wattnow

SAIEE SUPPORTS ENERGY EFFICIENCY AND THE ENVIRONMENT

RSA | R30.00 incl. VAT

THE PRESIDENTIAL ISSUE

SAIEE THE OFFICIAL MOUTHPIECE OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | **MAY 2013**

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wattnow magazine

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ISSN: 1991-0452

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It's that time of the year again where we celebrate the election of the new SAIEE council members and its new President. For those of you that were unable to attend the AGM at the end of March, we showcase the inauguration on page 12.

The inauguration of the new president, Mr Paul Van Niekerk was an auspicious event like only Gerda Geyer can organize. Well-done Gerda.

Page 28 features Paul van Niekerk's inaugural speech "Independent Power Production and Infrastructure Development" the article deals with the dichotomy that exists within the South African landscape, the difficulty of solving the challenges we face and most importantly, what we as industry leaders can do to aid in this situation.

The **watt**now magazine prides itself on being relevant and topical and with this in mind the May issue focuses on a subject that is not only relevant but also a source of raging debate across the world, and that is Insulator Testing. On page 36 we publish an insightful paper by Dr's Vosloo and Swinny from the Eskom Research, Test and Development team. The subject of the paper is the Koeberg Insulation Pollution Test Station, and due to the relevance of the subject we have decided to publish the paper in its entirety instead of two parts. Get the coffee, put the feet up and enjoy this interesting article.

Management of the **watt**now as well as the SAIEE are committed to service delivery and as a result are acutely aware of the frustration caused by the recent postal strike and the non delivery of the February through to March issues of the **watt**now magazine to many of our subscribers. With the above in mind it was decided to make the three effected issues available for online reading which was sent out in the weekly newsletter.

Hope you enjoy the read as much as I enjoyed putting it together.

Enjoy the read!

PS: April 2013 issue, pg 14: Correction
– Ansie Smit was employed for 22 years by the SAIEE.

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

Greetings to you all from the desk of the SAIEE President.

The first month of my tenure in the 'Chair' has been rather eventful. This started with my inauguration on 27 March 2013. It was a humbling experience to be inducted as the head of this esteemed 100 year old Professional Institute, and as previously stated, I will do my very best to uphold the standards set by my predecessors, at the helm of this prestigious organisation.

The AGM was held at the war memorial auditorium in Saxonwold, Johannesburg and rather well attended, despite there being between two long weekends, and once again very well organised by Gerda from the office of the SAIEE.

My Presidential address is included in this issue of **watt**now and as you are aware, my theme for the year is:
"To promote the skills, and hence the Professionalisation of Electrical Engineers, Technologists and Technicians to meet the identified needs for job creation and infrastructure development in South Africa".

As is always the case when the new President is inaugurated, the SAIEE committees have to be re-established to do the work of the SAIEE for next year.

Some of the changes that have been introduced this year, is the formalisation of the SAIEE restructuring team which has been combined with the Legal & Constitutional working group to ensure that a strategy is formulated before any restructuring is considered. This committee will be chaired by our immediate past President Mr Mike Cary and the Deputy will be Mr Viv Crone, while all the active past presidents on Council will serve on this committee to provide collective wisdom on a way forward for the SAIEE. Included in their mandate is the requirement to make provision for an executive function within the SAIEE to provide a SAIEE mentorship programme.

Other committees will also be subject to review and the team that has been appointed to Chair these working groups are as follows:

COMMITTEE	CHAIR	VICE CHAIR
Office Bearers	Paul van Niekerk	Pat Naidoo
Finance	Pat Naidoo	Andre Hoffman
Restructuring & Constitutional	Mike Cary	Viv Crone
Facilities	Jane Buisson Street	Bill Bergman
Membership	Rex van Olst	Prince Moyo
Events & marketing	Andre Hoffman	Pat Naidoo
Education and Training	Andries Tsabalala	Nlhanhla Maphalala
Professional Development	John Gosling	TC Madikane
Publications	Viv Crone	Hendri Geldenhuys
Technology Leadership	Michael Grant	Prince Moyo

The SAIEE Sections will be as follows:
Electronics and Software section will be Chaired by Mr Ian Gebbie;
Power Section will be chaired by Ms Thandiwe Nkambule;
Historical Section will be chaired by Mr Max Clarke.

These teams will meet every Council day at a minimum to ensure the efficient operation of the SAIEE. I am very grateful to these dedicated professional people who have kindly volunteered their time to participate in the support and professionalisation of our Industry.

Each of these committees has a set of terms of reference that include clearly defined objectives for the year.

- The SAIEE Finance Committee is responsible for the daily execution of financial issues, including payment of routine costs and managing non routine expenditure and investments. The SAIEE is a big business with annual turnover in the region of R7M and has investments of R28M plus property worth in excess of R11M;
- The Facilities Committee, besides managing of the SAIEE campus in Observatory, will also include in their terms of reference for 2013 the finalisation of the furnishing of the Museum at Innes House;
- The Membership Committee will register and manage qualification of new members of the SAIEE, they will also keep an accurate record of members, and look after the interests of members;
- The Marketing and Events team will of course, as the name implies, organise the events and maintain external relations with colleague organisations such as the IEEE and the IEE. In addition, they will coordinate SAIEE workshops, and events;
- The Education and Training Committee have a very important function of managing the education standards and award of SAIEE bursaries, they also ensure that the pipeline of children entering the field of Electrical Engineering is maintained. A current project that has been going for a few years, is the Bergville project, where SAIEE members have volunteered time and effort for the development of Math and Science amongst rural children which has really borne fruit and produced the best final year Engineering Student at KZN University in 2012;
- The Professional Development Committee is responsible to ECSA, for the registration of Engineers, PAC and EPAC and relations with external stakeholders including Government and international cooperation. They are also responsible for managing the Continuing Professional Development (CPD) activities of SAIEE and accreditation and validation of external training organisations. An additional, all important function is the management and control of the modified mentorship programme;
- The Technology and Leadership Committee are primarily responsible for review of current technology activities, Industry Association activities, participation on SABS and other relevant external committees including current issues such as IRP NDP and other documentation that affect the Electricity industry;
- The Publications Committee is inter-alia responsible for the publication and financial sustainability of **watt**now and the peer-reviewed Africa Research Journal (ARJ) and any other in house publication required in addition to the SAIEE Website.

All committees plays an integral part to the promotion of Electrical Engineering and the maintenance of standards in Electrical design in South Africa, and it is our responsibility as the South African Institute of Electrical Engineers to set examples and create opportunities to maintain this standard of Engineering.

Paul van Niekerk Pr. Eng
SAIEE President 2013

WATTSHOT

Father's Day is celebrated on the 16th of June 2013, let's spoil him...

The Bush Baby combined lantern and torch

The Bush Baby combined lantern and torch adopts the principle of cranking for power.

By cranking the handle, the internal battery is charged, which then feeds a direct current to the unit's powerful LEDs. The crank handle can be neatly locked away after charging. The Bush Baby can be used as a camping lantern or a super bright torch, and has a self-locking hook on the bottom of the product for added convenience. This product has a high and a low level LED light setting - it can produce bright task lighting or a dimmer ambient light.

The Bush Baby combined lantern and torch (code: 18471) is available at The Lighting Warehouse and retails for R139.95.

Visit www.lightingwarehouse.co.za

The Seal LED Dynamo flashlight

The Seal LED Dynamo Flashlight works on the cranking-for-power principle. This product is waterproof for up to 10m under water – making it ideal for fishing expeditions or for use in the rain.

It has a single waterproof switch that operates the three light settings of the high-power LEDs – including a flashing function, which is ideal for emergency situations. The Seal LED Dynamo flashlight is a shock-resistant product and can be used to charge a mobile phone.

The Seal LED Dynamo Flashlight (code: 18472) is available at The Lighting Warehouse and retails for R179.95.

Visit www.lightingwarehouse.co.za.

Glow In The Dark Toilet Roll

Now you'll always be able to find the toilet paper - even in the dark - with this new Glow in the Dark Toilet Paper!
If you don't want to wake anyone up in your household at night by switching on the light, you can follow the glow of this groovy loo roll to your bathroom. Perfect for powercuts or glow in the dark mummy outfits, this exciting bathroom accessory will ensure you'll never want to use normal loo roll again.

Features:
Glow in the dark toilet roll
Specially customised toilet roll
Perfect novelty gift
Price: R80 (incl.)

Zip Style Earphones (Black)

Quality sound with a funky zip style.
Sick of your earphone wires tangling in your bag or pocket? These zip earphones are the perfect solution - just zip them up when not in use!

Available in 3 on-trend colours, orange, black or pink, use the earphones to brighten up any outfit.

The fully working zip not only adds flair, it also aids functionality: Try unzipping to full length when sharing music with a friend and then zipping them the whole way back up when not in use.

Price: R165 (incl.)

Inflatable Beer Bucket

There's nothing better than enjoying a cold drink out in the sunshine, but nothing worse than reaching for a bottle of beer, only to find it's warm!

The solution is to keep your beers and other drinks cool in an ice bucket and this inflatable giant beer tankard drinks cooler is just the thing for filling with beverages at outdoor parties or barbeques.

Blow it up, fill it with ice and bottles of your favourite beer, then chill out and enjoy! Literally a very cool novelty that's really useful for summer.
Features:
Inflatable giant beer bucket
Simply blow it up add ice and drinks
Perfect for braais
Floats
Easy to use
Price: R199 (incl.)

True Utility Nail Clip Kit

Tough and easy to use, this great multi-function nail clip kit can be attached to your key ring. These strong, straight-edged nail clippers will produce precise, clean results and they are easy to use at arm's length. The strong design provides good levarage on even thickened or difficult nails. Attach to your key ring or keep in your purse, discreet and lightweight.
Features:
Flick-out nail clippers; Nail file & screwdriver; Scissors; Knife; Key ring
Product Size: L56 x W15 x D9mm
Price: R199 (incl.)

All the products featured on pages 8 & 9 are available online at www.mantality.co.za unless specified differently.

WATTSHOT

A few must-have's for the female engineer....

Personalized Modern Glass Clock Gift

Polished glass provides the dramatic framework for the silver tone clock, anchored by silver tone columns. It makes a memorable anniversary gift or an impressive recognition gift for a staff member - especially when you add an engraving to complete the presentation.

Printed Backup Battery For iPhone

A have-to-have accessory we're already addicted to: This supercute backup battery goes everywhere—even in the tiniest of clutches. In exclusive custom-developed prints, it's the chicest way to recharge on the go. Compatible with the iPhone 3G/4/4S.

Overlap Tray - Birch

Curl up next to the fire with your work and the Overlap Tray.

This hybrid table allows you to bring your office with you. Check email on the deck or take breakfast to your partner in bed.

Sensuously molded ply with a Walnut wood veneer, and cork covered area for your cup of coffee.

Designed by Eric Pfeiffer.

Personalized Beaded Business Card Case Gift

Whether it's securing a new job or closing the deal with a new client, the right detail can make all the difference. This elegant, sophisticated card case just might be it.

Its classic silver plating is a timeless nod to success and luxury, while the delicate beading detail lends a note of refinement that's both chic and subtle. Engrave it with your hopes for her success, and you just might have a hand in helping achieve it. While delicate in appearance, this is a heavy-duty card case with a sturdy design to help protect business cards.

-A great gift for birthdays, new jobs and promotions.

Freshwater Cultured Pearl Woven Necklace

With 14k White Gold strands of different sizes of freshwater cultured pearls are woven together to form this unique necklace, finished with a 14k white gold filigree clasp. A must have for the special person in your life!

All the products featured on page10 are available to purchase online at www.gifts.com

WATTSUP

SAIEE AGM

The 2013 SAIEE AGM took place at the SA Museum of Military History in Johannesburg.

The 2013 SAIEE President, Mr Paul van Niekerk was inaugurated at this meeting after a review of the SAIEE's audited Financial Reports. In his presidential address, Paul van Niekerk will focus his year as president on "The building of skills and professionalisation of Electrical Engineers ".

It was an auspicious event which saw SAIEE Council Members rubbing shoulders with our esteemed guests.

The Presidential address is featured on page 28 in this issue of the **watt**now magazine.

Mike Cary, 2012/13 SAIEE President handing the newly inaugurated 2013/14 SAIEE President, Mr Paul van Niekerk his presidential pin.

Andries Tshabalala presented Mike Cary with his Past President's badge.

Elizabeth van Niekerk with Margaret Cary.

Paul van Niekerk with Pat Naidoo, Deputy President, SAIEE.

Paul van Niekerk with André Hoffmann, Senior Vice President.

TC Madikane, newly elected Junior Vice President with Paul van Niekerk.

Paul van Niekerk with Viv Crone, Honorary Treasurer.

Paul van Niekerk with Sarel Schoombie, Honorary Vice President.

Paul van Niekerk with Ian Gebbie, elected Chairman of the E&S section.

Paul van Niekerk with Max Clarke, Chairman of the Historical Section.

Ken Nixon with Ian Gebbie.

A few of our members enjoying the festivities.

Margaret & Mike Cary, Immediate Past President.

Rabelani Dagada - President, Computer Society of SA with 2013 SAIEE President, Paul van Niekerk.

2013 SAIEE President, Paul van Niekerk with his family.

Prof. Jan de Kock

Alwani Ralineba, SAIEE Bursar.

WATTSUP

Seating (left to right): Mike Cary (2012 SAIEE President), Cyril Gamede (ECSA President) and TC Madikane (SAIEE KZN Centre Chairman) Standing (left to right): Pat Naidoo (SAIEE Senior Vice President) and Veer Ramnarain (SAIEE KZN Centre Vice Chairman)

TC Madikane presented Gill Nortier, the organiser of the event with a token of appreciation on behalf of KZN committee members. Gill has been a Secretary of SAIEE KZN Centre for more than 30 years. She has been very instrumental in ensuring that the KZN Centre runs smoothly and professional.

KZN CENTRE DINNER & DANCE

The KZN SAIEE Centre had Dinner and Awards evening on Friday, 30 November 2012 at Durban Country Club. The event was well attended by more than 200 members and visitors. The guest speaker was Mr Cyril Gamede, the ECSA President. The recipients of the awards were as follows:

A. Category: Significant project award

1. Title: Greater East London strengthen scheme phase 1
   a. Project Leader: Krish Govender
   b. Client: Eskom
   c. Consulting Engineers: Eskom

2. Title: Electronic Bicycle Line Management and People Counting System Project for Cop 17 in Durban
   a. Project Leader: Rob Anderson
   b. Client : Ethekwini Municipality
   c. Consulting Engineers: Rob Anderson and Associates Consulting Engineers

B. Category: SAIEE KZN Centre Lifetime Contribution Award to Cyril Rutters

Recipients receiving awards from the President of SAIEE, Mike Cary (middle) with Rob Anderson on the left and Krish Govender on the right.

Winners: Cyril Rutters Pr Eng and his portfolio regarding SAIEE activities reads as follows:

· Joined the SAIEE in 1984 - upgraded to SAIEE Fellow 2001;
· Served on KZN Centre Committee since 1989
· Served as KZN Centre Committee Vice Chairman 2003
· Served as KZN Centre Committee Chairman 2004
· Served as KZN Centre Committee Immediate Past Chairman 2005
· Served as Past Chairman on KZN Centre Committee 2006 to date.

PROMOTING ENGINEERING KNOWLEDGE AND PRACTICE

The Wits Power and HV research groups that attended SAUPEC 2013 at North-West University.

North-West University in Potchefstroom hosted the annual South African Universities Power Engineering Conference (SAUPEC) from 31 January to 1 February during its "O-week".

The conference plays a vital role in promoting engineering knowledge and expertise among the relatively small South African Power and High Voltage engineering academic community. Consequently it is no surprise that Wits University's School of Electrical and Information Engineering (EIE) made one of the strongest showings, delivering ten of the 27 presentations and providing almost a third of the participants.

Wits EIE's invaluable contribution to the conference is part of its drive to grow postgraduate research to promote the search for knowledge within the broad field of engineering to solve the tough engineering problems of the day.

It has long realised that solutions are not isolated within a single specialist field, leading to the creation of its three major research thrusts: energy, information and systems, all of which were represented in its presentations which covered 4th year projects from 2012 and current post-graduate research.

A wide range of topics was aired in the 27 presentations, ranging from renewable energy and energy efficiency fields to high voltage and power-grid disciplines, while also including "fringe" aspects such as sociological studies of developing countries and the effect of coal quality.

Many graduates and post-graduates were attending their first conference, meeting in person the academics with whose work they were already familiar and being exposed to the vastness of the power- and high-voltage engineering field. The EIE considers this aspect of the conference an important introduction for both graduates and post-graduates to the almost bewildering choice of career options in the sector.

EATON PEOPLE ON THE MOVE

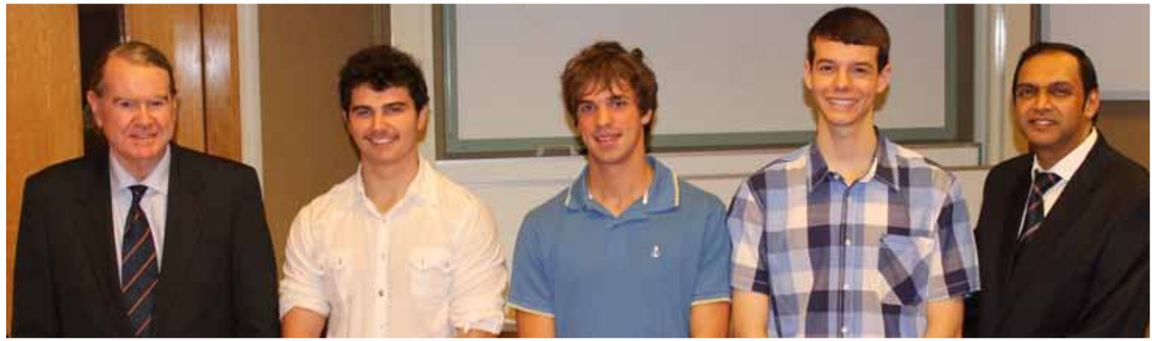
Rory Reid has been appointed as the new South African Sales Leader, for Eaton Electric SA (Pty) Ltd and will be based in Wadeville, Johannesburg.

In his new role, Reid will lead the Power Quality, Power Distribution, Projects and Branch teams nationally. This new organization will allow for improved sales and customer focus and internal training for the South African sales team.

Rory's zest for success, motivation and technical background in the Electrical industry sector, makes him the ideal choice to lead an extraordinary team.

Reid has a Higher Diploma in Business Management, a National Technical Diploma N5 in Electrical Engineering with a wireman's license and Electrician qualification foundation.

WATTSUP



Top achievers in the first year of study 2012: Left to Right: Mr. Mike Crouch (SAIEE), Mr. Brandon Craytor (Electrical), Mr. Albertus Malan (Electronic), Mr. Jacobus Herman (Computer), Prof. Sunil Maharaj (HoD)

Top achievers in the third year of study 2012: Left to Right: Mr. Mike Crouch (SAIEE), Mr. Yousef Alkayyali (Electrical), Mr. Anthony Gaskell (Electronic), Mr. Christopher Panayi (Computer), Prof. Sunil Maharaj (HoD)

DEPARTMENTAL PRIZE GIVING 2013

The Department of Electrical, Electronic and Computer Engineering held its annual prize giving ceremony recently. The ceremony, attended by students and personnel, was opened by Prof. Sunil Maharaj, the head of the department, with a special welcome to Mr. Mike Crouch, former president of the South African Institute of Electrical Engineers (SAIEE).

During the ceremony certificates and cash prizes were awarded to the top three students in the first, second and third year of study during 2012 for each of the three respective disciplines. The top achiever in the third year of study for each of the three disciplines was awarded a special certificate and cash prize sponsored by the SAIEE. These awards were handed over by Mr. Mike Crouch, who in his address congratulated the students on choosing what he believes to be the best engineering profession there is and highlighted the importance of continuous study to keep one up to date with technological advancements and to keep oneself young.

Two cash prizes were also sponsored by RapidM for the top three achievers in the two third year courses of Modulation Systems (EMS 310) and Stochastic Communication Systems (ESC 320).

The ceremony was concluded by Prof. Sunil Maharaj, who stated the importance of good lecturers in the development of good students in order to improve our international standing as a school and department. Finally all attendees joined for a delicious finger lunch before rushing off to do what top achievers do – work!

NEW INTELLIGENT BUILDING PROCUREMENT MODEL IN SA FINANCIAL SECTOR

Corporate South Africa is seeing a move to a new engagement/procurement model around the role of IT and facilities in real estate developments, according to Bradley Hemphill, Director of EES, an ISO 9000 professional engineering and management company. *"Our work with the financial services sector in particular indicates that provision for intelligent infrastructure is increasingly being made right from the word go during the design phases of the new headquarters of some of South Africa's leading financial institutions,"* says Hemphill.

EES is providing the consultancy for the intelligent infrastructure of the new corporate head-office of privately owned investment management firm, Allan Gray, a household name in the South African financial services sector. The landowner and client in this project is the V & A Waterfront. The development is to be called 'No. 1 Silo'.

MIGHTY BATTLE LOOMS IN CYBERSPACE

South Africa's eighth annual ITWeb Security Summit will be staged amid growing evidence that traditional IT security has failed.

A 'mighty battle' has broken out for the soul of the internet, and the cyber security risks facing enterprises are greater than ever. Cyber security in its old form has failed, and information security professionals are engaged in an ongoing strategic war for control.

Amid increasingly audacious cyber attacks and dire warnings, the world's top cyber security experts are set to travel to SA in May this year, to address 500 of the country's key business leaders and information security professionals on the battle raging on the cyber front.

Key to winning the war, they say, is informed strategy, effective tactics and the new imperative to know your enemy.

In an ever-changing environment, staying abreast of evolving threats and attack techniques requires constant vigilance. It's a game of chess or cat and mouse; and understanding the enemy and anticipating his next move is the new infosec top priority.

At the annual ITWeb Security Summit, to be held at the Sandton Convention Centre from 7 – 9 May 2013, the definitive gathering of security professionals, international and local information security analysts and experts will drill down into high profile security failures, forecast the future of cyber security and outline the tactics needed to win the war.

In a much-anticipated keynote address, international investigative journalist and author Misha Glenny will uncover his findings on the cybercrime underworld. Based on extensive interviews with cyber criminals, cyber policemen and government strategists, Glenny's presentation will reveal the new cybercrime landscape.

For more information about the ITWeb Security Summit, visit www.securitysummit.co.za

CURRENT UNBALANCE DETECTOR

Denver Technical Products are now able to offer current unbalance detectors. The Model 2722 is designed to monitor 3-phase AC current or compare three single-phase AC currents. A solid-state electronic sensing circuit drives an internal relay which energizes during normal, balanced conditions. An unbalanced condition will cause the relay to drop out. The Model 2722 accepts current inputs of up to 5 amps and will consider zero amps as balanced making the device suitable for use with 3-phase heaters.

Adjustments are available for percent of unbalance and time delay before tripping. The unit will automatically reset on restoration of correct current balance, or a normally-closed momentary switch can be connected for a manual reset. External CT's can be used to extend the operating current range. Applications include the protection of motors and detects open circuit of 3-phase heating elements, burnt out lamps and any industrial process where phase balance is important.

WATTSUP

ZEST WEG GROUP INCORPORATES GENSET BUSINESS UNDER CORPORATE BRAND

Zest WEG Group's generator set division team in Cape Town.

As part of its continued growth across the African continent, the Zest WEG Group has drawn subsidiary company IMS Cape, the oldest and largest generator set manufacturer in Cape Town, into its corporate brand. The business is now known as the Zest WEG Group's Generator Set Division.

"As a Group we're experiencing real growth, both in South Africa and in other parts of the continent, and our brand is becoming well recognised in the region," Gary Daines, Zest WEG Group's sales and marketing director, explains.

"At the same time, the genset business has evolved into a genuine solutions provider and, as such, is very much a part of the Group's total solution. At this point it makes sense to incorporate this business into the group brand.

"We have a vigorous business development team active from our Johannesburg headquarters whose responsibility is to expand our footprint into Africa. Integrating the genset business into the main brand will also strengthen the presentation of our Group offering, particularly since many mining operations in remote areas of the continent are running off alternate energy sources, such as diesel and HFO (heavy fuel oil)."

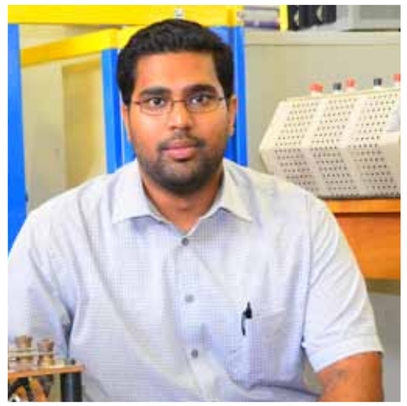
The Zest WEG Group acquired the generator business in 2007 from the IMS Group of companies and, with subsequent significant investment in both infrastructure and manufacturing plant, has developed this genset manufacturing concern to a specialist supplier capable of designing and custom-producing generator sets to suit specific applications.

The division's capacities are available in either stationary or portable configurations from 20 kVA up to 2 500 kVA and can be increased upwards with multiple synchronised sets.

Key sector users of generator sets produced by the Zest WEG Group's Generator Set Division include telecommunications, mining, municipal, retail and shopping complexes, marine, hotels, offices, hospitals and clinics. This technology is also being increasingly required in the energy, industrial and petrochemical sectors.

Integrated packages include mechanical and electrical manufacture and assembly as well as electronic design that incorporates control panel manufacture. The Generator Set Division also provides supply and installation of transformers, cabling, bulk fuel systems and sound attenuation with standby generators on a turnkey basis, together with project management, installation, commissioning and maintenance.

To date the division has supplied equipment throughout Africa, as far afield as Ghana, Nigeria, Zambia, Tanzania, Botswana and the DRC.



Wesley Doorsamy at the recent ICIT 2013 Conference.

WITS EIE AT ICIT CONFERENCE

Mr. Wesley Doorsamy and Professor Willie Cronje from the School of Electrical and Information Engineering at Wits University represented WITS at the recent IEEE International Conference on Industrial Technology (ICIT 2013) held in Cape Town. They presented a paper titled, 'Multiple fault diagnosis on a synchronous 2 pole generator using shaft and flux probe signals'. The paper deliberates ongoing work conducted on the development of a system that utilises shaft voltage analysis as a method of condition monitoring.

The IEEE International Conference on Industrial Technology (ICIT 2013), a major annual conference of the IEEE Industrial Electronics Society, was hosted at the Clock Tower Pavilion Conference Centre in Cape Town from February 25th to 27th, 2013. The exquisite waterfront venue was not only the attraction as the conference included 322 presentations of high quality papers over 10 technical tracks. A noticeable feature of the conference was the broad international representation.

DIRECTING ACTION TO MAXIMUM ENERGY SAVINGS AND FUNDING

Delegates at the Certified Measurement and Verification Professional (CMVP) training course held in Port Elizabeth in March 2013.

Port Elizabeth was recently the host to the Certified Measurement and Verification Professional (CMVP) training course and certification examination, presented by the Energy Training Foundation (EnTF), the sole Southern African region training provider of the Association of Energy Engineers (AEE), the 36-year old US-based organisation.

The value of CMVP in South Africa gives a credible qualification to evaluate energy management projects of government driven projects and / or financial incentive institutions. Delegates had varied reasons for attending the course, from being able to protect energy and water saving project claims from a legal standpoint in court, assess the energy use in buildings and assessing energy saving products, to evaluating independent M&V work to protect the organisations' interests. Some delegates found that municipalities are now asking for M&V reporting to be done by a CMVP for new building regulations like SABS 204 where M&V is required to substantiate energy and water efficiency claims. Transparent M&V has always been a requirement by Eskom DSM/IDM project funding, as well as DoE funded projects, and for energy efficiency tax incentives CMVPs are required to report on energy savings to substantiate claims.

Christo van der Merwe, the course presenter, is highly acclaimed in the field of M&V in South Africa being one of the very first persons to obtain his CMVP qualification locally. He commented that *"M&V can verify the performance of energy retrofits and Energy Services Companies (ESCOs) and can facilitate emission trading through enhancing the reliability factor of the results and value of Carbon Emission Reductions."* Christo was part of the group that started M&V in South Africa through the North-West University M&V Team so he is well-equipped to transfer knowledge to candidates registering for AEE's CMVP training in South Africa.

WATTSUP

ENERGY BAROMETER GIVES DIRECTION TO PORTFOLIO MANAGERS

The Three Cities team proudly show off their National Energy Barometer Survey status.

Petrus Swanepoel, Chairperson Mediclinic's Energy Initiatives Committee.

The top performers in the National Energy Barometer Survey for the 2011 utility year have received confirmation that their buildings' energy efficiency investments are paying off when compared to others in the same sector. Central Energy Fund (CEF) House, for a second consecutive year, is the winner of the Head Office category, runner-up is Exxaro Corporate Centre and in third place, Anglo Gold Ashanti.

Categories assessed in the 2011 survey included Head Offices, Hospitals, Hotels, and Motor Car Dealers, however due to non-disclosure agreements not all winners in all categories may be announced.

Three Cities Group of Hotels had three hotels that performed top of the Group and took 1st to 3rd place, whilst Mediclinic in the Hospital category entered purely to assess its own internal portfolio to assist them in making informed energy efficiency investment decisions.

Optimising a building envelope through standards and regulations is only a step in the right direction. The National Energy Barometer Survey encourages companies to become aware of their energy consumption levels when operating a building and to assist them to optimise their energy usage. The results improve profits, contributes to the national economy, whilst providing a platform for comparison and learning.

The Energy Barometer process poses no risk to a participant as they will never be 'named and shamed' and company-specific information remains confidential.

It is up to each participant to decide what may be disclosed. The Energy Barometer is a useful tool to steer energy managers in the right direction and is being used by many companies to decide which buildings in their portfolios will deliver the most significant impact from energy management perspectives.

ROYAL HASKONINGDHV APPOINTS VIC PRINS AS DIRECTOR AVIATION

International consultancy, engineering and project management service provider Royal HaskoningDHV is pleased to announce the appointment of Dr. Vic Prins as Director of the Aviation Business Line effective 1 April 2013.

Dr. Prins (b. 1952) brings more than 30 years of experience in international consultancy and engineering to the position. A Civil Engineer by trade, he holds a doctorate from the Massachusetts Institute of Technology (MIT) in Boston.

He has inter alia played a key role in developing and implementing transportation and aviation policy, including privatization of state-owned companies and services, and establishing the Airports Company of South Africa (ACSA). Vic Prins is married and has three children.

ZEST WEG GROUP MOVES INTO NEW PREMISES IN MONTAGUE GARDENS

The Zest WEG Group Cape Town team at the new premises in Montague Gardens.

The Zest WEG Group has moved into new fit for purpose premises in Omuramba Road, Montague Gardens, in a move that Gary Daines, Zest WEG Group's sales and marketing director, says has positioned the group for robust future growth as the Cape Town team takes advantage of the many opportunities coming to the fore in the area.

The new Zest West Group Cape office, not too far from its previous site also in Montague Gardens, features 3 300 square metres under roof and incorporates a training centre/auditorium accommodating about 70 people, warehousing, a drives and automation service centre, administrative offices and a staff canteen. The size and layout of the site has greatly improved logistical flow, with ample space for goods trucks to park and unload.

"Customers are already benefitting from access to an increased stockholding and a broader range of products, as well as from the enhanced training and meeting room facilities," says Daines.

"Although our Cape office is geared to serve the local drives and automation market, it is also being strategically prepared to contribute to the growth of the entire group. In addition to the new premises, Zest WEG Group's substantial investment into corporate growth in the area includes the establishment a few years ago of a dedicated generator set manufacturing facility and the EML warehouse, both in Epping."

The Zest WEG Group is the leading supplier of low, medium and high voltage electric motors, variable speed drives, soft starters, switchgear, transformers, MCC's, containerised substations, diesel generator sets and co-generation and energy solutions, as well as electrical and instrumentation engineering and project management services in Africa.

The Group is the South African-based subsidiary of global motor manufacturer, WEG. Group companies include Zest Electric Motors, Shaw Controls (local manufacturer of MCC's and containered substations), a division manufacturing diesel generator sets, EML (electric motors) and EnI Electrical (electrical and instrumentation contractors).

The Zest WEG Group operates a strategically situated network of branches and distributors offering pre- and post-sales support, as well as parts supply throughout Africa.

WATTSUP

Mike Cary, Immediate Past President, SAIEE with Jane Buisson-Street, 2012 Engineer of the Year.

2012 ENGINEER OF THE YEAR TROPHY HAND-OVER

At the 2012 SAIEE Annual Banquet, it was announced that the 2012 SAIEE Engineer of the Year award has to be shared between Mr Paul van Niekerk and Mrs Jane-Ann Buisson-Street.

Office Bearers decided that Mr van Niekerk would hand the trophy back to council after 6 months, where it will be handed to Jane for the remainder of the year, until the next Annual Banquet.

Therefore, at the recent Council meeting, held on the 5th of April, Mr Mike Cary, 2012 SAIEE President, handed Jane the Engineer of the Year Trophy, which will now find an honorary place on her mantelpiece.

CHARNAUD BREAKFAST

SAIEE played host to the recent Charnaud Breakfast session. Visitors and Members enjoyed a scrumptious breakfast before Scott Margolin, International Technical Director of Westex, USA, did a jaw-dropping presentation on Electric Arc Flashes. Charnaud was founded in 1975 and is regarded as a leading global supplier of personal protective clothing for flame, heat, molten metal and electric arc protection. The SURVIVE-ARC® brand name carries full American, European and South African standards certifcation and is exported globally.

From l-r: Patrick O'Halloran (CityPower), Andries Coetzer (Charnaud), Scott Margolin (Westex, USA), Andrew Charnaud (Charnaud), Mike de Jager (Charnaud) and Zarheer Jooma (E-Hazard).

Gavin Strelec (Eskom), Dries Wolmarans (Xamax) with John Emmett (Eskom).

Gerda Geyer (SAIEE) with Patrick O'Halloran (CityPower).

Roger Martin (EBM) and Ian Gebbie (DRA).

The newly developed cable protector and cable stands from Tega Industries

Rubber protection for equipment

A team of local rubber experts has developed a range of specially engineered products to curb two of the major causes of stoppages at mines around the country.

Dean Harty of Tega Industries' Industrial rubber division

Tega Industries South Africa's team of rubber specialists developed a range of cable protectors and stands that prevent heavy-current cables being damaged by mining trucks. This surprisingly common occurrence results in hours of lost production monthly and means that blasting cannot be completed at the business-end of the mine until the connection can be re-established. Similarly, another common cause of stoppages was addressed through the careful reengineering of shock sub-assemblies on rotary blast hole drill rigs. By addressing these major causes of stoppages mines can boost productivity and maintain tighter mining schedules.

Dean Harty of Tega Industries' Industrial rubber division says the new innovations are part of the company's ongoing quest to find rubber-engineered products to improve industrial processes. *"Rubber is a common and versatile commodity with amazing properties. Through the application of science we are able to use and enhance these properties to the benefit of most industries.*

WORLD FIRST

"Rubber is unbeatable in the fields of abrasion and shock resistance, as well as being able to provide grip or slip free surfaces where necessary. These same properties proved to be useful when we were approached by one of our major mining clients to find a solution to cables being damaged by 500-ton mining trucks."

Until now no other manufacturer could provide run-over cable protection to withstand the onslaught of these 500-ton plus machines. *"Our cable protectors can! They are available in different sizes to span different roads or track and allow cables of up to 10mm to be protected."*

In addition, the company developed rubber cable stands that can be used to lift cables off the ground especially where joints are likely to come into contact with moisture. The rubber stands replace the usual metal structures that are heavy and unwieldy to move.

SHOCK-SUBS

Tega Industries polymer scientists used similar logic to reengineer shock subs for drills rigs. These components are subject to some of the worst punishment possible acting as a coupling between the rock drill bit and the rig's gearbox.

The Tega Industries shock subs are purpose built for local ground and rock conditions and provide a good level of protection from overpowering. Tougher polymers, as well as overpower and slip-protection built into the mechanics also contributes to the dramatically improved lifespan of the locally-built shock subs. Combined with the lower cost and better productivity of the local unit miners will be able to enjoy longer spells of drilling without the need for costly stoppages.

How the Western Cape's largest electricity consumer saved R90 million in one year

African Utility Week to give insight into large power users' challenges

ArcelorMittal's steel plant in Saldanha, the single largest electricity consumer in the Western Cape, participated in an Industrial Energy Efficiency Improvement Project that has resulted in an astounding R90 million energy bill savings in one year. The upcoming African Utility Week in Cape Town from 14-16 May will give a unique insight into the challenges of large power users, including an exclusive site visit to ArcelorMittal's Saldanha Works.

The Saldanha Works is a flat rolling integrated steel facility that produces 1.2 million hot rolled coil (HRC) per annum. HRC from Saldanha is mainly exported, with approximately 20% sold on the local market. There are three main areas within the plant – iron making (producing liquid iron and direct reduced iron), steel making that has two converter arc furnaces (CONARC), and rolling with a hot strip mill and a temper mill.

ENERGY MANAGEMENT STRATEGY

To save energy, water and waste at the plant, Saldanha launched a focused energy management strategy in 2010 says Dhesan Moodley - General Manager of ArcelorMittal's Saldanha Works. He explains: *"resources were allocated both in terms of people and capital expenditure. Initially the potential was determined through an existing project list and doing an energy audit on the plant to determine further possible savings. ISO 50001 was implemented and energy management is now part of our daily routines. The energy saved in terms of baseline value of 160 MW was 10.6MW or 6.6% and the equivalent of R90 million in 2012."*

Moodley says they also implemented various VSD (Variable speed drive) projects that delivered greater savings than expected. *"This has proved to be sound technology given the correct application. We are also very proud of our waste heat project at the Roller Hearth Furnace where waste heat was used to replace a diesel heater at the Air Separation plant. We have also done some optimisation projects at the water plant on pump systems that required no capital expenditure."*

INTRODUCING SAVINGS EASY

According to Moodley introducing energy savings is relatively easy. He explains the main lessons the steel plant learnt: *"You need to assign resources if you are really serious about energy savings. You need to train people – a good technical person still needs to be trained in energy savings and the NCPC/ UNIDO program (supported by the DTI and DOE) is really an affordable way to train your staff to think and implement energy savings initiatives. Introducing savings is relatively easy. Sustaining these savings can be quite difficult especially if it is achieved by changing human behaviour. You need to incorporate it in your management infrastructure and implement a system such as ISO 50001 to entrench and sustain such savings."*

INCREASED ENERGY TARIFFS

Large Power Users are under increasing pressure with rising energy tariffs and the impending implementation of a carbon tax. ArcelorMittal's Saldanha Works, General Manager, Dhesan Moodley says the increased energy tariff and carbon tax is a significant risk for the plant. He expands: *"we are focused on the export market, specifically in Africa and we are competing against China and India.*

These countries do not experience any of the cost increases mentioned. The viability of export facilities is at risk with these increases. This obviously has significant potential impact on the economy, not just local, but also on the fiscal balance."

A number of delegates at the upcoming African Utility Week in Cape Town from 14-15 May will be able to experience a unique site visit to the steel plant at Saldanha. Moodley says their main message to fellow power professionals at the event will be that *"once you start focusing on energy savings there are numerous opportunities to achieve savings."* wn

EXHIBITION & CONFERENCE
14-15 MAY 2013

PRE-CONFERENCE WORKSHOPS
13 MAY 2013

SITE VISITS **16 MAY 2013**

LOCATION **CTICC, CAPE TOWN**

WEBSITES
WWW.AFRICAN-UTILITY-WEEK.COM
WWW.CLEAN-POWER-AFRICA.COM

Unveiling of the plaque at the SA Calcium Carbide (SACC) plant in NewCastle by (l-r) Mr Mvuleni Geoffry Qhena, CEO of the IDC, (centre) Mr Carmona, Chairman of SACC and King Goodwill Zweletini.

Opening of first "Green" industrial plant in Africa

A multi-million rand 8 MW co-generation (cogen) plant opened by the Industrial Development Corporation (IDC) and South African Calcium Carbide (SACC) in Newcastle, in KwaZulu-Natal will improve the company's performance and have a knock-on positive effect on the environment.

BY | DEREK WOODBURN **|** FSAIEE

Departing from IDC's Head Office in Sandton at 5 am on the 19th March 2013, we, the invited media contingent, headed off to Newcastle in two luxury minibuses. Once passed Heidelberg, the road quality deteriorated with long stretches of potholes, long mist patches, and heavy vehicle traffic. Several stretches of repair work were being done on the roads, leading to delays of up to 20 minutes each.

Some fifty-seven years ago, as a young Millwright apprentice on holiday, I had driven that route twice on a 150 cc Lambretta scooter from Pretoria to Durban and return. The trip had then taken me two days each way, sleeping over en route. The construction of the N3 freeway was just beginning, and the route via Standerton, Volksrust and Newcastle was the "normal" route from Pretoria to Durban.

On arrival in Newcastle we registered as delegates at the Black Rock Casino and hotel complex. After an address, about a hundred and twenty delegates were taken to the factory site in two large luxury buses.

The KarboChem Calcium Carbide Plant is part of the Intensive Energy User Group of Southern Africa. It uses about 50% of the total Newcastle demand for electricity. Lime and coke are reacted in a submerged electric arc furnace to produce Calcium Carbide. This furnace uses 30 to 50 MW of power, and achieves a temperature of 2,2000 C. The waste gases were previously burnt by being flared, contributing to the total carbon dioxide emissions.

The plant had previously produced 72,000 tons per year, and is increasing to 90,000 tons per year. It is the only producer of Calcium Carbide in Africa, and is expected to export more than half its output. It has an annual turnover of R400 million, and the green project has been funded, at a cost of R105 million, by the Industrial Development Corporation of SA. The SACC is now owned by the Ardira Group of Argentina. The IDC loan is expected to be paid off over ten years. The Calcium Carbide produced is used to generate Acetylene gas used in the welding, cutting and for de-sulphurisation of steel in the steelmaking industries.

The new plant was built on the site of an old calcinations plant. This "green" addition to the plant harnesses the furnace waste gases comprising 60% carbon monoxide and 30% hydrogen and, after scrubbing them in a double water column to extract the dust particles, it uses these waste gases to power alternators which co-generate 6 to 8 MW, or 45 million kWh per annum (10% of the required power for the furnaces). The plant has an electricity bill of R100 million per annum, and the co-gen plant will cut the annual bill by 20%.

The designation of a "green" plant can only be correctly used when registered with the United Nations. Besides generating carbon credits, the SACC supports a high school in Dannhauser with solar panels. The Company is rightfully proud of its outreach contribution, as Nelson Mandela said: *"Education is the most powerful way to change the world"*.

The Austrian GE-Jenbacher 620 gas engines, which convert this mix of carbon monoxide and hydrogen into energy are enormous. The plant has four engines each with 20 cylinders of 6.25 litre capacity per cylinder, or 125 litres per engine. That is like having a large truck capacity for each cylinder, standing 20 deep. Huge filters, passing 90,000 cubic metres of air per hour, protect the engine from the extremely dusty environment. Each engine is able to cope with the "knocking" effect of the hydrogen igniting first, followed by the carbon monoxide. The piston heads have three large purpose-made cavities to cope with this, and the engines are very noisy. A SCADA (Supervisory Control and Data Acquisition) control room monitors each cylinder over many parameters for each engine, and this is instantly accessible to engineers in the supplier's works in Austria.

The computer displays in the control room showed that three of the giant engines were generating power, the fourth engine being off-line. On start-up the operators have to synchronize each alternator to the Eskom grid frequency.

The cooling water from the engines is fed to enormous cooling grids located on the roof above the engine rooms. A short length of large-diameter pipe-work only needs to be fitted to complete the flow of exhaust heat from the radiators to the drier for the anthracite material in a rotating kiln. In replacing LP Gas, this will further increase the overall "green" efficiency of the plant, making it even more environmentally friendly. The greenhouse gas carbon dioxide emissions will be reduced by 30,000 tonnes per annum. WN

Radiators on top of Engine Room Roof

Intake Air Filters

GE-Jenbacher 620 Engine

Inside of Control Room

South Africa is faced with a dichotomy that is difficult to resolve. We have high levels of unemployment and poverty, and growing unrest among young people with great expectations for improvements in their lifestyles.

Yet, building new factories and creating employment opportunities which involve beneficiation of raw materials, will require large quantities of low cost power and highly skilled Engineers and Technicians. The management and control of such enterprises will require Professional Managers in Government.

To quote the Minister of Finance in his 2013 budget speech, he said:
The National Development Plan, supported by the New Growth Path and other programmes, invites us to look beyond the constraints of the present to the transformation imperatives of the next twenty and thirty years.

Independent Power Production and Infrastructure Development

These imperatives are already apparent in the realities of the social and economic restructuring that is under way.

- The first reality is our demographic transition – a million young people leave school every year, and we need a package of reforms that will improve education, training and work opportunities for young people.

- The second is that we are a rapidly urbanising society. This means we need to meet urgent demand for housing, municipal services, schools, clinics, public transport and commercial development, but it also means we have an opportunity to build an integrated urban landscape, with effective partnerships between municipalities, local businesses and civic associations.

- A third imperative is economic competitiveness. We need to invest in infrastructure, raise productivity and diversify our economy, to create jobs and raise living standards.

- Improving the quality of education and training is an essential foundation of a more productive and inclusive growth path while stronger links with Africa and other emerging economies are needed.

- We have to adapt to a low-carbon economy, including mobilisation of our renewable energy potential.

Finally - there is the social solidarity challenge that cuts across all of these, which is to build a more equal and inclusive economy that bridges our racial and other divides.

These are themes on which the NDP provides clear guidance, not just about strategic goals and objectives, but also about the practical difficulties and choices we face.

Hence the theme for the 2013/14 SAIEE Presidential term of office - *"Building of Skills and Professionalisation of Electrical Engineers."*

BACKGROUND

"For the year 2012 and beyond, we invite the nation to join government in a massive infrastructure development drive. We are going to launch a huge campaign of building infrastructure nationwide. This will boost the level of economy and create job opportunities", so said President Jacob Zuma in his State of the Nation Address on 9 February 2012.

The budget speeches in Parliament of various Ministers reinforced the expectations and the challenges contained in the President's statement.

It is clear that the National Government's intention is to use this infrastructure expenditure programme to achieve the socio-economic development vision of Government by transforming the economic landscape of the country.

This implies, inter alia:

- Improving South Africa's global competitiveness and level of socio-economic activity through improving existing infrastructure and by providing new infrastructure, and

- Providing a platform for employment in a significant number of new jobs created directly through the investment in infrastructure and permanent jobs in the industrial development and downstream economic activities that can be expected to follow.

Independent Power Production and Infrastructure Development

continues from page 29

At Mangaung in 2012 the ANC endorsed the National Development Plan (the report authored by Minister Trevor Manuel's National Planning Commission) which provides *"key implementable actions"* aimed at eliminating poverty and sharply reducing inequality. The Plan is widely considered to adopt a business friendly policy approach in seeking "inclusive growth".

These development objectives are admirable, and good for the socio-economic development of the country. However massive infrastructure development of this magnitude implies massive power requirements. Eskom have done very well for many years to supply the energy requirements of the country at a very low price. However this situation has changed rapidly in the past few years with consequent massive price increases. In order to meet this anticipated increase in demand, Eskom submitted an application to NERSA to increase prices by a massive 16% per annum for the next five years. However, an increase of only 8% pa for five years was granted, which will still make South Africa one of the most expensive investment destinations in the world and leaves Eskom in a difficult situation to meet demand with insufficient base load generation and a rapidly aging fleet of coal fired power stations .

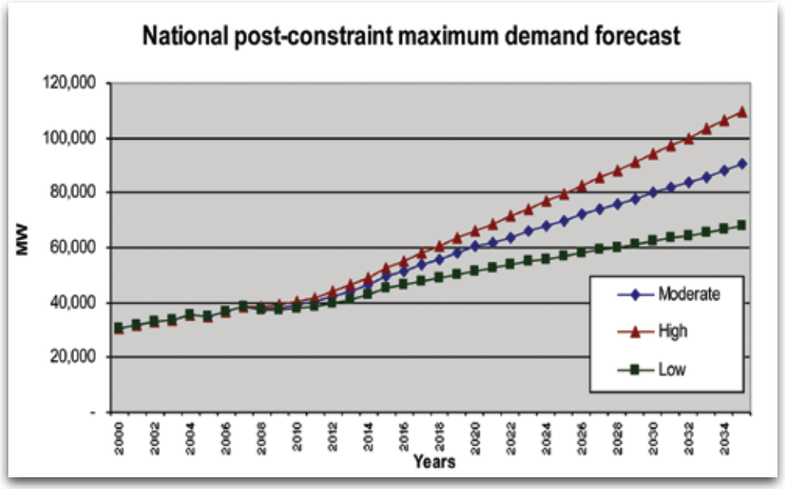


Figure 1

ESKOM'S CURRENT GENERATION SITUATION

In 2012 the total generation capacity of Eskom is 44,145 GW made up as illustrated in Table 1, while the long term forecast indicates an annual increase as graphically illustrated in Fig 1. Assuming that growth will take place at the moderate scenario, it is apparent that without that load will exceed demand by 2014 (figure 2).

Without further intervention, it is quite clear that the country is in a desperate situation until additional newbuild base load can be introduced.

The total capacity by 2030 will be 89,700MW hence matching the medium growth path anticipated in the NDP.

The total capacity envisages that 18.9 GW of renewables will have been completed at this stage.

INDEPENDENT POWER PRODUCTION

The Minister of Energy made an impressive start with the awards of twenty eight renewable energy IPP's in 2012 and promises to follow up with a further award in 2013 that will make South Africa one of the world leaders in renewable energy .

GEN. TECHNOLOGY	NOMINAL MW	NET MAX MW	RESERVE
Coal-fired	37 745	34 952	825
Gas/Liquid Fuel	2 426	2 409	0
Hydro-electric	661	600	0
Pumped Storage	1 400	1 400	0
Wind	3	3	0
Nuclear	1 910	1 830	0
TOTAL	**44 145**	**41 194**	**825**

Table 1
With two fossil fuel fired stations under construction, this will add an additional capacity of approximately 8000 MW by 2019

Project	Year to 31 March 2013	Year to 31 March 2014	Year to 31 March 2015	Year to 31 March 2016	Year to 31 March 2017	Year to 31 March 2018	Year to 31 March 2019	Total
Grootvlei (return to service)	30							30
Komati (return to service)	200							200
Camden (return to service)	30							30
Medupi (coal fired)		794	794	1 588	794	794		4 764
Kusile (coal fired)			800	800	800	800	1 600	4 800
Ingula (pumped storage)			1 332					1 332
Sere wind farm (renewable)		100						100
Total (MW)	260	894	2 926	2 388	1 594	1 594	1 600	11 256

Figure 2 - This table illustrates Eskom's current planned capital expansion programme. In addition Eskom has commenced the installation of a 100MW CSP station that will be commissioned in the Northern Cape in the near future.

TECHNOLOGY	CURRENT RE-IPP (MW)	THIS DETERMINATION (MW)	TOTAL (MW)
On-Shore wind	1 850	1 470	3 320
CSP	200	400	600
Solar Photovoltaic	1 450	1 075	2 525
Small Hydro (< 40 MW)	75 (<10 MW)	60 (<40MW)	135
Biomass	12.5	47.5	60
Biogass	12.5	47.5	60
Landfill gas	25	-	25
Small Projects	100	100	200
TOTAL	**3 725**	**3 200**	**6 925**

Table 2

The second round of IPP power procurement was gazetted by the Minister of Energy, on 19 December. Three Government Notices (No. 1074, 1075 and 1076) were published, covering the three elements of procurement that were anticipated following NERSA's concurrence to the Determinations on 3 October 2012. An amount of 3 200 MW of renewable capacity has been added to the existing six technologies being procured under the Renewable Energy based–Independent Power Production request for proposals. This includes 100 MW which has been allocated to small projects under 5 MW, for the same renewable energy technologies.

These are summarised in Table 2.
Over and above the foregoing Renewable Energy projects, the minister has included an additional amount of 2 500 MW of base load generation from coal fired stations which reflects the IRP 2010 for various fossil fuel technologies, including imported coal power for the period 2014 to 2020.

In addition, an amount of 2 652 MW, from natural gas sources which can be considered to be mid-merit generation, has been allowed for, and matches the, allocation in IRP 2010 for the period 2021 to 2025.

Also in a longer time frame, provision has been made for the importation of an additional amount of 2 609 MW of hydro power, as shown in the IRP 2010, to be starting in 2022 through 2024. The requirement for entering into the necessary foreign government agreements for imported electricity is also covered in the notice in the Gazette.

The role of the procurer in this notice includes the conceptualisation and the undertaking of feasibility studies so it is likely that these activities will take some time before a procurement programme is launched.

A recent press announcement has indicated that the Department of Energy (DoE) is expected to release procurement documents for a 'baseload' independent power producer (IPP) programme during the third quarter of 2013, and has confirmed that the programme will be in accordance with a determination released by the Energy Minister as discussed above.

This determination, confirms the DoE's intention to procure from IPPs generating power from coal, natural gas and hydroelectric facilities.

Independent Power Production and Infrastructure Development

continues from page 31

MEDIUM TERM RISK MITIGATION PROGRAMME

The foregoing scenarios imply that a gap between supply and demand will exist in the intervening period until the coal one and two power plants have been commissioned. To bridge this gap, the DoE has introduced a medium term risk mitigation plan that will involve 800 MW which is to be sourced from industrial cogeneration energy.

These sources are not clearly defined and may include one or more of the following: biomass, industrial wastes and combined waste heat. Once again the minister has referenced the relevant section in IRP 2010, which is very encouraging to would be developers, as it appears that the IRP document has been scrupulously followed. Although the 800 MW is below the "1000 – 1500MW" identified in the IRP 2010 MTRMP table, an amount of 474 MW of mid merit base load power from natural gas has been gazetted under this notice and this planned power appears in the IRP 2010 plan for the years 2019 and 2020.

For the cogeneration and natural gas electricity listed in this notice, the determination identifies the urgent need to secure connection to the grid as soon as possible, and also according to an acceptable schedule.

THE ISSUES RELATED TO INDEPENDENT POWER PRODUCTION IN SOUTH AFRICA

Various issues make the introduction and successful implementation of independent power generation, these include

- Legal and Regulatory issues;
- Localisation and Procurement issues; and
- Skills Development.

The first issues relating to Legal and Regulatory requirements are detailed in the Department of Energy RFP and are rather strenuous on potential developers.

- The installation shall comply with the South African National Grid Code;
- National Energy Regulator (NERSA) regulates South African electricity industry;
- NERSA licences electricity generation, transmission, distribution and trading activities in South Africa;
- NERSA sets tariffs based on its Multi-Year Price Determination Methodology (MYPD);
- Currently annual revenues are set for a three-year period currently from 1 April 2010 to 31 March 2013;
- Department of Energy is responsible for electricity generation planning via Integrated Resource Plan (IRP), which determines electricity generation capacity expansion requirements in South Africa;

In March 2011, Department of Energy finalised the IRP 2010;

- Objectives include reducing carbon emissions; minimising water usage; localisation and job creation; Southern African regional development and integration;
- IRP sets capacity requirements by energy source that will be provided by Eskom and IPPs in terms of the new generation regulations.

The issues related to localisation, include a myriad of very stringent requirements for local content including the use of local labour, BBBEE and skills transfer.

SKILLS DEVELOPMENT

Perhaps the largest single constraint to the establishment of IPP's in South Africa is the availability of skilled resources, particularly those that have had experience, and can design, implement and project manage such installations.

As mentioned in the introduction, it is the stated objective of Government, to build new infrastructure and beneficiate raw minerals and materials and in so doing create job opportunities in the country.

Large infrastructure projects will attract smaller service companies, which again will provide more job opportunities and hence becomes self-perpetuating. However, the majority of these jobs require skilled engineers, technologists and artisans.

This is an ideal situation in a modern developing country, but South Africa has a 'lost generation'- a period of political activity during which a whole generation of young people did not attend schools, technical colleges and universities to complete studies towards a productive career.

This education gap has grown, and insufficient numbers of learners have shown the required interest to study Mathematics and Physical Science and go on to study at University of Technology in order to qualify to become Engineers and Technicians and artisans.

Despite the gallant efforts of Government to establish a skills development fund and to finance the SETA's, this finance has not been correctly channelled towards the establishment of Work Integrated Learning opportunities for the professionalisation of Engineers.

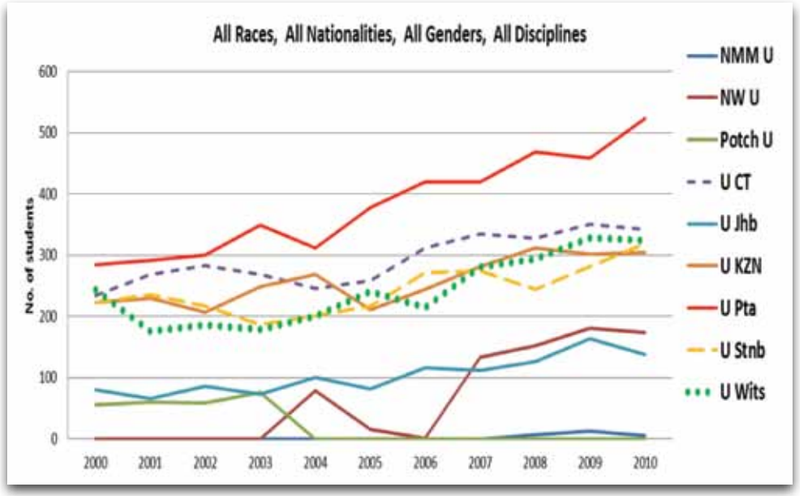
The State President stated in his 2013 State of the nation address that the South African economy is set to grow by 3.5% in 2013 and that Government will continue with the massive infrastructure development plan as envisaged by the national development plan (NDP). The intention is that such development will stimulate the economy and create millions of jobs.

What then is the duty of the SAIEE towards the provisioning of skilled engineers to assist the government with this monumental task?

The SAIEE is a learned body of skilled engineers which has a duty to assist in the development and professionalisation of young engineers. This is to ensure that the requisite internationally accepted standards of Electrical Engineering is maintained. South Africa has a very proud reputation of producing engineers of the highest calibre. In addition, SAIEE have several volunteer members that serve in various capacities on the ECSA committees to look after the interests of Electrical Engineers.

The Engineering Council of South Africa (ECSA) is a statutory body which has been created in terms of The Engineering Profession Act, Act 46 of 2000. Its mandate is the protection of the health, safety, environmental, and all other interests of the public, in relation to the activities of the Engineering Profession.

ECSA relies on various forms of quality assurance in carrying out its mandate, and is conscious of the fact that optimum long term benefit from implementation of the Government's Infrastructure Plan, will be conditional on the effective mobilization, in all respects, of the best quality engineering that can be made available.



This graphic from ECSA shows the numbers of Engineering Graduates from all universities in RSA up to 2010, and illustrates the problem faced by industry in the appointment of Engineers for the NDP .

As a statutory body, ECSA maintains a register of professionals, promotes the interests of its members via a voluntary associations such as the SAIEE. It is therefore incumbent upon the SAIEE to ensure that it provides proper guidance and mentoring of young engineering graduates.

The National Planning Commission (NPC) has identified the lack of capacity in Government Departments as a major constraint in government's ability to deliver on its vision.

A particular concern is the lack of suitably qualified and appropriately experienced Engineering Professionals and Project Managers in government, without whose input and guidance the proposed infrastructure rollout will be impossible to achieve.

This problem will be carried through to all industries, including the power generation and hence the independent power producers.

A possible solution for the problem is that experienced engineers (possibly retired) should make themselves available to mentor young graduates in specific disciplines.

RESTRUCTURING THE SAIEE

It is clear from the foregoing that we have a manifold problem in the first place to encourage an interest in science and engineering.

The SAIEE Council has recently approved a policy document to provide a mentoring service in support of new graduates and place suitably qualified mentors in the workplace to assist the candidates.

It is suggested that the SAIEE could enter into a service agreement with either an employer, or a candidate, for the provision of mentorship services.

Similarly the SAIEE will enter into separate service agreements with each mentor for the provision of such mentoring services.

Independent Power Production and Infrastructure Development

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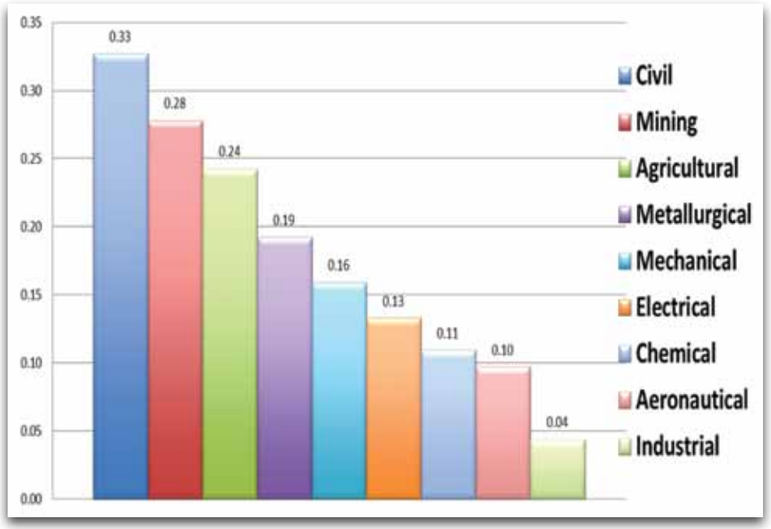

It would appear to be a particular problem that Electrical Engineers specifically do not consider registration to be important in their career. It is significant that ECSA are in the process of identifying specific work that may only be performed by Professional Engineers.

It is significant that the SAIEE has experienced unprecedented growth, which is primarily attributed to the efforts of the Immediate Past President, Mr Mike Cary, who made large inroads in a membership drive in his term of office as President of the SAIEE.

The development of engineering professionals is a complicated process. It has several stages and each stage is dependent on the flow through and quality achieved by the previous stage.

- Schooling: Achievement of adequate preparedness in Mathematics, Physical Science and English;
- Higher Education: Attainment of a qualification required by ECSA for the category of registration shown below;
- Candidacy Phase: Training and gaining experience after graduation to develop the competency required for registration.

It is at the candidacy phase where the SAIEE can (and should) assist members through the complicated process of registering as a Professional Engineer.

ECSA is now considering a paradigm shift in the registration process, it is thus important for the SAIEE to have an executive function to ensure that we stay on top of these changes, and keep members informed.

SAIEE will introduce a mentoring function whereby we will appoint Professional Engineers as mentors, to guide and assist young engineering graduates through the process of obtaining the correct experience to comply with stringent ECSA registration requirements. wn

EDUCATIONAL REQUIREMENTS FOR REGISTRATION IN PROFESSIONAL CATEGORIES

PROFESSIONAL DESIGNATION	HIGHER EDUCATION QUALIFICATION
Professional Engineer	BEng/BSc(Eng) – four-year NQF Level 8
Professional Engineering Technologist	BTech – one-year NQF Level 7, having completed a National Diploma
Professional Engineering Technician	National Diploma Three year (including one year experiential training) NQF level 6

Earn CPD Credits

Koeberg Insulator Pollution Test Station

For many years Eskom has followed international guidelines in selecting transmission and distribution insulator products for use in polluted environments.

BY | W. L. VOSLOO, PR.ENG | R. L. SWINNY, PR.ENG
ESKOM RESEARCH, TEST AND DEVELOPMENT

In most cases these guidelines could be validly applied to glass and porcelain insulator products. The recent proliferation of non-ceramic (polymeric, resin and coating) insulator products has led to their growing use in South Africa. There are, however, major concerns about their long-term electrical performance and material longevity. Laboratory tests do provide some indication of the likely performance in the field, but it has been Eskom's experience that only the field exposes insulator products to a realistic combination of pollution and material degradation mechanisms. Therefore an 11, 22, 33, 66 and 132 kV insulator pollution test station was established at Koeberg Insulator Pollution Test Station (KIPTS) to determine the natural pollution and ageing performance of insulator products.

Fig.1: Koeberg Insulator Pollution Test Station (KIPTS).

In conjunction with the leakage current measurements, material studies are performed, environmental data is monitored and visual inspections are carried out periodically on each test product at the site. The electrical data is cross-correlated with the material studies and visual and environmental data to ascertain the overall performance of each sample. Emphasis is placed on identifying generic trends and failure modes.

The objective of the research work at KIPTS is to position Eskom as an informed buyer of insulator products and also to help deal with operational problems. Some results obtained at KIPTS during the April 2003 to April 2004 test cycle are discussed in this publication.

KOEBERG INSULATOR POLLUTION TEST STATION

The KIPTS (as shown in Fig. 1) with 11, 22, 33, 66 and 132 kV insulator test bays, complete with control room, environmental monitoring station and logger systems is situated along the Cape west coast, about 50 m from the sea on property made available by the Koeberg Nuclear Power Station.

The climate at KIPTS is characterised by dry summers, high winds, mist banks and heavy marine and industrial pollution. The rainfall occurs mainly in winter. The natural pollution cycle at KIPTS is light to medium during the winter, and heavy to very heavy in the summer. Therefore KIPTS constitutes the ideal marine and industrial pollution area in which to evaluate insulator products.

The following parameters are monitored at KIPTS along with visual examinations, surface hydrophobicity, electrical observations and material studies in accordance to Eskom specifications[1].

Koeberg Insulator Pollution Test Station

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Climate Monitoring:
- Wind Speed and Direction.
- Relative Humidity.
- Temperature.
- Accumulated Rainfall.
- UVB Solar Radiation.

Pollution Monitoring:
- Directional Dust Deposit Gauges (DDDG).
- Equivalent Salt Deposit Density (ESDD).
- Non-Soluble Deposit Density (NSDD).
- Surface conductivity using the Insulator Pollution Monitoring Apparatus (IPMA).

Leakage Current Monitoring using the On Line Leakage Current Analyser (OLCA):
- Maximum positive and negative peaks over a set time interval (highest peak current, $I_{highest}$).
- Number of current pulses exceeding selected amplitude thresholds.
- Average leakage current over a set time interval.
- Leakage current waveforms.
- Positive and negative charge (Coulomb) flowing over the insulator for a set time interval.
- Integral of the leakage current squared (Coulomb ampere) over a set interval.
- Real power loss (watts) over the insulator.

The ageing at KIPTS has been correlated to the "IEC 61109, 5000h ageing test" and a factor of at least 2:1 (KIPTS:IEC61109) was found[2]. KIPTS therefore constitutes the ideal environment in which to evaluate insulator products.

Fig. 2(a) shows an insulator that performed very well for the first 8 months of energisation at KIPTS, and then rapidly degraded from the live to dead end. An identical unit was subjected to accelerated ageing according to IEC 61109 Annex C. The unit passed the test, and qualified as one of the best performers ever tested.

The question to be asked here is, *"Does accelerated artificial ageing prove the integrity of an insulator that is to be used in severe marine environments?"*

Fig. 2(b) shows a Cycloaliphatic cut-out fuse which developed severe erosion in the pin area after 5 years in service.

An identical failure mode has been observed (within one year) on a similar unit energised at KIPTS (shown in Fig. 2(c)).

Many samples of other insulators have been retrieved from the field and they too show similar failure modes to that observed at KIPTS, thus proving that KIPTS is an ideal test facility to prevent unsuitable products from entering the South African market.

PASS OR FAIL CRITERIA AS USED AT KIPTS

One of the main unanswered questions at present in the world of insulators is: *"What constitutes a failure?"* This question is the topic of debate at most of the IEC, IEEE and Cigre work groups.

However, there are a few documents available that contain some form of a guideline as to what constitutes a failure on insulators.

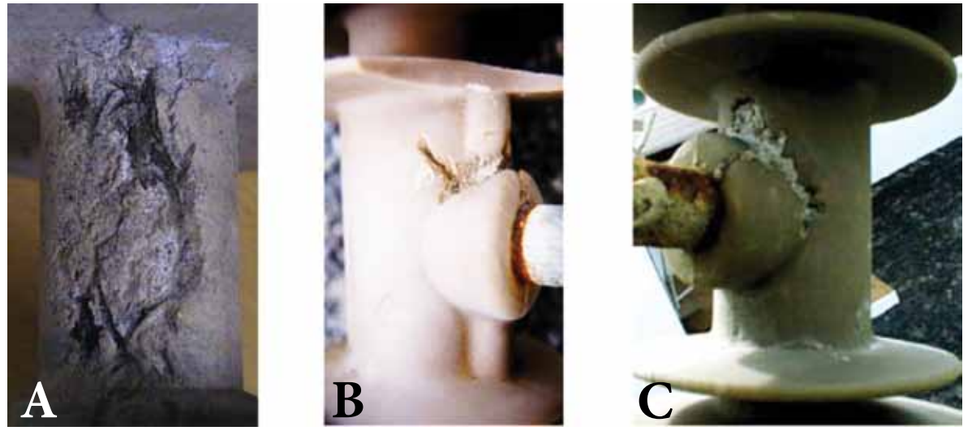

Fig.2: (a) Silicone rubber insulator after 8 months energised at KIPTS, (b) Field aged Cycloaliphatic cut-out fuse, (c) Cycloaliphatic cut-out fuse after natural ageing test at KIPTS.

a) IEC 1109 [3], 1 000h Salt fog or 1000/5000h ageing test uses the following acceptance criteria:
"The test is regarded as passed if: no more than three over-current trip-outs occur for each specimen tested, if no tracking occurs, if erosion does not reach the glass-fibre core and if no sheds are punctured or cracked. The core shall not be visible."

The following insert is an indication of the current stance of international research:
"At present, it is not possible to indicate reliable criteria quantifying the permissible number of erosion cracks. Further experience with this test will have to be correlated with service performance."

The following definitions are given in IEC 1109:
"Tracking is an irreversible degradation by formation of paths starting and developing on the surface of an insulator material. These paths are conductive even under dry conditions. Tracking can occur on surfaces in contact with air and also on the interfaces between different insulating materials."
"Erosion is an irreversible and non-conducting degradation of the surface of the insulator that occurs by loss of material. This can be uniform, localised or tree-shaped."

b) ANSI C29.11-1989[4], 1 000h Salt fog test uses the same acceptance criteria as the IEC 1109:
"No more than three over current trip-outs are allowed. No tracking is allowed. No weather-shed punctures or cracks are allowed. Erosion is not allowed to reach the core."

The following definitions are given in ANSI C29.11-1989: *"Tracking is the formation of electrically conducting paths starting and developing on the surface of an insulating material. These paths are conductive even under dry conditions. Tracking can occur on surfaces in contact with air and also on interfaces between insulating materials."*
"Erosion is non-conductive loss of material from the insulating surface. It can be uniform, localised, or tree-shaped. Shallow surface traces, commonly tree-shaped, can occur on composite insulators as on ceramic insulators after arcing. These traces do not affect the operating characteristics of the insulator."

The originally proposed acceptance criteria used at KIPTS is similar to those used for the IEC and ANSI tests as described above and are summarised as follows:
a) No more than three over current trip-outs (Mace fuses blown).
b) No signs of material degradation including erosion or tracking in the material.
c) No sheds are punctured or cracked.
d) No signs of metalwork corrosion that could lead to base metal exposure or failure of other hardware.

The product insulation material must pass the QUV (Relative Magnetic Bearing), acid, hydrolysis and ozone resistance tests.

It was fully understood at the time that the above acceptance criteria were harsh and also open to the *"interpretation"* of the observer. However, it was decided that the first set of KIPTS test results was needed so as to finally fix measurable acceptance values.

The criterion of *"No more than three over current trip-outs (Mace fuses blown)"* is fairly simple and easy to judge. So too is whether tracking, puncturing or cracking has taken place. However, what is unacceptable material degradation, or when is erosion a failure is very much open to debate.

Analysis of the KIPTS test data leads to the decision that *"No signs of material degradation"* is too broad a term and it was therefore decided not to use it as part of the acceptance criteria. Thus, discoloration, chalking and crocodile skin(crazing) are not seen as a failure but the presence thereof should be reported.

The question is also what degree of erosion should be considered a failure? Analysis of the KIPTS data and also looking at the latest developments in the IEC standards[3] lead to the decision that material erosion of 2 mm and deeper will be defined as a failure.

Fig.3: Erosion depth is measured with a special little tool to determine if it is deeper than 2 mm. The insulator shown was defined as failed due to severe erosion present.

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A special little tool (as shown in Fig. 3) was made to help ascertain if the erosion present is a failure or not.

The criterion *"No signs of metalwork corrosion that could lead to base metal exposure or failure of other hardware"* was changed to *"No signs of corrosion that has exposed the base metal or can lead to failure of hardware"* as the term *"could"* was found to be very open to debate.

The acceptance criteria *"The product insulation material must pass the QUV, acid, hydrolysis and ozone resistance tests"* were removed.

On analysing the KIPTS material studies data, it was found that further work is needed on understanding the various material performance and failure modes before a pass/fail judgement can be given with confidence. However, comment can be made on whether a material is prone to QUV, acid, hydrolysis and ozone.

From the discussion above, the final acceptance criteria used at KIPTS are as follows:

e) No more than three over current trip-outs (Mace fuses blown).
f) No signs of material erosion deeper than 2 mm.
g) No signs of tracking in the material.
h) No signs of punctures or cracks in the material.
i) No signs of corrosion that has exposed the base metal or can lead to failure of hardware.

The results from the product insulation material analysis (QUV, acid, hydrolysis and ozone resistance tests) are commented on when of concern.

ACCEPTANCE CRITERIA	RESULT	COMMENT
No more than three over-current trip-outs (750 mA Mace fuse blown)	Pass	Zero fuses blown
No signs of material erosion deeper than 2 mm	Pass	Erosion starting during the heavy-to-very heavy pollution test
No signs of tracking in the material	Pass	None
No signs of punctures or cracks in the material	Pass	None
No signs of corrosion that has exposed the base metal or can lead to failure of hardware	Pass	None
Results of material analysis		Prone to UV(chalking and micro surface cracks)

Table 1: Example of the tabulated acceptance criteria results used in the KIPTS test certificates.

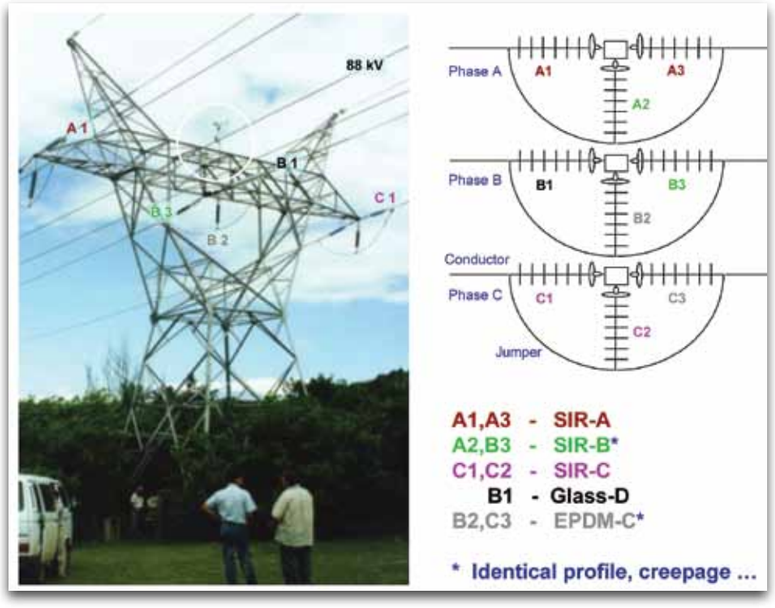

Fig.4: Clansdale in-service 88 kV insulator test tower in Natal. Three various SR (test positions A1, A3, A2, B3, C1 and C2), EPDM (test positions B2 and C3) and glass (test position B1) insulators are tested.

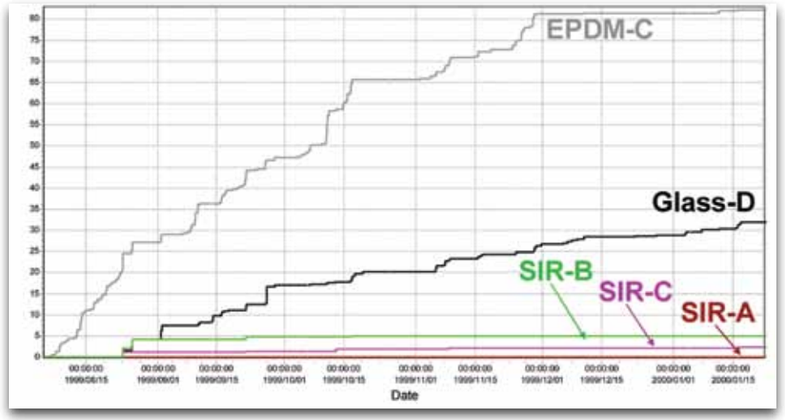

Fig.5: Accumulated charge measured on SR, EPDM and glass insulators tested in the Clansdale tower in Natal.

An example of the tabulated acceptance criteria results used in the KIPTS test certificates is shown in Table 1.

EXAMPLE OF RESULTS OBTAINED AT KIPTS

Results obtained at KIPTS[5] during the April 2003 to April 2004 test cycle on the 41 medium voltage, and forty six high voltage, insulator products tested are discussed below.

PERFORMANCE OF LONGROD INSULATORS

In general the silicone rubber (SR) and liquid silicone rubber (LSR) materials had more signs of erosion and tracking when compared to their ethylene propylene diene monomer (EPDM) and enhanced silicone polymer (ESP) counterparts. However, the latter all had crazing, microscopic surface cracks and higher leakage current activity. The material studies performed by Dr Roediger also showed that the EPDM and ESP materials were prone to chalking and microscopic surface cracks. Results obtained[6] from the Clansdale 88 kV in-service insulator test tower in Natal (picture of tower and test position layout in Fig. 4) also show that EPDM longrod insulators have higher leakage currents (see Fig. 5) when compared to identically dimensioned SR units.

Fig.6: Chalking observed on the EPDM insulator tested at the Clansdale tower in Natal.

Chalking was also observed (see Fig. 6) on the EPDM insulator tested at the Clansdale tower in Natal.

The effect of orientation was also well demonstrated at the Clansdale test tower. Tension (horizontally mounted) insulators had a better leakage current performance when compared to suspension (vertically mounted) longrod insulators (see Fig. 7).

It was noted that SR longrod insulators with a smaller trunk diameter had more material degradation.

SR longrod insulators with a lower specific creepage distance showed a better material performance (see Fig. 8). However, they had higher leakage current activity. This phenomenon is under further investigation.

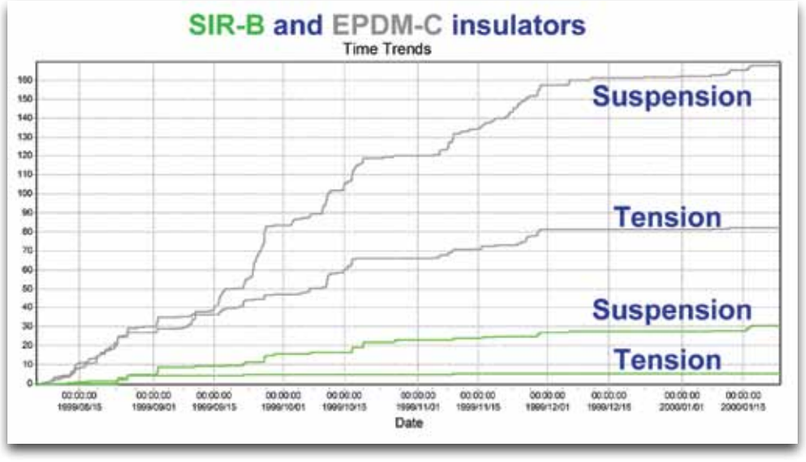

Fig.7: Accumulated charge measured on suspension (vertical mounted) and tension (horizontally mounted) SR and EPDM insulators tested at the Clansdale tower in Natal.

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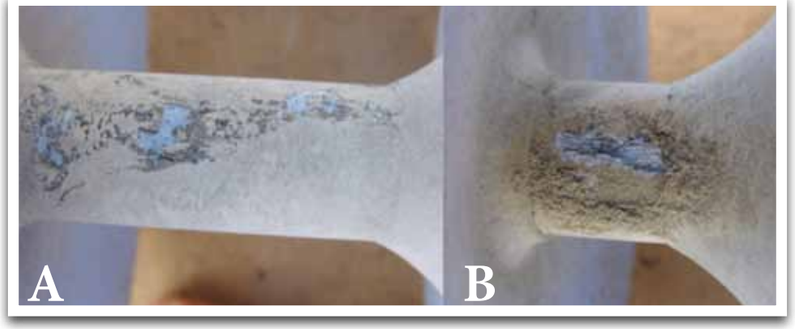

Fig.8: Material degradation observed on longrod insulator 132-31 (a) with specific creepage distance 20.1 mm/kV, in comparison with the severe material erosion found on unit 132-30 (b) at 31.7 mm/kV from the same manufacturer.

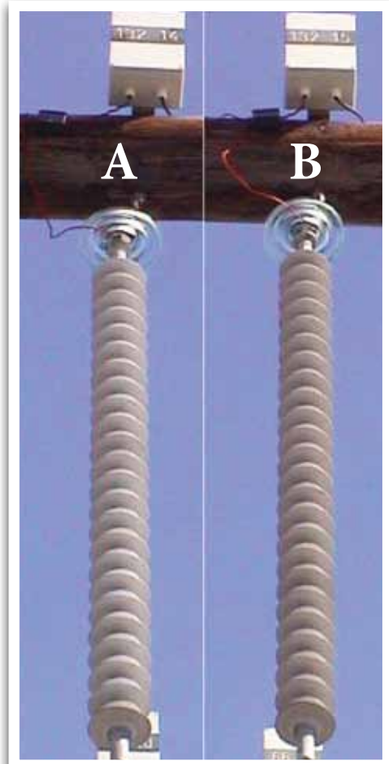

Fig.9: Two longrod insulators 132-14 (a) and 132-15 (b) identically manufactured from the same mould, however using two different suppliers of SR insulating materials.

The end fitting to first shed interface and also the insulator body sheath was found to be areas under the most stress. However, shed puncturing and sheath splitting due to poor material and/or design also occurred.

The effect of supplier of SR material was also well demonstrated. The two-longrod insulators shown in Fig. 9 are identically manufactured from the same mould, however using two different suppliers of SR insulating materials. The one unit (132-14) totally fails the KIPTS test due to severe material erosion and punctured sheds whilst the identically looking unit (132-15) passes with absolutely no signs of material degradation.

During the first few weeks of energization blackening of the material on the first shed on the live side was observed (Fig. 10) on some of the 132 kV longrod test insulators (not all shown in Fig. 10). The same phenomenon was not observed on any of the other longrod insulators tested at 66 kV and below.

The blackening of the material was found (see Fig. 10 (b), (c) and (d)) to be more dominantly present on the longrod insulators with a sheath extruded rod crimped to the end fitting type of design as shown in 9 (b) below. The position of the first shed also had an influence (see Fig. 10 (b) and (d)), the further away the less blackening.

The insulators with an over moulded end fitting to insulator body type design (shown in Fig. 11 (a)) had far less blackening present when compared to the others. The shed tips had some blackening (see Fig. 10 (a)).

The CoroCAM, ultraviolet sensitive corona observation camera, was used to investigate the longrod insulators for discharge activity. A direct correlation between the blackening of the material and corona discharge activity was found.

Longrod insulators with over moulded end fitting to insulator body type design (shown in Fig. 11 (a)) had discharge activity on the first sheds tips, while longrod insulators with a sheath extruded rod crimped to the end fitting type of design as shown in Fig. 11 (b) has discharge activity from the live end fitting to the bottom of the first shed.

Similar corona discharge activity was not present on 132 kV insulators fitted with corona rings or units energised at 66 kV and below.

From the above it is evident that corona activity, which leads to the blackening of the material, was present on the live side of some of the newly energised 132 kV insulators.

It is thus recommended that longrod insulators intended for use at 132 kV be evaluated before installation to ascertain if a corona ring should be fitted or not.

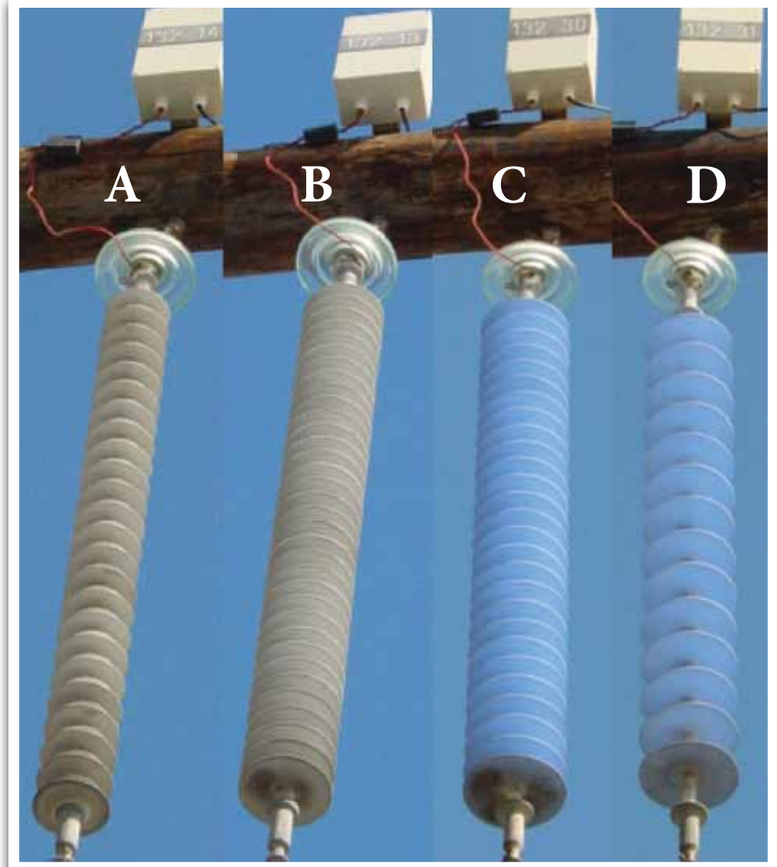

Fig.10: Blackening of the material on the first shed on the live side observed within the first few weeks of energisation on the 132 kV longrod test insulators.

PERFORMANCE OF LINE POST INSULATORS

The effect of colour of the porcelain glazing, the classical brown versus white, on the performance of the medium voltage line post insulators was found to be negligible.

The question can be asked why all the porcelain medium voltage line post insulators failed the heavy to very heavy test. The specific creepage distances used for the porcelain line post insulators were in the order of 31 mm/kV. This should normally be ample for an area with very heavy pollution. However, KIPTS pollution levels are extreme, with a high degree of instantaneous pollution events.

This is not unique to KIPTS, for example in Saudi Arabia they use more than 45 mm/kV porcelain long rods with a RTV SR coating for insulators in their extreme pollution environments.

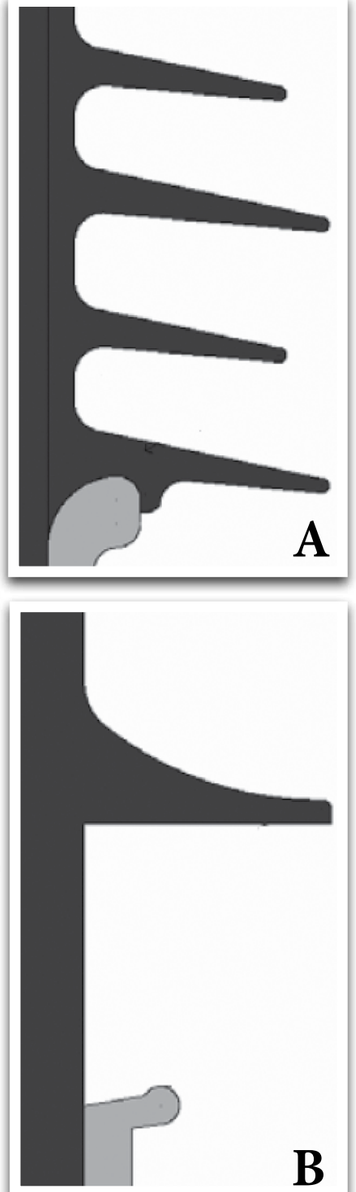

Fig.11: Over moulded end fitting to insulator body design (a) and sheath extruded rod crimped to end fitting design (b).

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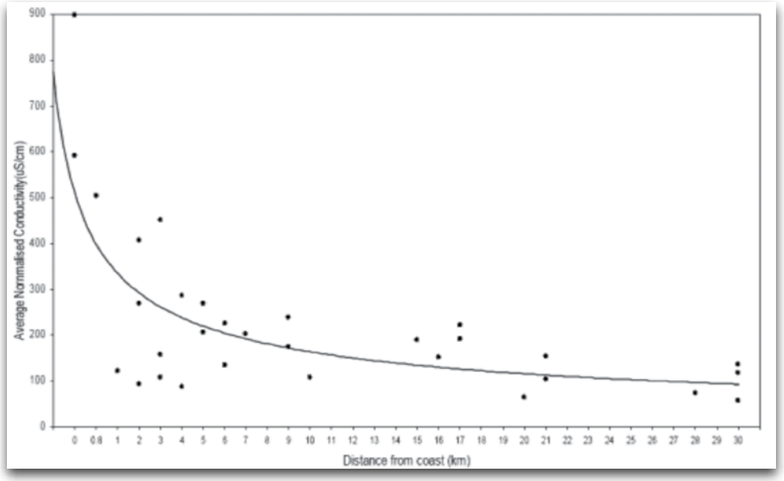

Fig.12: Plot of the DDDG pollution levels as a function of distance from the coast.

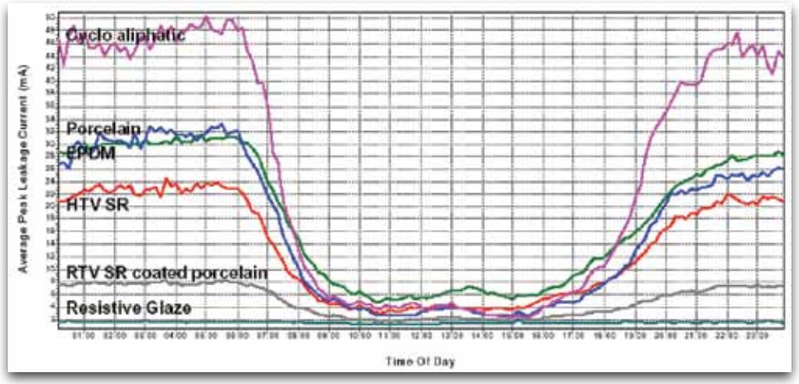

Fig.13: The effect of material type on the leakage current performance [8].

The western region of South Africa uses more than 60 mm/kV for porcelain line post insulators in extreme conditions (31 mm/kV, 22 kV insulators on 11 kV lines), based on poor line flashover performance when using normal 31 mm/kV, 11 kV insulators.

They have also experienced flashovers on 31-mm/kV porcelain substation equipment, especially during the November to February months of the year. They now have a policy in place to RTV SR coat the substations so as to resolve their flashover problems.

The 11 kV supply to KIPTS is also insulated with 62 mm/kV capped porcelain post insulators which are performing with absolutely no flashover problems. The same 11 kV line, about 1 km from the coastline is performing fairly well at 31 mm/kV.

It is recommended by IEC 60815 for ceramic insulators in very heavily polluted areas that 31 mm/kV and above should be used - it does not state that 31 mm/kV is the upper limit. Thus, using a higher specific creepage distance is allowed.

A plot of DDDG pollution levels as a function of distance from the coast can be seen in Fig. 12. The data was obtained[7] from measurements made in the Western and Eastern regions of South Africa. When the average DDDG measurement is larger than 350 µS the area is rated as very heavy. It is clear from the graph that within 1 km from the coast the pollution levels can reach extreme values.

Thus, the fact those 31-mm/kV porcelain insulators tested at KIPTS (50 meters from the coastline) and also in the field (close to the coast) flashes over are not unreal. The instantaneous pollution levels at KIPTS exceeded the very heavy level during the last months of the test and thus flashovers are to be expected.

However, a 27.5 mm/kV porcelain longrod was tested at KIPTS without a single flashover. But, the diameter was far smaller than the line post insulators. Insulating material also plays a big role. For example the cycloaliphatic insulator products tested at KIPTS also flashed over (four mace fuses blown) even at 40.5 mm/kV, and also had severe material degradation. Thus, creepage distance is not the only parameter.

However, what is astonishing is that so many other insulator products at 31 mm/kV and below were able to more than adequately withstand the pollution levels at KIPTS.

The effect of a room temperature vulcanized (RTV) SR coating was also again demonstrated as the reference porcelain insulator (66-14) had blown four mace fuses and the same insulator with a good performing RTV SR coating (66-12) not one.

The effect of material type on the leakage current performance can be seen in Fig. 13. The enhancement in leakage current performance when a RTV SR coating is applied to porcelain can clearly be seen.

Note: The six insulators tested (results shown in Fig. 13) are all identical in profile the only difference is the insulating materials used. Thus, RTV SR coating the porcelain line post insulators will be a good solution.

Furthermore, the use of other, especially hydrophobic materials as insulation should be considered by manufacturers. Composite medium voltage line post insulators that are priced competitively with their porcelain counterparts are urgently required by the distribution business.

In general the SR and LSR materials had more signs of erosion and tracking when compared to their EPDM and ESP counterparts.

However, the latter all had crazing, microscopic surface cracks and higher leakage current activity.

Fig.14: Material erosion observed in the sealant at the end-fitting on high voltage line post insulators tested at KIPTS.

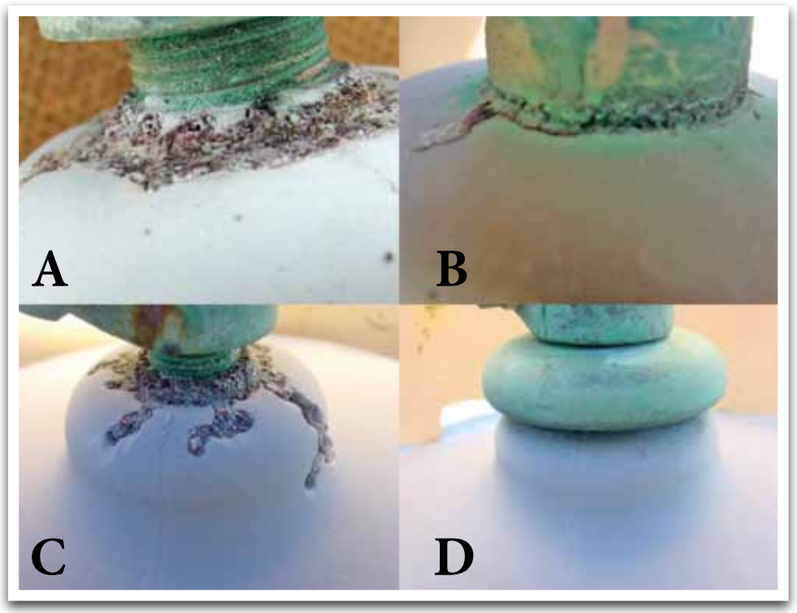

Fig.15: Severe localised material erosion at the metal to insulating material interfaces (a), (b) and (c). A stress release designed solution was applied by the manufacturer to a previously non-energised pole of the same unit shown in (c) - the result showing that the solution working well after being energised and exposed to natural ageing can be seen in (d).

The end fitting to first shed interface, especially the sealant at the end fitting, was found to an area of concern (see Fig. 14). The erosion observed in this area was mainly in the sealant, and present on both the live and dead-end sides.

The manufacturers are in the process of addressing this problem.

Within the first few weeks of energisation, the CoroCAM, ultraviolet sensitive corona observation camera, was used to investigate the line post insulators for discharge activity. No corona activity was found. Thus, it seems that due to the larger diameter end fittings no corona rings are required for line post insulators used for 132 kV and below.

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PERFORMANCE OF AUTO RECLOSERS

Corrosion was found on the metal hardware and tanks of the auto-reclosers.

A generic problem found on the auto-reclosers tested at KIPTS was severe localised material erosion at the metal to insulating material interfaces as shown in Fig. 15(a), (b) and (c).

A stress release designed solution was applied by the manufacturer to a previously new non-energised pole of the same unit shown in Fig. 15(c). - The result showed that the solution worked well after being energised and exposed to natural ageing. This can be seen in Fig. 15(d).

PERFORMANCE OF CUTOUT FUSES

The severe localised material erosion should be further investigated by the manufacturer as it also seems to be due to a design problem, as experienced with the auto reclosers (as shown in Fig. 15 (a), (b) and (c)).

A clear difference was noted in the leakage currents measured on the two cut out fuses of identical design and appearance, but manufactured from two different LSR materials. Unit 22-21 had higher leakage current activity when compared to that measured on unit 22-20.

PERFORMANCE OF HOLLOW CORE INSULATORS

Two hollow core insulators, using the same silicone rubber (SR) insulating material, and of a spiral type shed design, were tested at KIPTS for the heavy to very heavy test cycle, energised at 132 kV.

Both hollow core insulators passed the light to medium test cycle. No mace fuses blown, and no material degradation.

However, both failed the heavy to very heavy test cycle, due to four mace fuses blown each. Material erosion was starting on the insulating material to end fitting interfaces (see Fig. 17) on unit 132-45 which has the smaller core diameter of the two. A hardening of the insulation material and a total loss of hydrophobicity was observed on both units.

In a previous study *"Optimized use of HV composite apparatus insulators: field experience from coastal and inland test stations"*[9] the following conclusions were made:

Fig.16: Severe material erosion (a) and metalware corrosion (b) as found on two of the LSR cut out fuses (units 22-20 and 22-21) tested at KIPTS.

Fig.17: Photos taken during the visual inspections on the 132 kV hollow core insulators up for test at KIPTS.

"With regard to ageing characteristics, the results of 2-7 years of field testing show that there is only slight deterioration for the apparatus insulators even with rather short creepage distance and in severe coastal environment. This is a much better performance than that of silicone rubber line insulators tested at the same site. The most important explanation of less ageing is a lower and differently located maximum E-field in the vicinity of HV flanges and lower current density due to a large diameter in comparison with line insulators."

This phenomenon was also observed when comparing the good material performance of the two large diameter hollow core insulators, with that found on some of the smaller core diameter insulator products tested at KIPTS.

However, the following conclusion from the previous study[8] was not confirmed during the KIPTS test.

"With regard to pollution performance, the short-term and long-term hydrophobicity characteristics of silicone rubber apparatus insulators are better than of the porcelain insulators at the same site. The number of the high pulses of the leakage current provoking a flashover is much lower for silicone rubber apparatus insulators than for the porcelain insulators at the same site."

Thus, why did both hollow core insulators tested at KIPTS fail electrically? The spiral-shed design used on both the hollow core insulators tested at KIPTS, and their known poor pollution flashover performance when totally hydrophilic, is the only possible explanation.

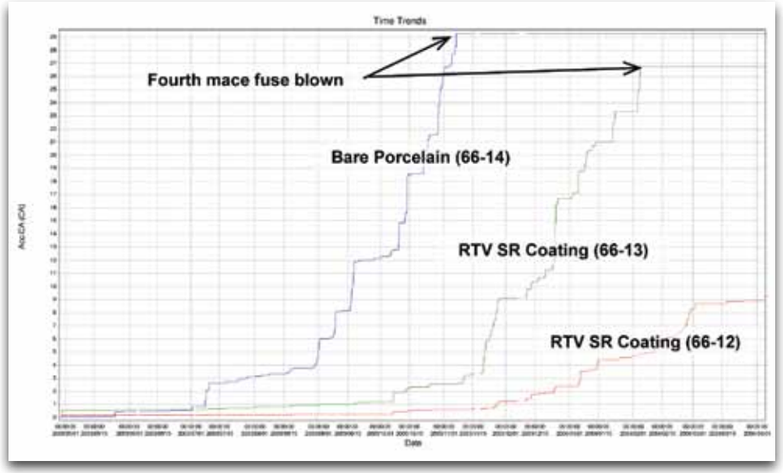

Fig.18: Accumulated coulomb ampere leakage currents measured on the bare porcelain reference insulator (66-14), compared to that measured on the two different RTV SR coatings (unit 66-13 and 66-12). Both the bare porcelain reference insulator and RTV SR coating (66-13) had four mace fuses blown during the test cycle.

PERFORMANCE OF RTV SR COATINGS

Two RTV SR coatings applied to porcelain insulators identical to the reference insulator (66-14) were tested at KIPTS for the heavy to very heavy test cycle. The one RTV SR coating (unit 66-12) passed the heavy to very heavy test cycle at KIPTS with no mace fuses blown and no material degradation of concern.

However, the other (unit 66-13) failed the heavy to very heavy test at KIPTS due to four mace fuses blown.

The relative electrical performance of these units tested at KIPTS can be seen in Fig. 18. RTV SR coating 66-12 showed the best leakage current performance.

DISCUSSION OF THE KIPTS 2003/4 TEST CYCLE

Twenty-three of the 41 medium voltage insulator products tested at KIPTS during 2003/4 passed the test cycle. The eighteen failed units were mainly due to four mace fuses blown (high leakage currents) especially on those with insulating materials of porcelain, cycloaliphatic (CA) and ESP. The other failures were mainly due to severe material erosion and tracking.

Thirty-three of the forty-six high voltage insulator products tested at KIPTS during 2003/4 passed the test cycle. The fifteen failed units were mainly due to severe material erosion and tracking, only four of them failed due to four mace fuses blown.

In general, the following:

- CA, EPDM and ESP units had higher leakage current activity when compared to the rest.
- EPDM and ESP units had crazing and micro surface cracks present in their material.
- SR and LSR units, if failed, were normally due to severe material erosion and tracking.
- Insulator products with a smaller trunk diameter had more material erosion present.
- The metalware to insulation interface was found to be an area of high stress especially where metal inserts interface with the insulating material.
- An interesting observation, which needs further research, is that insulator products with a lower specific creepage distance had less material degradation when compared to those with a higher creepage distance. They did however, as expected, have higher leakage current activity.

Eighty-nine certificates were issued in July 2004 for insulator products tested at KIPTS using the above acceptance criteria. Only one manufacturer was not happy with the issued certificate which confirmed the failure of their product due to severe erosion and tracking. The product in question is shown in Fig. 19.

The findings at KIPTS during the April 2003 to April 2004 test cycle are confirmed by those reported in the Cigre publication *"Selection of composite insulators for AC overhead lines: implications from in service experience and test-station results"*[10].

Koeberg Insulator Pollution Test Station

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Fig.19: Severe erosion and tracking observed on insulator product 11-31.

Year	MV			HV			Pass	Failed
	Tested	Pass	Failed	Tested	Pass	Failed		
2003/2004	41	23	18	46	33	13	64.37%	35.63%
2004/2005	36	22	14	18	8	10	55.56%	44.44%
2005/2006	42	26	16	17	9	8	59.32%	40.68%
2006/2007	41	34	7	4	4	0	84.44%	15.56%
2007/2008	56	50	6	23	18	5	86.08%	13.92%
2008/2009	36	30	6	21	20	1	87.72%	12.28%
2009/2010	29	26	3	15	15	0	93.18%	6.82%
2010/2011	52	34	18	9	8	1	68.85%	31.15%
2011/2012	47	44	3	11	6	5	86.21%	13.79%

Table 2: Summary of KIPTS results since 2004

The results confirm that KIPTS can be successfully used to evaluate the natural ageing and pollution performance of insulator products.

The research work done at KIPTS has significantly contributed to the development of Cigre Guide 333[11], *"Guide for the Establishment of Naturally Polluted Insulator Testing Stations"*.

STATISTICS OF TESTS DONE TO-DATE AT KIPTS

Since 2004, over 540 medium and high voltage insulator products have been tested at KIPTS. Due to the initial high demand for test positions, testing of various categories of insulators was staggered over the first three years from 2004 to 2006.

By the end of the 2006 test cycle, all types of insulator products had been given an opportunity to be tested at KIPTS. The overall pass rate for all insulator products during these 3 years was in the region of 60%.

By 2007, the designs and material compositions of products that had failed during the previous 3 years of testing had been improved upon and this saw a significant improvement in the pass rate of products tested from here on.

Besides acting as a filter for insulator products entering the South African market, KIPTS has played a fundamental role in research and development for many local and international insulator manufacturers. The work done to date at KIPTS has contributed to a step change in insulator product technology.

CONCLUSIONS AND RECOMMENDATIONS

Since the inception of Eskom certification testing at KIPTS in 2003, insulator product ageing has significantly diminished as manufacturers use KIPTS for new product development. However, since KIPTS is only equipped to 132kV, the above benefit has largely been restricted to Distribution class insulation.

Plans are in place to develop a new insulator pollution test facility catering for Distribution and Transmission voltage levels (11, 22, 33, 66, 132, 275, 400 and 765 kV) and both polarities DC variable up to 800 kV. In addition to performing natural ageing and pollution performance testing, the new test station will have facilities to perform:

- Salt and Clean fog tests according to IEC 60507 and IEC 61245.
- Tensile and Cantilever strength tests in accordance with IEC 60383, 61109 and 61952.
- Puncture tests (IEC 61211) and Residual Mechanical Strength (IEC 60797).
- All tests as required by IEC 61109 (except ageing chamber), IEC 62217, IEC 60587, IEC 61952 and IEC 62231.

It is envisaged that this new test facility will be commissioned within the next 5 years. This new facility will play an even greater role in the future of insulator product technology.

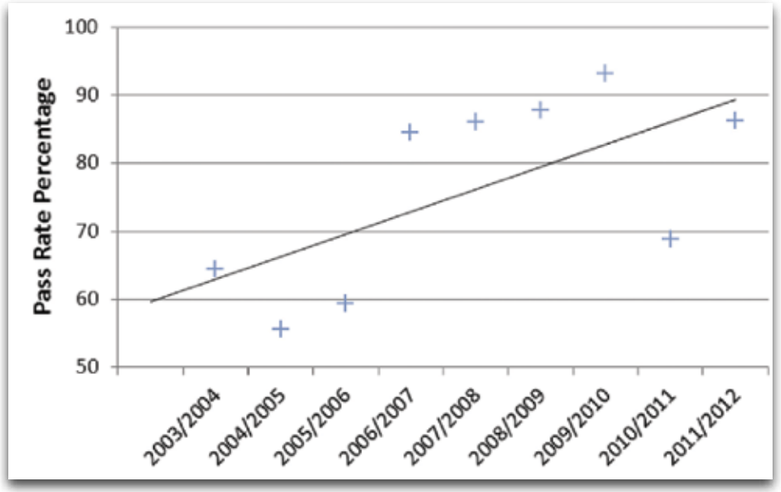

Fig.20: Improvement in KIPTS pass rate from 2004 to 2012

Fundamental pollution flashover research, for both AC and DC, is currently in progress. This research using the Tracking and Erosion dipping wheel (IEC 62217), as well as the Incline plane (IEC 60587) with the aid of high-speed video camera and leakage current recording systems.

ACKNOWLEDGEMENTS

The authors acknowledge the key role of Eskom in supporting the funding of the research on which this paper is based.

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Transforming the Power Industry

Powertech Transformers (PTT) consists of three world class operations involved in the design, manufacture, installation and commissioning of transformers.

BY | NICO GUNTER | LEON SCHULTZ | JACQUELINE BURN

PTT supplies a full range of transformers, from generator step-up to transmission and distribution transformers. The range includes three-phase and single-phase units, auto-transformers, arc-furnace, locomotive and traction transformers, miniature sub-stations, NECRT's as well as and shunt reactors. PTT has also recently entered into the renewable power market which has resulted in orders being placed for several projects.

PTT designs every transformer to meet the customers' exact requirements.
The power transformer factory in Pretoria West is a well-equipped factory and is among the biggest and most sophisticated transformer manufacturing plants within the Southern Hemisphere and one of two large manufacturers within sub-Saharan Africa. PTT Pretoria manufactures 20MVA to 800MVA transformers with a primary voltage up to 500kV. Other products include arc-furnace, on-board locomotive and grid-connected traction transformers as well as shunt reactors up to 100MVAr.

The Johannesburg operation manufactures 1000kVA to 20MVA transformers with a primary voltage up to 132kV. They also produce neutral earthing resistors, compensators, and NECRT combinations, as well as 100kVA to 3150kVA cast-resin dry type transformers with a primary voltage up to 36kV.

The Cape Town operation manufactures 16kVA to 1000kVA transformers with a primary voltage up to 36kV and 200kVA to 2500kVA miniature substations with a primary voltage up to 36kV.

All operations carry ISO accreditation. Both the Pretoria and Cape Town operations have ISO 9001 -2008 quality, ISO 14001 – 2004 environmental, and OSHAS 18001-2007 health and safety accreditations. The Johannesburg operation has the ISO 9001 – 2008 quality accreditation. Recently the Pretoria operation's ISO 14001-2004 and OSHAS 18001-2008 health and safety accreditations were recertified.

The Pretoria West facility includes a laboratory, which has been in existence since 1973. The main activities are testing of materials for transformers and calibration of instruments. The testing of transformer oil is very important and this service is also offered to external companies. The laboratory has SANAS accreditation IEC 17025: 2005 for competence of testing and calibration laboratories and calibration work is performed in-house.

In order to capitalise on synergies, the engineering and technical departments were divided into two groups. The engineering department which concentrates on the day-to-day production of electrical and mechanical transformer designs and the Technology Group which focuses on research and development, support and testing of transformers.
The intention is to enhance our own research and development. The main emphasis of the Technology Group at present is the development of new transformer technologies. One of the projects that the group is currently working on is a collaborative research and development project with the Department of Mechanical Engineering at the University of Pretoria, through funding received from the Department of Science and Technology's (DST) Technology Localisation Programme. The R&D project relates to the short-circuit withstand ability of transformers. Through this project PTT will further develop knowledge, empirical factors and engineering models representing the short circuit characteristics of transformers, establishing a local knowledge base.

The development of cutting edge technology for transformers involves an in-depth understanding of the fundamental phenomena experienced by the transformer under normal, transient and fault conditions involving voltages and currents. These complex phenomena are extensively studied through the development of virtual prototype models and experiments (including FEM and 3D simulations). Essentially, the research teams continually assess the improvements of materials, test methods, manufacturing processes and design philosophies. Tools for computing the design parameters are being developed and verified using the virtual experimentation platforms based on numerical methods.

The Technology Department participates in the development of international standards responsible for benchmarking the design of power transformers. This comes in a form of contributions to CIGRE and IEEE working groups. The following disciplines covered under the R&D section include:

MAGNETOSTATIC CORE AND ACOUSTIC PERFORMANCE

The magnetostatic steady state thermal models are developed in Finite Element Method (FEM) modelling to identify and quantify the core hot-spot temperatures of various grains of core steel, core type (3-limbs, 2-limbs and 5-limbs) and flux density in the core. There are also on-going test experiments of the core temperature hot-spot determinations using the fibre optic technology. The identification and quantification of core cross fluxing due to non-magnetic gaps and change in flux flow (in relation to the orientation of core steel grains) are studied using FEM and analytical methodologies. The effect of combining different core steel grades, (e.g. Regular grain oriented and highly permeable or domain refined steels) are examined to establish the flux distribution, no-load losses and sound levels.

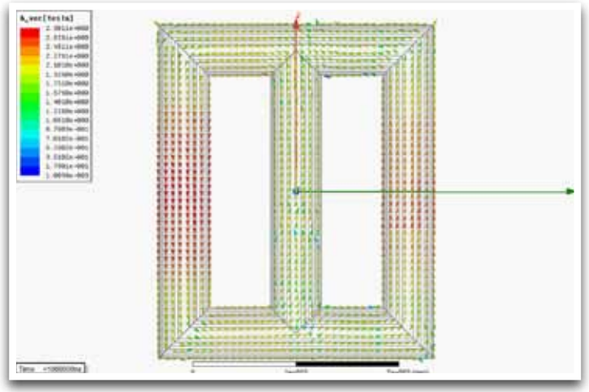

Figure 1: Flux density distribution in the three limb transformer core

DIELECTRIC INTEGRITY

The structure of the main insulation system of power transformers is such that the windings and pressboard insulations are concentrically arranged. This allows the use of well-known methods for evaluating the electrical stress. This type of analytical methodology of cylinder-to-cylinder or cylinder-to-plane configurations checks the prevalence of these stresses. This method gives an approximation of the electrical stress between two electrodes, which is applicable to uniform field distributions. Thus there is a need to study electrical stress using 2-D and 3-D FEM so as to understand both uniform and non-uniform field distributions. In addition, the results of the analytical stress are compared to withstand curves of the matured technologies of insulation designs, such as WEIDMANN oil curves.

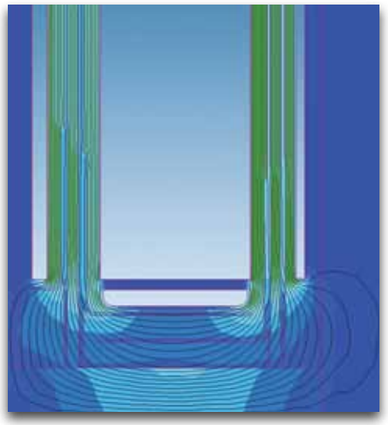

Figure 2: Electric field between the insulation barriers

The knowledge of potential and field distributions in the internal insulation system of a transformer during transient excitation is vital to its construction. The research is undertaken to improve the accuracy of analytical electric field methods when power transformer windings are impressed with impulse and power frequency voltages.

A lumped parameter equivalent model of transformer windings is constructed using RLC networks and the model is excited with an impulse signal.

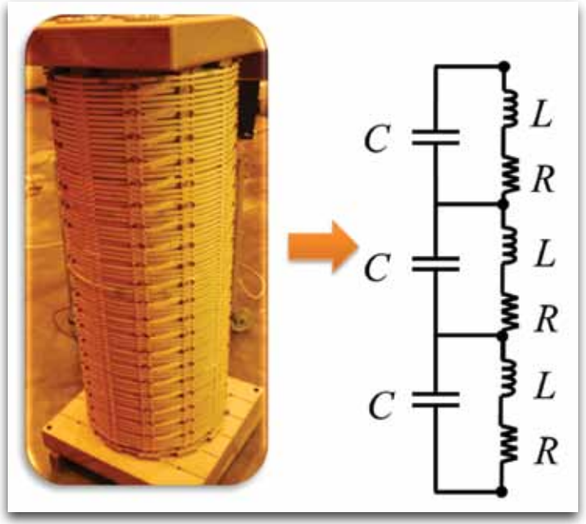

Figure 3: Winding discretization for fast transient simulations

SHORT CIRCUIT DURABILITY

The development of a comprehensive short-circuit calculation philosophy is currently being undertaken. This includes research into fundamental principles of short-circuit forces and electromagnetic fields, calculation methodologies, mechanical behaviour and material characteristics. Analytical methods such as Rabins' method and numerical methods such as the FEM are being studied to find a best fit tool for electromagnetic field calculation.

The transient mechanical behaviour of windings under short-circuit is being investigated. This endeavour involves expert researches at the University of Pretoria and the Centre for Scientific and Industrial Research (CSIR) to model and verify windings structures numerically. Further research is being conducted into the current redistribution in transformer windings and the statistical effect of winding manufacturing inaccuracies.

Transforming the Power Industry

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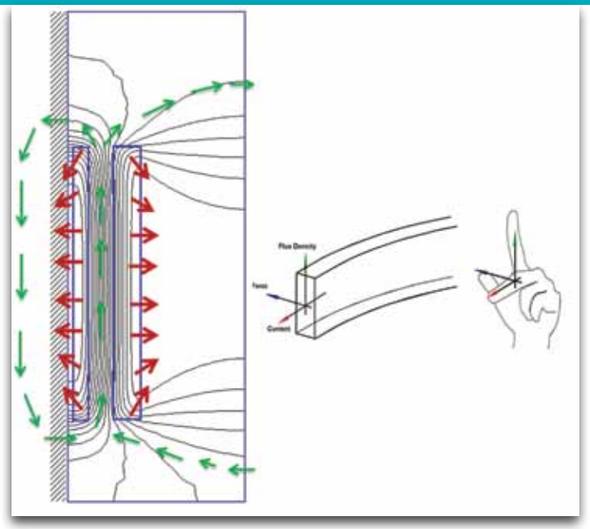


Figure 4: Radial and axial forces experienced by the windings during short-circuit faults

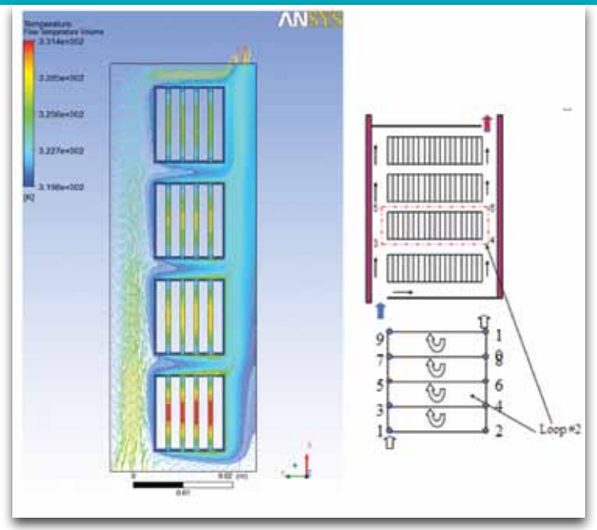


Figure 6: The computational fluid dynamic simulation of the oil flow in a winding

THERMAL STABILITY

The leakage fields present during the normal transformer operation impinges upon the metal structural parts, inducing eddy currents. A series of computational models involving analytical and numerical methods are developed. The numeral modelling approach includes full scale computation of eddy current losses and temperature distributions in metal parts. There is planned and on-going experimental work tailored to improve and validate the computational methods for hotspot temperatures in metal parts.

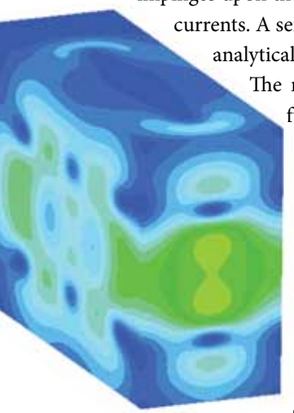


Figure 5: Stray losses in metal part of the transformer

The heat due to direct current (dc) and winding eddy losses leads to excessive and hazardous hot-spots if not properly dissipated. The fluid flow around the windings is responsible for the removal of this heat. Models are built for the simulation of individual windings of a transformer using a network of oil flow paths through the discs, and calculation along each flow path, the oil velocities, and temperatures using a thermal network model (TNM) philosophy. Iterative flow models with oil guides of the disc windings are used to predict the local temperatures of the conductor strands.

The aim then is to increase the level of local manufacturing capabilities and activities, and thereby reducing the reliance on imports, resulting in increased skills development and sustainable work opportunities.

We firmly believe in continuous improvement and ensuring that all improvements are in line with customer requirements and plan to keep investing money in improving and upgrading our facilities. Our transformers include the following:

- Robust design features which meet global design criteria.
- Test records verify continuous quality improvements: Design and manufacturing are carefully monitored.
- First-class suppliers: Suppliers are subject to regular quality audits.
- On-time delivery with quality guaranteed.
- Low life-cycle costs: Low losses, high quality insulation and hot spot control are just a few of the features that keep our transformers performing efficiently and the lifetime running costs down to a minimum.

BUILT-IN SYSTEMS KNOW-HOW

The company has years of experience of transmission and distribution technology

PTT believes empowering its employees is of utmost importance and as such we have training centres at our Pretoria West and

MAY day and beyond...

COMPILED BY | JANE BUISSON-STREET
PR ENG | SSAIEE

1 May

1931 – The Empire State Building on 5th Avenue is officially opened by US President Herbert Hoover. The steel frame building, the world's third "skyscraper" (380m), went up in just six months.

1994 – Aryton Senna was killed during the San Marino Grand Prix.

2 May

1519 – Leonardo da Vinci has died at Cloux in France at the age of 67. He was a painter, architect, civil and military engineer, an expert mathematician, biologist, a grinder of lenses, designer of clock mechanisms, of devices for transmitting energy and of flying machines amongst other things. Da Vinci considered art and science as one, *"part of the search for energy"*.

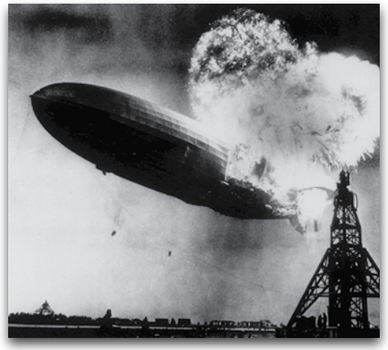
1952 – "Jet age travel" was born today as a de Havilland Comet jet airliner with 36 passengers aboard took off from London to Johannesburg on the first scheduled jet flight. The British Overseas Airways Corporation flight is scheduled to take 18 hours flying via Rome, Beirut, Khartoum, Entebbe and Livingston.

1980 – *"Another Brick in the Wall"* by Pink Floyd was banned by the South African government today.

4 May

1904 – Charles Rolls and Henry Royce sign a provisional agreement to collaborate in the production of Rolls-Royce cars.

1979 – Margaret Thatcher, the first female Prime Minister of Britain, moved into 10 Downing Street.



6 May

1937 – The Hindenburg, Germany's giant transatlantic airship, exploded on landing in New Jersey tonight. 35 of the 97 on board were killed. It is thought that her 7 million cubic feet of gas was ignited by lightening when wet mooring ropes touched the ground. *"This is the fifth airship to crash and today's tragedy must spell the end of the line for them."*

1994 – Queen Elizabeth II and president Mitterrand opened the Channel Tunnel that links Britain with the mainland.

7 May

1945 – Nazi Germany surrendered to the allies. The war in Europe has ended.

10 May

1994 – Mandela sworn in. Leader of the African of the African National Congress party, Nelson Mandela, has been sworn in as the first president of a multi-racial South Africa.

Transforming the Power Industry

continues from page 52

Cape Town operations. Our Cape Town operation is recognised as an Accredited Trainer by MERSETA.

PTT also invested in an Engineers-in-Training program where we are able to fast track electrical designer training from 4 years to 12 months. The course comprises 6 months of practical training within the factory (in order for the trainees to have practical knowledge of the transformer industry) followed by the 6 months classroom training.

The training centres in our Pretoria West facility include a winder training centre facility which was opened in January 2007. The intention of this training facility was to augment the amount of transformer winders as our industry was experiencing an extreme shortage of these skills. Here, the intention was to train all our winders in all types of windings that we manufacture. Our boilermaker/welder training facility is at present seeking regional accreditation as a training facility at MERSETA. Within the transformer assembly area, a training centre has been installed to cater for training of power transformer assemblers.

PTT's Transformer Manufacturing and Design training course has been accredited by the South African Institute of Electrical Engineering (SAIEE). The training course has been awarded 4 (four) Continuous Professional Development points (CPD) and the validity period stretches over a period from July 2012 until June 2015. The course, which includes both practical and classroom training over 5 (five) days, covers various aspects of transformer production, inter alia: design processes (both electrical and mechanical); tank fabrication; insulation; paper-lapping; core-cutting; core stacking; winding manufacture; winding assembly; active part assembly; oil processing; tanking; quality assurance and control; factory testing, protection components, first line maintenance, transport and dispatch of the transformers as well as research and development.

There are five training sessions scheduled for 2013 and at present a maximum of twenty delegates can be accommodated. The course brochure and other details are available on our website.

Delegates who have attended the training include personnel from ESKOM, eThekwini Municipality, Sasol and Enzani Technologies. Overall feedback has been very positive regarding the training course. PTT has also developed an after sales service division which offers complete peace of mind for our customers. Services include maintenance of their transformers and related equipment for an extended period specific to each and every customer.

Once again in June 2012, our BEE score was verified as a Level Three Contributor by Empowerdex.

This article was commissioned by Powertech Transformers. For more information please call 012 318 9911 or visit www.pttransformers.co.za

May Day and Beyond....

continues from page 54

11 May

1991 – 36 year old Reggae artist Bob Marley died today of cancer. He introduced the world to reggae and the Rasta religion.

14 May

1796 – Edward Jenner, a British physician, carries out the first smallpox vaccination.

1900 – The second modern Olympic Games open in Paris. This time women are allowed to compete.

15 May

1936 – Amy Johnson, an aviator, arrives back in England after a record breaking return flight from London to Cape Town.

1998 – "Goodbye to ol' blue eyes". Veteran singer Frank Sinatra died today after a sparkling career spanning 60 years of show business.

19 May

1906 – The Simplon Tunnel through the Alps between Italy and France was officially opened.

20 May

1910 – World fails to end as comet passes. Thousands of people prepared for the world's end today as earth passed through the fiery tail of Hayley's Comet. In America, "comet pills" have been on sale, claiming to offer protection against the comet's effects, and miners refused to work, not wanting to die underground. The comet lit up the night sky, passing its closest to the Earth today – 13 million miles away.

22 May

1908 – The Wright brothers, Wilbur and Orville, patented their flying machine, four years after their first powered flight at Kitty Hawk in North Carolina.

24 May

1862 – Westminster Bridge, London, England, is opened.

1988 – Snow falls for the first time in 50 years in the Syrian Desert.

25 May

1990 – British Prime Minister, Margaret Thatcher, today warned of the dangers of global warming and pledged Britain to a 30% reduction in carbon emissions, which are thought to be the main cause of global warming.

28 May

1987 – Mathias Rust, 19, West German, landed his plane in the Soviet Union's Red Square as a prank.

29 May

1953 – New Zealand born climber Edmund Hilary and his Sherpa guide, Tenzing Norgay, summited Everest at 11:30 am this morning. They stayed 15 minutes, long enough to take photos and plant 3 flags (the Union Jack, the Nepalese flag and the UN flag).

30 May

1959 – The first hovercraft is launched from Cowes on the Isle of Wright off the south coast of England.

31 May

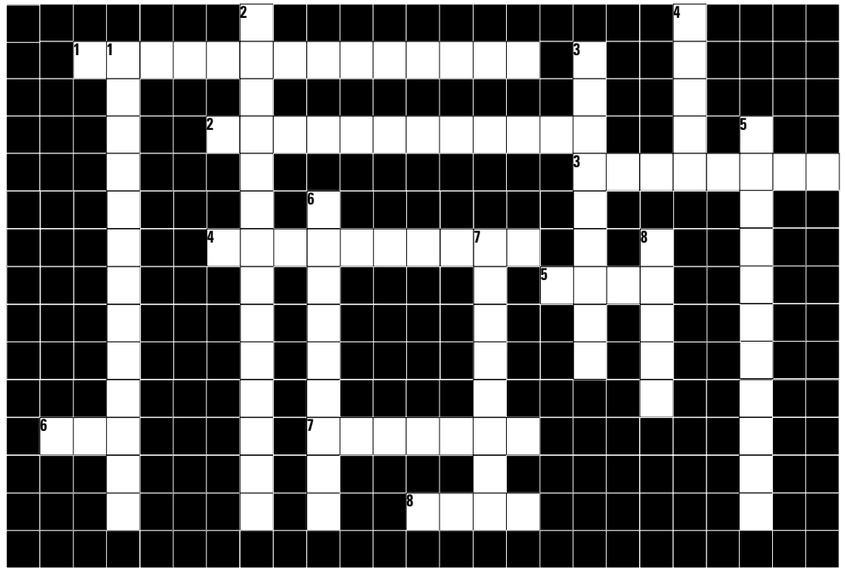
1927 – Ford's last Model T (No. 15 007 003) rolled off the assembly line. It will take 6 months and a minimum of $200 million to retool their production line. The Model T Ford has been replaced as the number 1 selling car by General Motors. wn

Excerpt from "On this day - the history of the world in 366 days. Published by Octopus Books.

win R1000

Have some fun and stand a chance to win R1000.
Complete the May issue crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, May 2013 Crossword Puzzle, P.O. Box 751253, Gardenview, 2047* or email it to *minx@saiee.org.za*. The completed crossword puzzle should reach us by no later than **31 May 2013**. The winner of R1000 will be announced in the July 2013 issue of the **watt**now magazine.

BERGMAN FISHER ASSOCIATES, DESIGNERS OF A SAFER GREENER ENERGY EFFICIENT FUTURE, ARE THE PROUD SPONSOR OF OUR CROSSWORD PUZZLE.



ACROSS

1. The 2013 SAIEE President (4,3,7)
2. Who is the Mpumalanga Centre Chairman? (5,7)
3. Immediate Past President (4,4)
4. 2013 Junior Vice President (2,8)
5. The Chairman of the SAIEE KZN Centre (4,9)
6. The sponsors of the crossword (abbr.)
7. Surname of the wattnow magazine's Managing Editor (7)
8. In which year was the SAIEE formed?

DOWN

1. Who is the 2013 Senior Vice President? (5, 8)
2. The 2013 Honorary Vice President (5, 9)
3. Who the the Chairman of the Western Cape Centre? (9,8)
4. South African Institute of Electrical Engineering (abbr.)
5. The Chairman of the Eastern Cape Centre. (5,6)
6. See 5 across.
7. See 3 down.
8. Surname of the 2013 Honorary Treasurer and a Past President. (4)

March issue answers:

ACROSS 1 Rubber Insulated **2** Tensile **3** Insulation **4** MHZ **5** Conductors **6** OFE **7** Protective Jacket **8** Silver **9** ISO **10** Oxygen Free

DOWN 1 Creep **2** Aluminum **3** Shielded **4** Soldering **5** Goodyear **6** Charles **7** Ductility **8** ETP **9** Copper **10** SAIEE

Terms and conditions: 1. Only one entry per person. 2. Winners will be notified via email. 3. Incorrect information will automatically disqualify the entrant. 4. Anybody may take part except the office staff of the SAIEE, their family members and members of the Publications Committee. 5. **watt**now magazine and the SAIEE cannot take any responsibility for lost entry forms or any damage, losses or injuries related to the draw of the prize. 6. The winner must be prepared to be photographed and such photograph will be published in the relevant issue of the **watt**now magazine. 7. Closing date for entry is 31 May 2013. 8. The winner will be announced in the July 2013 issue of the **watt**now magazine. 9. The Managing Editor's decision is final and no correspondence will be entered into.

SAIEE Membership Benefits

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

You simply cannot afford not to be a member!

- A discount of up to R1110 on their ECSA registration fee, which is due in April every year, provided that they join the SAIEE before the end of March that same year.
- Upon joining the SAIEE there is a standard entrance fee of R700, an annual membership fee of R923 for Members, and between R1129 and R1223 for Senior members depending on age. Most of this will be recovered through the ECSA discount.
- SAIEE members receive 11 issues of the wattnow magazine valued at R330.
- The SAIEE Africa Research Journal (ARJ) our peer reviewed research publication (which incorporates the SAIEE Transactions) is also available to SAIEE member's quarterly upon request.
- The real rewards of being a member can be realized through attending monthly lectures, debates, tours and site visits organized by the SAIEE. These are mostly free of charge and provide refreshments at no extra cost. Members are awarded valuable CPD credits for attending these events.
- Membership has significant career benefits, as membership holds prestige and recognized status in the profession. SAIEE gatherings provide excellent opportunities for members to interact with normally inaccessible captains of industry.
- SAIEE letters after your name indicate your membership grade and are a useful measure of your experience.
- Members receive generous discounts on the SAIEE run CPD courses and earn (category 1) CPD credits. Members also have the option of joining the wattnow online CPD program at a fraction of the cost.
- The SAIEE mentorship program assists members to gain professional status through the Institutes large database of mentors.
- SAIEE members are awarded 1 CPD credit (Category3) for being a member of the SAIEE.
- Members are able to serve on organizing committees and gain valuable experience and professional networking in doing so.
- Use the electrical engineering library at SAIEE House.

APPLICATION REQUIREMENTS FOR SAIEE MEMBERSHIP

It is always exciting to receive an application as it means that we will soon be welcoming another new and valuable SAIEE member to our family of nearly 6000 members. However, more often than not the application is incomplete. To avoid unnecessary delays in the process it is important to highlight the problems regularly experienced within the administration with received applications:-

Many applicants do not read the list of requirements.

WE REQUIRE THE FOLLOWING DOCUMENTS:

- Copy of the applicants ID;
- Certified copies of achievement certificates;
- A copy of the applicants latest CV;
- The completed application form;
- Proof of payment for the application and membership fee which are required upfront. ***Please use surname and initials as payment reference.***

Copies of the required documentation should accompany the application forms but unfortunately we still find application forms are sent in without it.

A number of applicants do not complete the application forms adequately, ***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!!

2013 Membership fees

Rates as from 1st January 2013

Grade of Membership	Annual Subscriptions paid by 28 February 2013		Annual Subscriptions paid after 28 February 2013		New Members FEES * see Notes 1 & 4 below.	
	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)
Student	**117**	82	130	92	130	92
After 6 yrs study	**752**	526	835	593	835	593
Associate	**752**	526	835	593	835	593
Member	**831**	582	923	648	923	648
after 6 years	**972**	680	1,079	765	n/a	n/a
after 10 years	**1,016**	711	1,129	801	n/a	n/a
Senior Member	**1,016**	711	1,129	801	1,129	801
after 6yrs/age 40	**1,102**	771	1,223	868	1,223	868
Fellow	**1,102**	771	1,223	868	1,223	868
Retired Member (By-law B3.7.1)	**465**	326	515	365	n/a	n/a
Retired Member (By-law B3.7.3)	**nil**	nil	nil	nil	n/a	n/a

NOTE

1. Entrance fee for all grades of membership is R700 (except Students which is free)
2. Transfer fee to a higher grade is R400.00 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 2013 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 in the amount of his subscription.

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 be exempt from the payment of further subscriptions." Members who comply with the requirements of By-Law B3.7.3 may make written application to Council for exemption form paying 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 June of each year will be struck-off the SAIEE membership role - subject to Council decree.

Members in good standing and no longer in substantive employment and do not receive payment or salary for work done may apply to Council for a reduction in their annual subscriptions.

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www.saiee.org.za

Calendar of events

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

MAY 2013

4-6	Led Expo Mumbai	Mumbai, India	www.biztradeshows.com
8-9	Electrical Manufacturing and Coil Winding Expo	Frontier Airlines Center, Milwaukee, USA	www.biztradeshows.com
13-17	2013 PowerEng Conference	Instanbul, Turkey	www.powereng2013.org
14-15	African Utility Week	Cape Town International Convention Centre	www.african-utility-week.com
23	President's Invitation Lecture	University of Johannesburg	geyerg@saiee.org.za

JUNE 2013

3-6	ECCE Asia 2013	Melbourne , Australia	www.ecceasia2013.org
16-19	2013 IEEE Transportation Electrification Conference and Expo	Metro Detroit MI , USA	www.itec-conf.com
23-26	2013 IEEE 14th Workshop on COMPEL	Salt Lake City UT , USA	www.ece.utah.edu/compel13
24-27	Road Trans Africa 2013	Sandton Convention Centre	www.terrapinn.com

JULY 2013

23-26	KZN Industrial Technology Exhibition 2013	Durban Exhibition Centre, Durban	www.kznindustrial.co.za
16-19	2013 IEEE Transportation Electrification Conference and Expo	Metro Detroit MI , USA	www.itec-conf.com
23-26	2013 IEEE 14th Workshop on COMPEL	Salt Lake City UT , USA	www.ece.utah.edu/compel13
29 - 1	ASME 2013 Power Conference	Boston, Massachusetts, USA	www.asmeconferences.org

AUGUST 2013

13-15	International Symposium on Resilient Control Systems	San Francisco, California, USA	www.ieee-ies.org
27-30	9th IEEE International Symposium on Diagnostics for Electric Machines, Power Electronics and Drives - (SDEMPED 2013)		
		VALENCIA , Spain	www.ta.ieee.org

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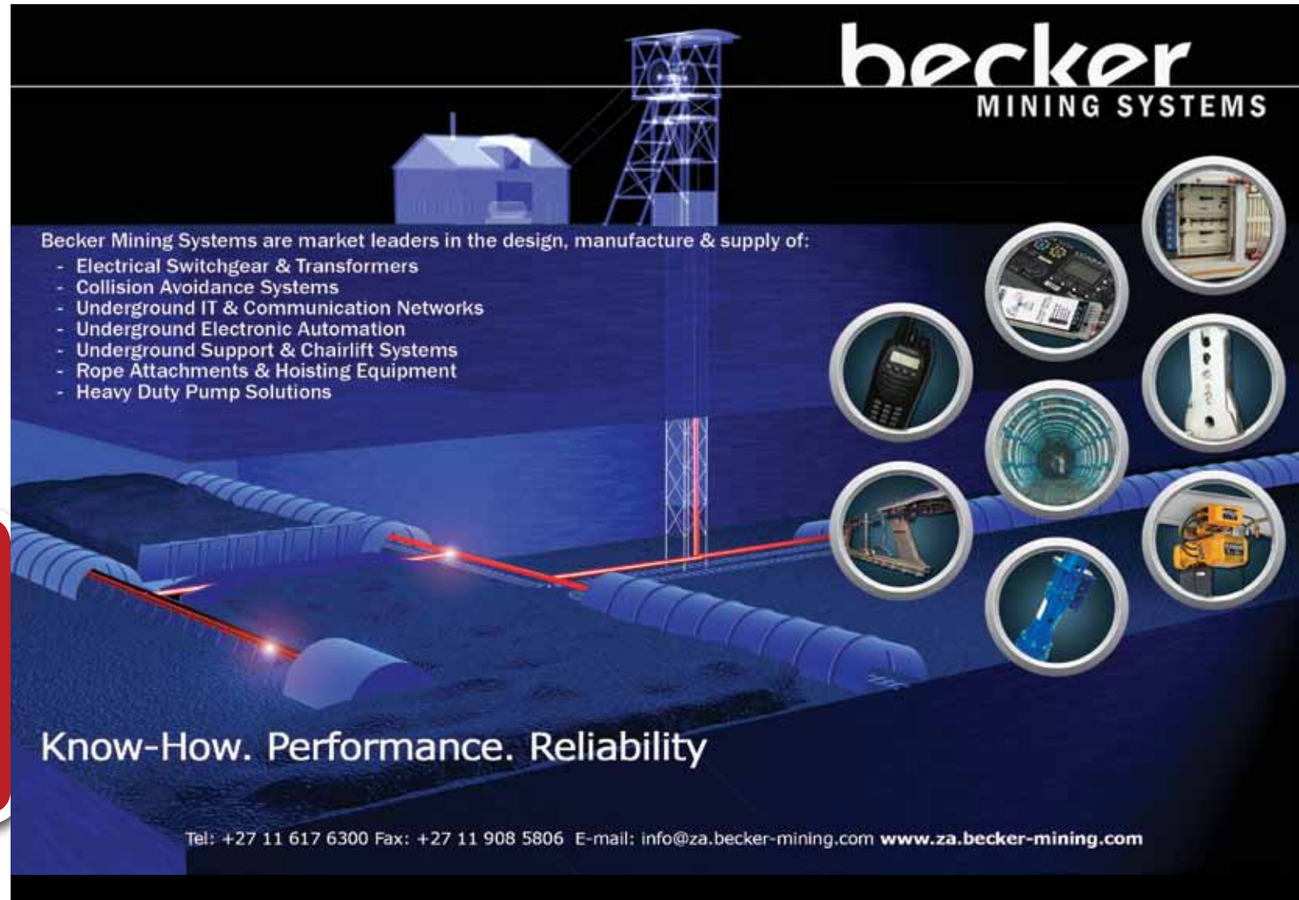

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