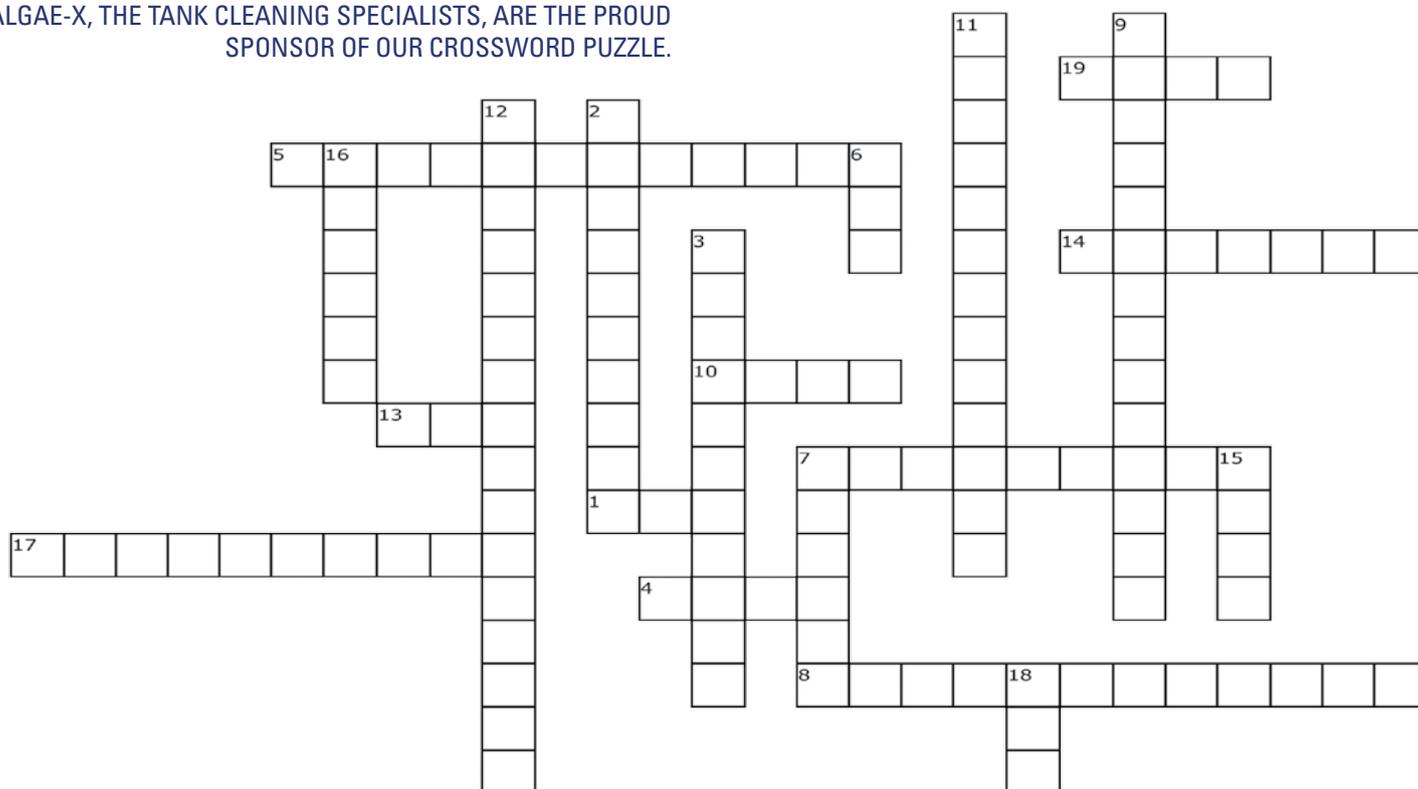
Due to the fact that the South African office is the main repository of the deep level mining skills within Hatch, experts from that branch have been called in to help with the shaft, the winders and underground development, while the Canadian office is managing the surface infrastructure. "We're also installing BMR winders in the headgear structure. This has never been done before so this is a groundbreaking project in many ways."

Looking to the future, Sinclair admits that the unsettled world economic outlook may result in another dip in mining activities. He does however, remain confident about Hatch Africa's prospects in the short to medium term. "In terms of minerals and mining, Hatch Africa is generally in an expansionary mode, and I am optimistic and confident about the year ahead," he concludes. **WN**

Have some fun and stand a chance to win R1000. Complete the November crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, November Crossword Puzzle, P.O. Box 751253, Gardenview, 2047* or email it to *wattnow@saiee.org.za*. The completed crossword puzzle should reach us by no later than **15 December 2011**. The winner of R1000 will be announced in the February issue of the WattNow magazine.

# R1000

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



#### ACROSS

1. The inability of an imaging tube to respond to instantaneous changes in light
4. Prefix for metric unit that indicates division by one billion
5. The change in the colour of light emitted by heavenly bodies?
7. What does the NF in NFC stand for?
8. What does the AM in AMOLED stand for?
10. Mr Dirac's first name?
13. WAVE DIMENSIONAL MULTIPLEX (abbr.)
14. Very light metal used in batteries?
17. God particle?
19. Legislation to control mobile phones?

#### DOWN

2. What does the O in OFDM stand for?
3. A voltmeter
6. Tape Automated Bonding (abbr.)
7. Mr. Tesla's first name?
9. Energy of motion
11. Energy produced by water, usually from storing it in dams
12. The study of the effect of electric charges at rest and in motion
15. Demand Assign Multiple Access Protocol (abbr.)
16. Double the frequency?
18. Common notation for the FET gate-to-source voltage (abbr.)

Terms and conditions: 1. Only one entry per person. 2. Winners will be notified via email. 3. Incorrect information will automatically disqualify the entrant. 4. Anybody may take part except the office staff of the SAIEE, their family members and members of the Publications Committee. 5. WattNow magazine and the SAIEE cannot take any responsibility for lost entry forms or any damage, losses or injuries related to the draw of the prize. 6. The winner must be prepared to be photographed and such photograph will be published in the relevant issue of WattNow magazine. 7. Closing date for entry is 15 December 2011. 8. The winner will be announced in the February issue of the WattNow magazine. 9. The Managing Editor's decision is final and no correspondence will be entered into.

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# 2012

# Calendar of events

If you want to see your function or event listed here, please send the details to Gerda Geyer at [geyerg@saiee.org.za](mailto:geyerg@saiee.org.za)

## January 2012

9 SAIEE Head Office open after holidays

## February 2012

3 Council Meeting

6-9 Investing in African Mining Indaba

21-23 Africa Energy Indaba 2012

28 - 2 Africa Roads 2012

t.b.c. SAIEE Golf Day

SAIEE House

Intl Convention Centre, Cape Town

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

Sandton Convention Centre, Johannesburg

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

Sandton Convention Centre, Johannesburg

[www.terrapinn.com/2012/africaroads/](http://www.terrapinn.com/2012/africaroads/)

Benoni Lake Golf Club

## March 2012

2 Council Meeting

26-29 Power & Electricity World Africa Expo

29 SAIEE AGM

SAIEE House

Sandton Convention Centre, Johannesburg

SAIEE House



MINING - INFRASTRUCTURE - ENERGY

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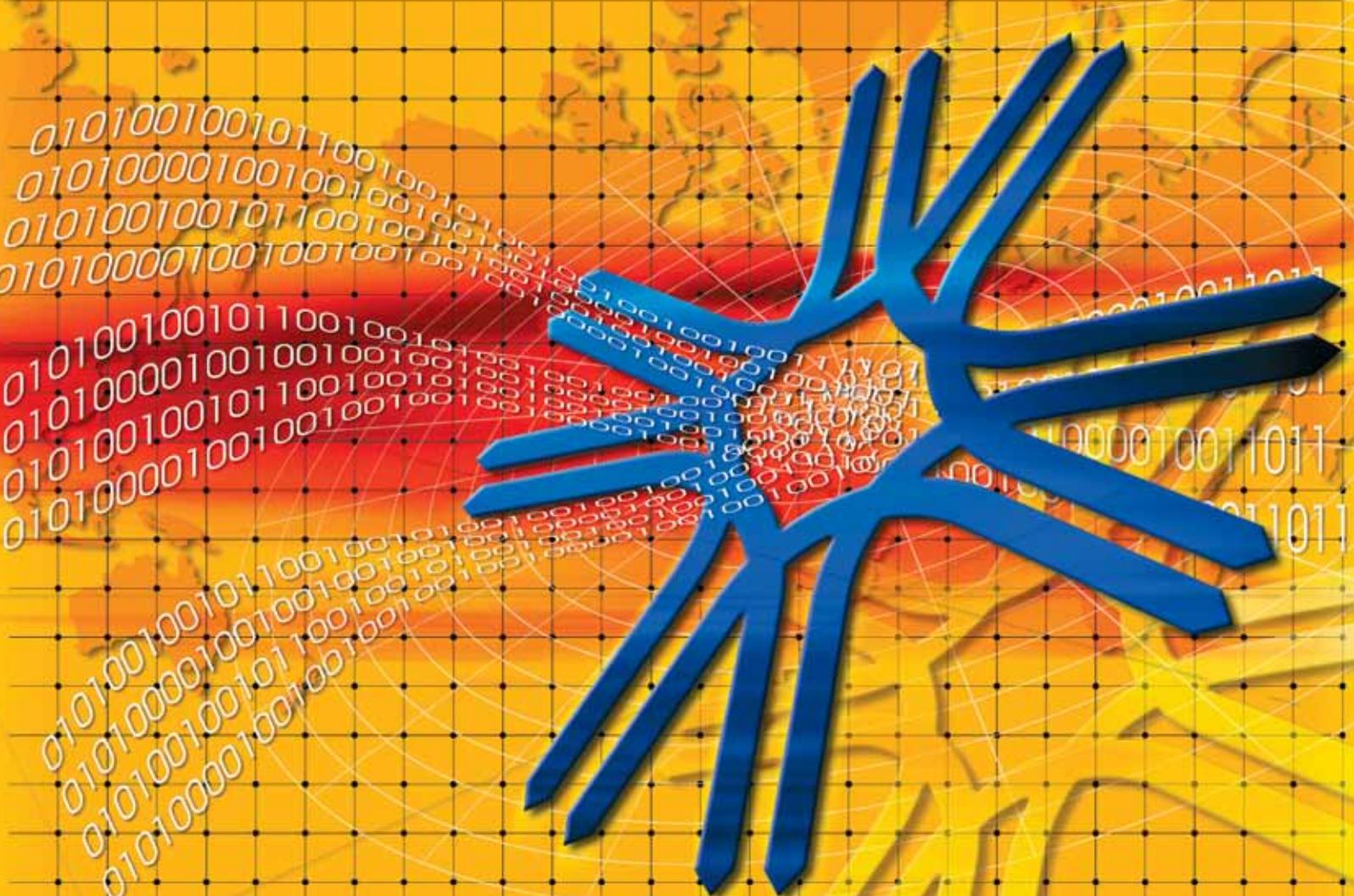
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# SMART GRID TECHNOLOGIES

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## Power Electronics

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