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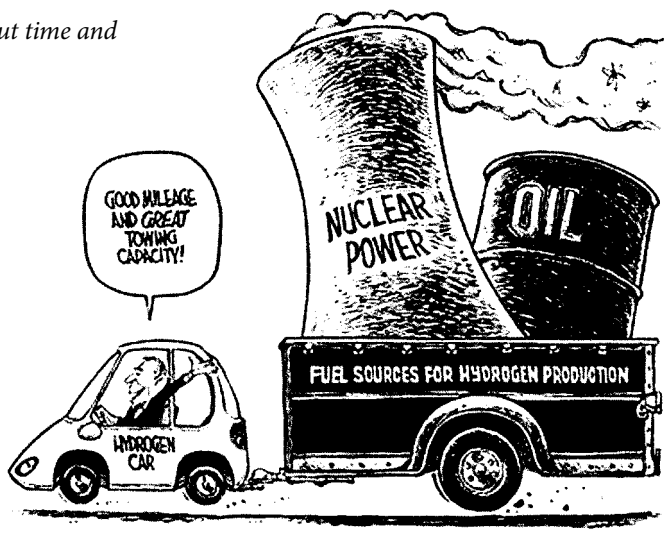

wattnow magazine

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Through the year of 2013 we've met new people, and said goodbye to a few dear to us. We've laughed, cried, were happy, upset, even angry, but life goes on …

This issue of **watt**now - the last issue for 2013 - features the energy source Hydrogen. It includes articles which will generate some heated debate (no pun intended). It also gives you an insight into the SAIEE and its latest events.

The three faces on the cover of this issue are the three major award winners announced at the SAIEE Annual Banquet. They are:- from left to right; Prof Jan de Kock, who won the SAIEE President's Award; Refilwe Buthelezi, the SAIEE Young Achievers Award winner and Max Clarke, who received the SAIEE Engineer of the Year award. The **watt**now magazine salutes you, well done! See the article and photos on page 12.

I had the privilege of interviewing Easton LaChappelle at the end of October, before he began his whirlwind tour of South Africa with Paul van Niekerk, our SAIEE President. More about this remarkable young man on page 26.

We were sad to bid farewell to Prof. Mike Case recently – a man whose passing has left a big gap at the SAIEE. See his eulogy on page 32.

South Africa's infrastructure is in a poor state. Apart from some good initiatives for new infrastructural projects, there is wide agreement that the existing infrastructure is suffering from a serious state of disrepair. Stan Bridgens expands on a possible solution. Read more on page 46.

The staff of the SAIEE head office and I warmly wish all our SAIEE members, and **watt**now readers, a joyous festive season and a prosperous 2014. Do enjoy the holiday season, and drive safely.

Enjoy this issue!

Minx

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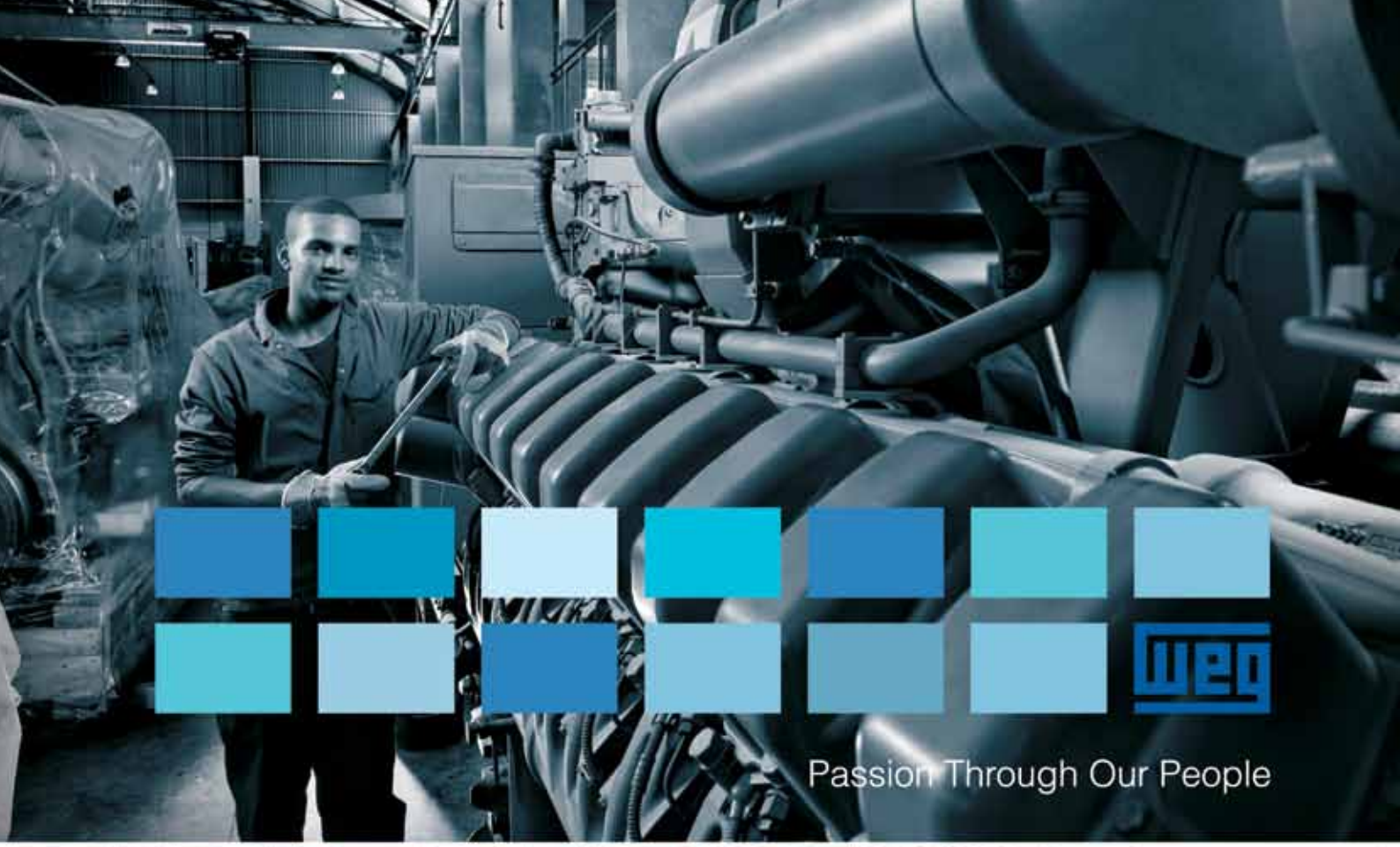
*Visit www.**watt**now.co.za to answer the questions related to these articles to earn your CPD points.*



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Greetings from the desk of the President of the SAIEE.

Being back in the 'hurly burly' of Johannesburg and at the SAIEE activities I become aware of the pressures of daily work, and more particularly, the pressure on Engineers in South Africa.

The SAIEE month started with a 'bang,' This month will see a whole series of individually inspired initiatives regarding the provisioning of Engineers in South Africa. ECSA in liaison with the Council for the Built Environment (CBE) has undertaken to do a survey to determine the Engineering resources available in South Africa to undertake a massive infrastructure development programme over the next few years.

The government has resolved to do eighteen Strategic Infrastructure Development Projects (SIPS) which are subdivided into hundreds of individual projects valued at Billions of Rand. These projects are intended to stimulate the economy by increase domestic mineral beneficiation, and in so doing, job creation. However, as we predicted, politicians, economists and businessman can make plans, but Engineers must execute the projects. ECSA has undertaken to bring this to the attention of Government, and they have asked us, the Voluntary Associations to assist with discipline specific enumeration projects. A survey regarding existing Engineers is on the SAIEE website; please refer to it and complete the questionnaire.

In addition, ECSA has launched a "Thought Leadership Project" which is intended to position ECSA and the discipline specific voluntary associations to improve the public understanding of the Engineering Profession.

The provision of Professional Electrical Engineers in South Africa is the SAIEE presidential theme for 2013, and we are making considerable progress with the introduction of the SAIEE mentoring programme.

I've attended the Bergville Community Building programme (BCB), Prizegiving Ceremony and I was most impressed with the programme being run by Nhlanhla Maphalala and sponsored by SAIEE.

I am very proud of the tutoring programme, and the sponsorship from the SAIEE. It was a pleasure to participate in the prize giving and address the learners and educators about their role in the future of Engineering South Africa.

The new 'Central' Centre of the SAIEE in Bloemfontein has now been commissioned, and it is up and running. The new Bloemfontein Centre Chairman is Ben Kotze.

The Innes House restoration project has been completed, and this magnificent Herbert Baker building once again looks beautiful and not only graces the SAIEE campus, it improves the whole neighbourhood. My thanks and appreciation to the facilities management team ably lead by Jane Buisson-Street.

In the near future, Innes House will accommodate the museum and some additional SAIEE administration facilities. The Historical Section of the SAIEE, under the watchful eye of Max Clarke, has commenced equipping of the museum to accommodate the carefully restored artefacts that they have been working on for many years.

On behalf of the SAIEE Council, I wish each of you a very blessed and safe holiday season.

Paul van Niekerk Pr. Eng. FSAIEE
2013 SAIEE President

Paul van Niekerk | Pr. Eng | FSAIEE
SAIEE President 2013

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All the products featured on page 10 are available from www.mantality.co.za.

The IDC provided an international guarantee facility to Vektronix in East London where Samsung flat-panel television sets are assembled. The net result has been the creation of 153 secure jobs.

After more than 35 years, Vektronix, the first TV manufacturing plant in South Africa, remains a flexible and cost-effective consumer electronics manufacturer in the country.

The IDC continues to identify and provide development funding for projects that will contribute to the accelerated building of South Africa's industrial capacity and the creation of sustainable jobs. **Visit www.idc.co.za** to find out more.

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WATTSUP

2013 ANNUAL SAIEE BANQUET

The 2013 annual SAIEE Banquet was another successful event hosted by the 2013 SAIEE President, Mr Paul van Niekerk and his wife, Elizabeth.

The Wanderers Club in Johannesburg saw approximately 300 guests arrive decked out in their best black suits and ties, with the ladies dressed to the nines. Judging by the photos it was an event enjoyed by all.

Even though only a handful of the Members achieving 50 year status were present to receive their certificates, the complete list of members is as follows: Graham William Attwood; Pierre Ballot; Walenty Bozyczko; Stan Bridgens; Prof Anthony Douglas Broadhurst; Hugh Vernon Caroline; Denis Alfred Carstens; Matthys Jacobus de Beer; Albert Tielman Dreyer; Neville Frevin; Ronald Horace Goodwin; Jacobus Hermanus Grobbelaar; Selwyn Neville Hammerschlag; Jacobus Andreas Heymans; Alan Taylor Jackson; Benjamin Stephanus Janeke; Gabriel Korvink; Edwin Rudolph Krause; Clive Digby Leyland; James Neville Bruce Lock; Charles Ian Machutchon; Brian Clifford Mathiesen; Colin Ian McNeill; Alan Stuart Mitchell; Jacobus Johannes Frederik Myburgh; John Cecil Kenneth Picton; Johannes Louis Mey Pretorius; Harold Woodhouse Rees; Willem Johannes Roos; Andrew Martin Roxburgh; Clive Vincent Rutter; Robert Arden Scott; Leslie Alexander Stewart; Richard Charles Samuel Tyrer; Gerrit Dirk van der Veer; Andries Jacobus van Tonder and Dr Trevor Laurence Woodburn.

2013 SAIEE President, Mr Paul van Niekerk, with his wife, Elizabeth.

Sarel & Anita Schoombie

Rohan Morgan

Mahle & TC Madikane

Kemraj & Usha Ojageer

David & Kim Spohr

Theuns & Mathilda Erasmus

Barend Rademeyer & Lizelle Hartman

Lizette & Danver Jacobs

The winners of the **watt**now articles judged to be the best were announced. They each received a prize of R5000 cash and they are:

- Robin Coombs, for his article, *"Manufacturing & Testing of High Voltage Transformers"* published in September 2012 issue.
- Felix Bosch for his two-part article on *"Uranium Technology"*, published in the 2013 June & July issues.
- J.P. Scholtz, for his article *"Transient Earth Fault Clearing Scheme"*, published in September 2012 issue
- Gavin Strelec for his article, *"The eradication of copper theft"*, published in the August 2013 issue.
- Gino Bougaardt for his article *"Cyber Security Challenges for SME's"*, published in the August 2013 issue.

Those of you who fancy a chance to win a prize next year, please read the competition rules on our website (www.saiee.org.za). Please write and submit an interesting article on a project in which you have been involved, or technology in which you have expertise. You earn 1 CPD credit for every article you publish.

A brand new award was launched within the SAIEE/**watt**now stable and that is the **watt**now Advertiser of the Year award. Our very first recipient of this award is Impact Energy. Wayne & Den Bromfield were present to receive this award. Thank you for your continual support with advertising in the **watt**now magazine. The SAIEE also would like to thank all the **watt**now advertisers for their support during the past year.

*Minx Avrabos with the **watt**now Advertiser of the Year award winners, Wayne & Den Bromfield from Impact Energy.*

WATTSUP

ANNUAL SAIEE BANQUET (CONTINUES)

The Young Achiever's Award winner, Refilwe Buthelezi with SAIEE President Paul van Niekerk (left) and Bernard Meyer from Powertech.

This year, Bernard Meyer presented the Keith Plowden Young Achievers Award, which is sponsored by Powertech Transformers.

This annual award is for the most outstanding young achiever of the year in the field of Electrical/electronic engineering and was awarded to Refilwe Buthelezi.

The award is for an engineer 35 years or younger who has displayed the spirit of achievement, creativity and leadership, coupled with innovative, entrepreneurial action, plus an infectious enthusiasm which counts for this award.

This year the award goes to an engineer who graduated at the former Rand Afrikaans University in 2007, and achieved a Master's Degree in Engineering Management at the same university. This follows on from being nominated as one of the "Top 5 Most Promising Women in Engineering" by the University of Johannesburg in 2012.

Refilwe's work experience includes being a Mathematics and Technology Facilitator for primary and high school learners, encouraging them to become engineers through conducting workshops and seminars. This important pipeline, of producing school-leaving learners properly equipped to successfully complete the rigorous engineering curriculum, is vital to the needs of SA at this time.

This enterprising young engineer has a high regard for professionalism. Since becoming a member of the SAIEE 2011, she has made a major contribution to the aims and objectives of the Institute by chairing, revitalizing and sustaining the important activities and involvement of the Power Section of the Institute.

The SAIEE Engineer of the Year award winner Max Clarke with SAIEE President Paul van Niekerk (left) and Jack Rowan from Actom.

The SAIEE Engineer Of The Year Award, sponsored by Actom, was presented by Jack Rowan to a true, esteemed gentleman, Max Clarke.

The Engineer of the year is an SAIEE award made to the Engineer who has made the greatest contribution to the SAIEE.

This year our award goes to a gentleman who has spent many…many years in the Electrical Engineering industry.

Having qualified at Wits University, he started his career as an engineer in training or as a graduate apprentice as it was known in those days. He retired after many years in the Municipal electricity distribution industry in South Africa, having made major contributions to the AMEU.

As a member of the SAIEE of over fifty years, his energy and exuberance still stimulate heated debates and generate excitement at Council meetings, while his sense of humour and contagious enthusiasm for the Historical Section of the SAIEE know no bounds.

As the Chairman of the Historical Section he and the HS team have been working actively for many years in collecting, restoring and cataloguing electrical artefacts for the establishment of the SAIEE museum. Hopefully this exciting initiative will come to fruition early in 2014

Max is a truly remarkable engineer.

The SAIEE President's Award is sponsored by Rotek & Roshcon Engineering, and was awarded to Prof Jan de Kock by Paul van Niekerk & Kemraj Ojageer (Rotek & Roshcon). This prestigious award recognises major current contributions in any sector of electrical, electronic, telecommunications and computer engineering in South Africa.

Prof Jan de Kock received his B Eng, M Eng and PhD in electrical engineering from Stellenbosch University. He is a registered Professional Engineer in South Africa.

In 2001 he was appointed Professor in Electrical Engineering at North-West University. He is currently Director of the School of Electrical Engineering and has previously acted as Dean for 14 months. He has taught power electronics, electrical machines and final year project to undergraduate students, and advanced

Priscilla & John Gosling

Janine & André Hoffmann

Neil & Ian McKechnie

Bernard & Anelise Meyer

Nkada & Rabelani Dagada

Margaret & Mike Cary

WATTSUP

ANNUAL SAIEE BANQUET (CONTINUES)

The SAIEE President's Award winner Prof Jan de Kock with SAIEE President Paul van Niekerk (left) and Kemraj Ojageer from Rotek & Roschcon.

protection and power system dynamics courses to postgraduate students.

Prof De Kock's professional training and experience encompasses the spectrum of electric power system technologies. He has been a project manager and technical contributor to a variety of analytical consulting, teaching, hardware, and software projects. His expertise in analysis of power systems includes steady state, dynamic and transient simulations and quality of supply investigations. He has developed or applied hardware and software models for a wide variety of power system equipment. He is also the holder of an international patent for a new pole-slip function to protect electrical generators from pole slipping by detecting pole-slipping before is actually occurs.

Prof de Kock is a member of IEEE and a Fellow of the SAIEE. He is actively involved in the SAIEE rotating machines working group for the past 14 years and was a member of the IEEE rotating machines committee for 3 years. In 2012 he was elected as a fellow of the SAIEE.

Jan has over many years made a major contribution to the tertiary component of the electrical engineering pipeline in South Africa and will continue to do so for many years to come. He is also very involved with strategic projects and outreaches in South Africa, and thus a worthy recipient of the SAIEE's top award.

The knee-slapping Richelieu Beaunoir, who had the guests in stitches with his anecdotes.

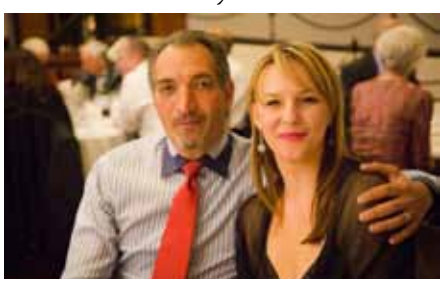
A huge thank you goes out to Gerda Geyer, who organized another successful evening.

Thank you Gerda.

Stan & Margaret Bridgens

Tersia & Pierre Ballot

Liz & Wayne Fisher



Andreas & Minx Avrabos

Calvin & Sue Moseley

Anton & Gerda Geyer

SAIEE PAST PRESIDENT'S LUNCHEON

From L-R: R. Coney, J. Gosling, W. Jackson, A. Hoffmann, M. Davidson, M. Crouch, P. van Niekerk, I. McKechnie, S. Bridgens, V. Crone, D. Grobler, A. Hay and A. Tshabalala.

W. Jackson (PP 1988), A. Hoffmann (SAIEE Vice President) with M. Crouch (PP 1993).

R. Coney (PP 2002), S. Bridgens (PP 1998) and V. Crone (PP 2006).

Gerda Geyer with P. van Niekerk, 2013 SAIEE President.

A. Tshabalala (PP 2011) and V. Crone (PP 2006)

J. Gosling (PP 2001), M. Davidson (PP 1995) and V. Crone (PP 2006).

Mrs M. Davidson (PP 1995) with A. Hoffmann, Senior Vice President.

D. Grobler (PP 1999) and R. Coney (PP 2002)

The annual Past President's luncheon took place recently at the Johannesburg Country Club.

It was quite a biostorous group of old President's who enjoyed each other's company and spoke fondly of the old days.

The 2013 SAIEE President, Paul van Niekerk spoke a few words and concluded: *"I truly feel priviledged to join the ol' boys club in a few months, and thank you for your support to the SAIEE and the legacy each one of you has left."*

The afternoon were not without it's knee-slappers and we were sad to make another tick on the SAIEE Events Calendar.

WATTSUP

ANGLO DONATION OF DESKBAGS PUTS A SPRING IN THE STEP OF LEARNERS

Nothing could dampen the smiles of the learners of Baikagetse Intermediary School recently as they received DeskBags for their school. Thanks to the generous support of Anglo American, all 600 pupils at the school each received their very own bag, which when folded open, acts as a portable desk. The handover forms part of DeskBags' larger commitment to help ease the educational struggles of South African children who do not have access to school desks.

"Lack of school desks is a problem faced by many South African schools. Minister of Basic Education, Angie Motshekga, estimates that schools across South Africa need approximately three million desks. This is not a statistic that we can ignore. It is our duty as corporate citizens to ensure that children's educational struggles are addressed," explains Madelain Roscher, DeskBags originator and managing director of PR Worx.

Aside from being made from 100% recyclable billboard materials, DeskBags are school bags which provide a portable desk solution for learners to use at school and at home. The front flap of the bag is reinforced with durable ABS plastic, that when folded open, allows for instant desk support. The light weight school bag also allows plenty of space for learners to carry all their books and stationery whether they are in pre-primary school or matric. In order to make an impact of the 3 million children in need of desks, DeskBags are reliant on the support of corporate sponsors to cover the production costs of the bags. Through the support of corporate companies, such as Anglo American, DeskBags are donated to needy schools free of charge.

"As a company that places immense importance on education we constantly partner with initiatives that help strengthen education in communities throughout South Africa. We understand that by doing so we are leaving a positive legacy and making a real difference in the lives of so many children. We are proud to support the DeskBags initiative and help secure a bright educational future for the children of Baikagetse Intermediary School," says Dr. Pranill Ramchander, Head of Anglo American's Corporate Communications division.

"It is always such a joy for us to be able to make a difference in the lives of the underprivileged school children across South Africa. The smiles on their faces make us realise just how worthwhile it is to give back to schools that need it most. We would love to be able to assist many more schools but need the assistance of corporate South Africa in order to do so. With sponsorship costs of as little as R100 per DeskBag, there is no excuse not to get involved," concludes Roscher.

SABS-APPROVED MINIATURE CIRCUIT BREAKERS FOR A COMPLETE SOLUTION

WEG manufactures a full range of SABS-approved miniature circuit breakers, including all accessories in both 5 kA and 10 kA, making it possible for the Zest WEG Group to supply customers with complete solutions for specific projects. These miniature circuit breakers can be used in all commercial and domestic applications.

The WEG MDW and MDWH miniature circuit-breaker line offers protection against overload and short circuit in electric conductors. These products have been developed to be used in low voltage circuits with direct or alternating current from 2 to 125 A and short-circuit breaking capacity up to 10 kA.

AURECON'S RISK MANAGEMENT TEAM SHINES AT THE IRMSA AWARDS

Gustav Rohde and Simon van Wyk accepting the 'Environmental Initiative' category award.

The 10-year anniversary ceremony of the prestigious Institute of Risk Management South Africa (IRMSA) Awards took place at Gallagher Estate recently.

The annual IRMSA awards programme acknowledges and celebrates excellence within the risk management sector nationally and celebrates professionals who have made a significant contribution annually.

This year, Aurecon won awards in two highly-contested categories, being named the category winner in the 'Environmental Initiative' category; and runner-up in the 'Mining, Resources, Construction and Engineering' category.

Additionally, Aurecon's Simon van Wyk, Associate: Risk Management, as well as Carin Joyce-Donald, Risk Consultant, were shortlisted in the 'Risk Manager of the Year' and 'Up and Coming Risk Manager' categories, respectively.

IRMSA's CEO, Gillian le Cordeur, notes: *"This was arguably our toughest selection process that we have ever undertaken, given the high calibre of nominations received in all categories."*

Gustav Rohde, Aurecon's Chief Operating Officer, was in attendance and commented on Aurecon's achievements: *"Having been awarded these accolades amongst SA's best is a privilege. Aurecon's achievements at these awards highlight the group's aptitude for providing in-depth solutions to the multi-faceted operational and project risks our clients face. These awards are the first of which there will certainly be many more for Aurecon's exceptional Risk Management Team who constantly achieves success by pursuing leading risk innovations and service offerings."*

FLUKE VP VISITS SA DISTRIBUTOR

Herman Warnshuis, Fluke's Vice President Europe, Middle East & Africa (EMEA) regions; Barend Niemand, Comtest FD; Peter Verwer, Comtest MD; Francesco Pagin, Fluke's southern African country manager and Steve Hood, Fluke's General Manager (EMEA) during a recent visit to Comtest.

Fluke Corporation's (Fluke) Herman Warnshuis, Vice President Europe, Middle East & Africa (EMEA) regions, and Steve Hood, General Manager, EMEA, visited Comtest, their authorised distributor in South Africa, during October. As it was Warnshuis' first visit to South Africa, Comtest arranged a number of visits, spending time with several Fluke value-added resellers, dealers and customers to see for themselves how Fluke is marketed, distributed and used locally. *"I was impressed with the knowledge and enthusiasm for Fluke of all the people I met during the few days I was here,"* said Warnshuis. *"I also had the opportunity of discussing some of the recently launched products, particularly the new range of advanced performance Ti400/Ti300/Ti200 thermal imagers and have no doubt that this new generation of thermal imagers will be perfect for South African applications".*

Warnshuis' visit comes just a few weeks after the Fluke Champion training programme, headed up by a number of technical specialists from Fluke. The week-long programme was well attended by Fluke dealers throughout Africa and highlighted Fluke's commitment to supporting Comtest and other African distributors in skilling-up their product specialists and dealers to better market and sell Fluke's products throughout the region.

Peter Verwer, Comtest's MD and Barend Niemand, Comtest's FD, said they were extremely happy that Warnshuis had taken the time to visit South Africa and expressed their sincere thanks for the ongoing assistance that Fluke offers Comtest in terms of technical support, training, marketing and new product development. Francesco Pagin, Fluke's southern African country manager accompanied them on the visits.

WATTSUP

ST HELEN'S ROCK PUMP STATION UPGRADE WINS SAICE NATIONAL WATER AWARD!

A team from Royal HaskoningDHV were announced the winners in the water category with the St Helens Rock Pump Station upgrade project at the recent South African Institution of Civil Engineers Annual Awards, held in Johannesburg.

Sharing the presentation stage with Royal HaskoningDHV was Cllr Mondli Chaliza Ugu District Municipality Deputy Mayor. The project presented many challenges which were overcome through high level innovative engineering – aspects that convinced the judges that the team from Royal HaskoningDHV were worthy winners!

The project involved the rehabilitation and upgrading of 1970's St Helens Rock Pump Station – in its day was a marvellous engineering feat as it was carved out of and anchored into sheer granite slopes of the Umzimkhulu River. The project is located nine kilometres upstream from the town of Port Shepstone on the KwaZulu Natal south coast in South Africa.

Said delighted project manager, Rowen Clark *"For 30 years the pump station worked tirelessly providing up to 54Mℓ/day raw water to the Bhobhoyi Water Works supplying the greater Port Shepstone area as far as Margate, as well as growing rural and peri-urban communities, whilst supporting the explosive tourism economy of the south coast."*

In 2006, the severe demand and strain on the system, as well as lowering water levels in the Umzimkhulu River, prompted the Ugu District Municipality to take action.

"After an investment of R83-million with final completion certified in April 2012 the district now has a guaranteed supply system of 81Mℓ/day with pumping capacity potential of 108Mℓ/day."

"The population that will benefit from this project is estimated to be over a half-million people by the year 2020, with approximately 400,000 currently" concluded Clark.

Receiving the SAICE Annual Award for Water Engineering are: (L to R) Rowen Clark (RHDHV), Mondi Chalize, Deputy Mayor Ugu District Municipality, Pieter Kleynhans, (President of SAICE) and Sibusiso Nselo (RHDHV).

Through the team-work of three main contractors and a myriad of sub-contractors, the complete overhaul and doubling capacity of the aged river pump station was undertaken without having missed a day of operation.

A total of 4,000 man-days of labour went into the civils component and the safety audits conducted by KZN Master Builders Association resulted in the project receiving a 4-star rating.

BOTSWANA BUREAU OF STANDARDS PURCHASES A FLUKE REFERENCE MULTIMETER

John Wilson from Comtest hands over the Fluke model 8508A/01 reference multicenter to Ronnie Orlando, the senior engineer for Industrial Metrology at the Botswana Bureau of Standards Industrial Metrology Unit.

The Botswana Bureau of Standards recently purchased a Fluke model 8508/01 reference multimeter from Comtest Technologies. John Wilson of Comtest visited the Bureau to install the new reference standard and to train the metrologists on how to use it in their laboratory.

"Metrology, is the science of measurement where the only certainty is uncertainty. Most of a metrologist's time and effort is spent characterising, understanding and trying to reduce or remove some of those uncertainties. Fluke Calibration is made up of metrologists who understand these issues thoroughly. The 8508A Reference Multimeter is designed specifically to address these challenges." says Wilson. Ronnie Orlando, the senior engineer for Industrial Metrology at the Botswana Bureau of Standards Industrial Metrology Unit, says that he is very happy to receive his Fluke and that he now has a professional Calibration Standard multimeter in his lab. He is looking forward to achieving more accurate measurements for his defence force, telecommunication and industrial customers.

ALSTOM INTRODUCES ADVANCED CIRCULATING FLUIDISED BED BOILER

Utilising the efficiency of ultra-supercritical (USC) steam conditions and the flexibility of circulating fluidised beds (CFB), the Advanced CFB boiler offers 660 MW or more in output, based on the type of fuel. The boiler provides customers in coal-rich markets with the opportunity to reduce operating costs and increase output. By combining the two principles, Alstom offers customers a single, highly attractive boiler option, which diminishes fuel consumption and the CO_2 footprint by 6% versus plants of comparable size using traditional technology. The boiler is able to achieve this while ensuring fuel flexibility and reliability.

With ultra-supercritical boilers the overall net efficiency of the power plant is increased by around 3 points compared to traditional technology based on subcritical steam pressure and lower steam temperatures. Alstom has already established leadership in ultra-supercritical boilers and up to 30% of the world's boilers use Alstom technology.

In addition, circulating fluidised bed technology allows for a wide range of lower-grade fuels, such as lignite and anthracite, to be combusted efficiently and with low emissions – reducing the need for additional environmental protection measures. Further versatility comes from the ability to fire on mixes of fuel types, and even 'fuels of opportunity', including biomass and oil shale. Over 32 GW of CFB boilers installed in the world today use the Alstom technology with a maximum commercial size around 350 MW.

"The new Advanced Circulating Fluidised Bed boiler brings together Alstom's leading expertise in both USC and CFB technology," said Senior Vice President of Steam, Andreas Lusch. *"By offering both fuel flexibility and high efficiency it enables operators of coal-fired plants to take full advantage of cheaper fuels, safe in the knowledge that performance and emissions levels will be comparable to plants burning higher grade fuels."*

This product is best deployed in markets where lower quality fuel is available. As a result, areas of Vietnam near the anthracite mining industry is a prime market, as are the lignite producing regions in Turkey, India and eastern Europe. Other developing markets include Indonesia, where more high moisture lignite is being produced and South Africa which has large amounts of waste bituminous coal available.

KEY APPOINTMENTS STRENGTHEN ALTIUM'S CHANNEL BUSINESS AND GLOBAL REACH INTO THE ELECTRONICS & MECHATRONICS DESIGN INDUSTRY

Altium Limited, a global leader in Smart System Design Automation, 3D PCB design (Altium Designer) and embedded software development (TASKING) has appointed Rudolf Danzer as Vice President Global Channel Sales to further expand global market reach into the electronics and mechatronics design industry.

This appointment reflects a focus on growth and are part of Altium's worldwide channel strategy. Rudolf Danzer joins Altium as a proven leader in global investments and expansion strategies in Emerging Markets with 20+ years experience in sales and business execution and leadership in Europe, Middle East and Africa.

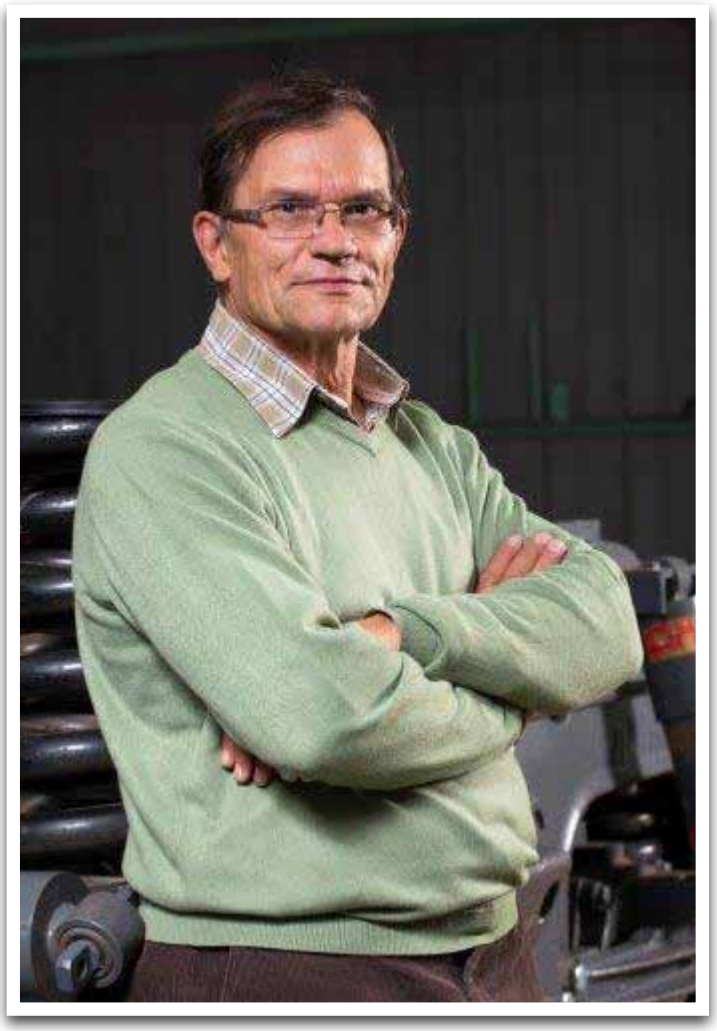
"Rudolf has an excellent background in channel business. He led multiple teams in multicultural environments in various roles within Autodesk, as part of the EMEA VP staff management team before leaving to look for new challenges," says Martin Harris, CSO at Altium. *"He has a proven track record in emerging countries and global strategic investment initiatives like the foundation of a new sales organization and production site in Russia and the Middle East and I'm looking forward to his contribution in Altium's global sales team."*

"I'm excited to be part of a company with great products and member of a highly motivated team," says Rudolf Danzer. *"The technology provided by Altium is leading edge for PCB and embedded software design and I'm looking forward to making it accessible for even more designers worldwide."*

Rudolf Danzer
Vice President Global Channel Sales | Altium

WATTSUP

DCD ROLLING STOCK LAUNCHES A WORLD-FIRST IN LOCOMOTIVE STEERING



Pat Smit
DCD Rolling Stock product engineer and Jika PHS inventor

Johannesburg-based DCD Rolling Stock has revolutionised international railway logistics by increasing the lifespan of the average locomotive wheel by three times while reducing track wear by 60 percent and energy consumption by three percent - through the development of its patented 'Jika' passive hydraulic steering (PHS) system for locomotives.

As a division of international manufacturing and engineering company DCD Group, DCD Rolling Stock has established itself as a leading supplier of locomotives, wagons, bogies and related equipment to local and international railways, mining and industrial operations.

DCD Rolling Stock product engineer and Jika PHS inventor Pat Smit indicates that the company's latest technological breakthrough in hydraulics, which is officially being trialled in full rail service, serves as a more efficient, reliable and cost effective alternative to the current mechanical linkage system for locomotives.

In addition to minimising wear on the rail and locomotive wheel, the reduction of locomotive force also reduces the lateral movement of the rails on their sleepers that results in the rail spreading apart. Smit says that it is important to note that the Jika PHS also reduces the angle of attack between wheel and rail. *"A prominent overseas locomotive manufacturer is on record that one test showed maintenance on the curved sections of the railway system reduced by 60 percent,"* he says.

The Jika PHS is also beneficial for traction and braking, but most importantly, the system reduces the rolling resistance of locomotives when negotiating curves, consequently reducing energy consumption by three percent.

"Mechanical linkage systems in locomotives have proven to be inefficient, as a large amount of time and money is spent on maintenance. Bearing this in mind, DCD Rolling Stock began research on a more user friendly and cost effective solution for locomotive bogie steering and maintenance in 2009," he adds.

Jika hydraulic Cylinder

COEGA'S FOOT ON THE GAS PEDAL AS IT CLINCHES AFROX INVESTMENT

MILLION DOLLAR MOMENT: Afrox managing director Brett Kimber signs a R300-million investment deal with the Coega Development Corporation's executive manager for business development, Christopher Mashigo for the establishment of the 150-ton air separation unit in Zone 3 of the Coega industrial development zone.

COEGA celebrated today as it put pen to paper on an R300-million investment deal with industrial gas company Afrox. *"Coega has really gained momentum over the past few years in spite of a tricky global economic climate and we have shown sustained investor attraction, particularly on strategic and high impact projects,"* said Christopher Mashigo, Coega Development Corporation (CDC) Business Development Executive Manager. *"Clearly investors are closely watching the developments at the Coega Industrial Development Zone and seeing the potential in the Eastern Cape. This is encouraging for the CDC and we applaud Afrox's savvy investment which will enable supply chain development and secure further industrial prowess for the province, while creating jobs across industry."*

Afrox will establish a 150 ton per day air separation unit (ASU) in the Industrial Development Zone (IDZ) to service customers throughout the Eastern Cape. The investment will see the supply of a variety of industrial gases used in the automotive, food processing and medical sectors.

"Afrox will have a critical role to play in the next 20 years as we diversify [the industrial base]. Something we don't realise is how far and wide gas goes. It touches so many sectors of the market and it is wonderful to see the nature of such investment in our city," said chief executive, Kevin Hustler.

GIGAVAC POWER PRODUCTS NOW CE COMPLIANT

GIGAVAC, manufacturer of Advanced Switching Solutions, announces that their line of Power Products, including contactors and battery disconnect switches, are now CE approved. The approval includes standard GIGAVAC EPIC® sealed contactors both GX, industrial, and MX, hi-reliability series. Other GIGAVAC products covered under the CE mark are the BD and HBD manual switch series along with the upcoming HX series of high voltage contactors.

According to Markus Beck, Vice President of Sales & Power Products, *"Customers for our contactors and manual disconnect switches have been asking for CE compliance and we listened. CE approval is a major step for GIGAVAC in meeting the compliance requirements of the European Union and European Free Trade Association regions. It opens new possibilities to grow our business in these markets."*

PINNACLE SIGNS 49M PLEDGE

The Pinnacle Holdings Group of Companies is one of Africa's largest providers of Information and Communication Technology products and services, and has now pledged to become the 126th partner in the 49M initiative.

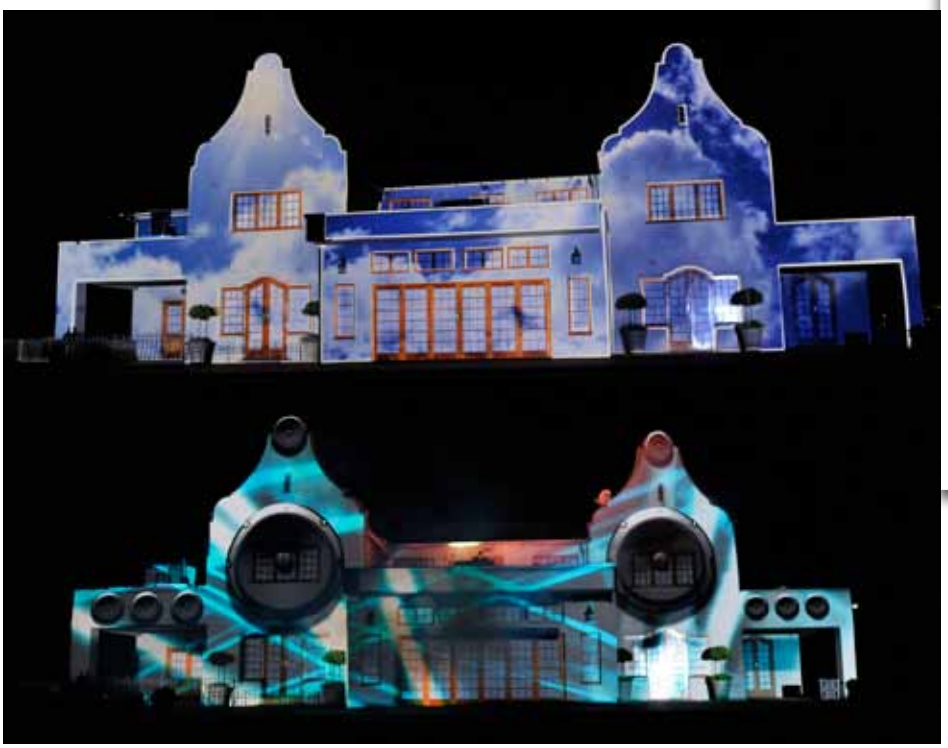
"As an enterprise-sized organization, we understand that our business activities have an impact on the environment, and it is to this effect that we have decided to commit to being energy efficient as an organisation and implement energy efficient technologies in our business facilities to reduce our energy usage," says Arnold Fourie, CEO of Pinnacle Holdings.

The 49M initiative aims to inspire and rally all South Africans behind a common goal - to save electricity and create a better economic, social and environmental future for all. If we all reduced our energy usage by just 10% it would be as effective as building a brand new power station.

Over the last few years, Pinnacle Holdings has endeavoured to be more conscious of its effect on the environment and has introduced initiatives to curb its energy usage.

WATTSUP

TECHRIG: AT THE FOREFRONT OF EVENTS-EVOLUTION



The TechRig Team

TechRig Technical Solutions Agency, one of SA's leading AV, Lighting, Sound and structures companies, have imported projection technology that will change SA's branding, eventing and technical landscape for good.

Most of us don't spend our days imagining that a projector could not only change the face of our brand, company or product, little less propel it to the next level. Thanks to developments in size, power and mobility, projection has been given a new lease on life. Projection is moving out of the norm and into a realm of creative genius. It's all due to a new era for projection technology, a long way from its humble beginnings of flickering images that stunned the first Parisian audience in the late 19th Century. We are fortunate to have a very lively newcomer to the industry that barely resembles the original 124 year old, grand dame predecessor projector.

TechRig is proud to be at the forefront of the projector revolution *"part of the industry demand is coming up with alternative solutions to standard visual communication and marketing tools. We constantly try to find innovative solutions for our blue chip clients"* notes TechRig CEO Michael Collyer. *"In today's communication space, online and television is highly informative and interactive, which is also very much the norm and is truly overpopulated. So we pose the question - 'What technology and solutions are available to set a brand apart?'"*

Thanks to TechRig's vision and foresight, they have cleverly identified a desperately needed niche in top quality projection. Their latest acquisition is Global Technology Company, Barco's HDF-W26 and HDQ-2K40, the brightest projectors in the world, designed for the rental and staging industry. The projectors have several applications and are widely used in all types of settings for a variety of scenarios. They ensure razor-sharp, ultra-bright images, guaranteeing an unequalled visual experience on every occasion.

These top of the range projectors have allowed TechRig to fill that niche and turn the industry as its known - on its head. They are the Holy Grail for creative and technical industry leaders who have for many years expressed their desire for such technology, enabling them to create a new communication landscape for their clients. This medium allows for a broad spectrum of applications including sought after 3D mapping and large-scale conference or product visualization.

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17-YEAR OLD WONDER

Easton LaChappelle: the interview

The SAIEE invited the 17-year old Easton LaChappelle as speaker on the 2013 SAIEE Presidential visiting lecture. Easton is a native from a small town in Colorado, USA.

Easton LaChappelle and Paul van Niekerk, SAIEE President.

From L-R: Prof David Rubin (Wits), Paul van Niekerk, Easton LaChappelle and André Hoffmann, Senior Vice President.

Easton LaChappelle with his mom, Julia.

Easton was a 14-year old freshman, when he was first noticed for winning 3rd place in the Colorado State Science Fair in 2011 with his first robotic hand, controlled remotely by a glove with sensors sewn into it. Easton was not satisfied with the robot's functionality, so he set out to improve on his initial design. The second version of the robotic hand grew into an arm, and featured a few parts which were 3D printed. Easton used a telemetric Nintendo Power Glove, which he purchased off the Internet and a brainwave-activated headset to control the arm's movement.

Easton's inventions created a stir, both because he was so young, and because the devices were flat-out amazing. When he started, he knew nothing about electronics or programming. He taught himself. Easton won a 2nd place Ribbon at the Intel International Science and Engineering Fair, and what makes it all so amazing is that he build the robotic arm costing as little as $400.

Minx Avrabos, Managing Editor of **watt**now, had the opportunity of sitting down to interview Easton before he started his whirlwind tour through South Africa.

Minx Avrabos: Welcome to South Africa Easton, I'm sure you must be very tired and jet-lagged after your trip to South Africa. You are doing your first presentation at the University of Pretoria tonight, how are you feeling?

Easton LaChappelle: I'm feeling fine, I enjoy talking to groups of people and share sharing my ideas. I find it quite interesting, especially in the questions the audience asks me sometimes.

MA: When did you first realise you were interested in robotics?

ELC: I've always been interested in seeing how things work. I often used to take things apart and put them back together. That has really encouraged me into making something unique. From the time when I was 14, I've been taking things apart, and then worked on improving it before I put the parts back together again. My first idea was to develop a robotic hand and I had no idea how to make that a reality.

MA: What particularly focussed you into doing a hand? Why not another part of the human body?

ELC: To me I thought it was "cool". As a 14 years old I thought how cool it would be to control a wireless robotic hand. I was completely fascinated by it, but I'm not totally sure why I chose the hand. Once I started working on it, and I did my research on the hand, I began to realise just how complex the human body really is.

MA: With these projects you completed,

what was the most challenging, and which one created a complete breakthrough for you?
ELC: I struggled a lot in the beginning, especially having no one to ask when I was stuck on a particular problem. I turned to the Internet and did a lot of research there in finding solutions to my problems.

MA: Is it your ultimate vision to have a complete brain controlled robotic arm?
ELC: I chose the brain-controlled system mainly for prosthetics users, because it is easier on the user. Where you are replacing natural uses of their limb (this being the arm) with prosthesis, they just have to think of an action for the hand to do, and the robotic hand does it. But once again, I thought it was "cool" to have something working by only thinking about it. So, although just developing the brain-control system was a major task, there are endless possibilities for this.

MA: So the actual device that controls the movements is completely wireless?
ELC: It's based on a gaming device I tweaked. You see, with actual prosthetics, it costs ±$80 000 for on limb with neuron-control, and the patient has to undergo a very invasive operation to implant a neuron-sensor into the spinal cord, in order to have the control move the prosthesis. I did my research on all the different wavelengths from the brain to have to do this work.

MA: Most prostheses are rather heavy – how does yours compare?
ELC: My third generation robotic arm will be able to turn through 360˚, and will only weigh 2.5 kilos. The arm will also be very strong, being able to lift anything up to 70kgs.

MA: Apart from the disabled applications for the robotic arm, are there applications for the robotic arms to be used in dangerous, areas or in any other difficult environment?
ELC: Exactly – I was working as an intern at NASA, in their Robotics Division, and I was assisting in the development of the use of robots in outer space in place of humans. This application can be used in any situation, whether it is underwater, in a fire, or in any other dangerous or life threatening emergency.

MA: How far from the signal is the control able to work?
ELC: Some signals can only go about 100metres indoors, but the cool thing is that the newer models can go much further, and they have transceivers, so they can send and receive data and work on about a 30-mile radius. It also gives the user a feedback sense of touch. I'm currently playing around with that in picking up an egg, and working on the sensory skills of the hand.

MA: Are there any other applications than those you've mentioned?
ELC: There are a few applications I'm working on, but I do not want to divulge that right now, as it is still a 'work-in-progress'.

MA: You are currently on tour with our SAIEE President, Mr Paul van Niekerk. After the robotic arm and the completed internship at NASA, what's next after you leave SA and return home?
ELC: Actually, I'm developing prosthetic legs, which will aide paraplegics who are paralysed from the waist down. I have a school friend who was involved in a vehicle accident and is paralysed. My aim is for him to be able to walk on his prom-night. Again, this device will be very cost-effective, strong and lightweight.

MA: What comments do you have on the commercial side of things – did you approach the prosthetics companies, have they been of any assistance to you in marketing your product?
ELC: I didn't approach anyone, and I think that may be what worked so well for me. I had to learn the hard way how to make things cost-effective, and at such a low price. There is a fine line between helping people and making money off them, and I am purely in it to help people who can't afford the hundreds and thousands of dollars in costs for prosthetics to make some kind of normal living.

MA: Julia, your son is an amazing 17-year old, who is nearly finishing school, who has developed these life-changing prostheses. Tell us how Easton's success has changed things for you and your family?
Julia LaChappelle: I think it is totally amazing that Easton has been so motivated in doing something along these lines, compared with so many teenagers who gets together with their pals and don't even focus – especially at the age of 14 – when Easton started on this project. Easton has had a very normal life growing up. He went to Washington DC where he met President Obama. He came back home, went to Prom, and the next day got his drivers licence. He is just a regular boy-next-door, and I think that is what gives him that great balance and perspective. It is truly important to have balance, because true geniuses, as we know them from history, can be a little obtuse and different compared with normal people on the street. I commend Easton for being so mature in his life.

MA: If you can give me your motto for motivating students and young people who read wattnow, what would it be?
ELC: Gosh, let me think…. Never give up! Stay curious, always ask questions. Curiosity didn't kill the cat.

wn

Risk Management and Insurance Solutions are crucial in Financing SA's Renewable Energy Projects

The focus on the renewable energy sector has never been higher, with governments around the world setting tough targets for the amount of energy provided by renewable sources.

Global demand for renewable energy continued to rise 2012, supplying an estimated 19% of global final energy consumption, according to The Renewables Global Status Report published by REN21. Given the financial hurdles of many renewable energy projects, and the speed of change in renewable energy technology in what is still a relatively new industry in South Africa, contractors and developers in the field require specialist risk and insurance broking advice to ensure that this increasingly competitive industry is able to meet its many complex challenges.

"The Renewable Energy Sector will continue to grow significantly faster than any predicted national and international economic growth indices, providing significant opportunities for developers and operators alike. South Africa has set a target of generating 3275 MW from renewable energy, according to the Energy Department of South Africa. Demand by governments and individuals for a secure supply of cleaner and cheaper alternatives to fossil fuels is escalating, along with the introduction of tightening emission reduction targets. But renewable energy projects come with significant and complex risks and in most instances, massive financial requirements and contractual liabilities due to the debt financing models in place," explains Christa Strydom, Renewable Energy Account Executive at Aon South Africa.

Insurance costs can be a notable line item in the costs for renewable projects. Accordingly the impact of premium cost fluctuations can be significant to the profitability of developments and debt cover ratios required to support finance arrangements. It is important that an insurance advisor has an understanding of the financial sensitivities in the cash-flow model of the project in order to design the most efficient insurance programme. Aon has experience in supporting finance agreement negotiations, working closely with clients, the mandated lead arranging bank and legal advisors.

"The reality is that the availability of project finance depends heavily on the insurance solutions available. Banks are risk averse, requiring high levels of insurance and this can be the deal breaker in the event that a broker cannot find adequate risk transfer capacity combined with seamless local solutions. Effective use of insurance is an essential part of securing funding for projects," concludes Christa.

"One of the most crucial areas is the traditional pre-construction risk advice which includes liaising with lenders and contractors, including lawyers and insurance advisers, to enable effective contract negotiation. As the developer, it is essential to have a risk partner that is involved in the contract negotiations to avoid potential pitfalls that can be very costly if risk and insurance issues are not considered early enough during contract negotiations. By being involved in the negotiations, we are able to marry the insurances to the risk and indemnity clauses that flow from the contracts."

It is also essential to have a global risk partner that is able to utilise both local and global markets to develop appropriate risk transfer solutions where necessary, along with the core contractually required insurances.

"From a South African perspective, the success of the project relies heavily on having a risk partner that fully understands the consultancy and market placement advice to be used within the bank feasibility study which happens long before the project even gets off the ground," explains Christa.

Seamless cover is a key requirement of any renewable energy project, right from the planning and early works stages and between marine cargo transits, construction All Risks, delay in start-up, operating property damage and business interruption, as well as all third party liability exposures. Renewable energy insurance products cover the main lines of insurance such as property, engineering, marine and liability while additional special types of insurance can be made available such as credit, political and weather risks, errors & omissions, and directors & officers cover.

The traditional engineering/construction and property insurance markets have embraced the renewable energy sector as a growth area and have created significant capacity and competition. Consequently there is a wide choice of markets and coverage options. The reality is though that renewable energy projects pose some specific risks and barriers. Technologies applied are relatively new and the available expertise and actuarial data is still low. Thus there are few standard products in this sector and risk management is primarily done on a case-by-case basis which is why it's essential to have a risk partner with global infrastructure and capability, along with local experience of country specific conditions and requirements.

CHRISTA STRYDOM
RENEWABLE ENERGY ACCOUNT EXECUTIVE
AON SOUTH AFRICA

Engineering moves into the renewable energy generation market

Brand Engineering SA (Pty) Ltd is diversifying and expanding its role in the electrical engineering industry. It stands at the doorway to a new era in renewable energy generation in South Africa, and has been awarded a total of 14 projects in the implementation of solar and wind energy.

Established over 40 years ago, Brand Engineering, together with its two Empowerment Companies, Besamandla Western and Eastern Cape, is a leading electrical contractor in Southern Africa and throughout the African continent.

It started its venture into the renewable energy sector in April 2010 when the Department of Energy (DoE) issued its first Request for Proposal (RFP) for new generation capacity under the Renewable Energy Independent Power Producers Programme (REIPPP).

"Renewable energy is required to address climate change, and shift the country's energy supply from its mainstay, coal, to clean, green sources to contribute to gas emission reductions," says Herman Kriel, Group Managing Director, Brand Engineering SA (Pty) Ltd. *"This is in line with the move to green, sustainable business. It contributes to gas emission reductions and assists in reducing the carbon footprint."*

While initially there were concerns as to the cost of renewable energy, Kriel explains that costs are in fact decreasing. *"The cost of renewable energy is steadily falling. In the case of solar and wind energy, we expect parity between coal-fired energy and renewable energy by the third round of the REIPPP. A key factor contributing to this will be large scale deployment of renewable energy technology."*

The RFP was aligned with Government's Integrated Resource Plan (IRP) 2010, which provides for the procurement of 3725 MW of renewable energy from IPPs by 2016. *"3200 MW of this capacity is to be taken up by solar and wind and it is these areas on which Brand Engineering is focusing,"* explains Kriel.

PV SOLAR ENERGY

Brand Engineering was initially awarded five engineering, procurement and construction (EPC) contracts to carry out electrical and automation installations for photovoltaic (PV) solar energy projects. Together, the five projects will provide am impressive 59.8 MW of power. The company was also awarded three separate grid connection projects. All eight projects, won by IPPs in the first round of the DoE's REIPPP, are situated in the Northern Cape and North West Province.

The Northern Cape and surrounding

areas are characterised by intense solar radiation, and the availability of land, of water, and the proximity to transmission lines and sub stations make it ideal.

"Quality control is integral to the entire procedure and Brand Engineering continuously verifies installation standards and regulations. We also visited Germany and France to gain first hand experience in renewable solar power," comments Kriel.

Preferred bidders for the second round of the REIPPP were announced in May 2012. In this round Brand Engineering was awarded another two PV contracts at Aurora and Vredendal solar plants in the Western Cape where construction has commenced.

WIND POWER

It is in the second round that the company was also appointed to carry out three EPC wind power projects in the Eastern Cape. *"Wind power generates energy 24 hours per day, which helps overcome intermittency challenges and improves security of supply,"* states Kriel. The three projects, which take the form of wind farms, will supply 109 MW.

SOCIO-ECONOMIC DEVELOPMENT

Essential to the development of green business and renewable energy generation in South Africa is socio-economic and environmentally sustainable growth, including the creation of new industries and much needed jobs. Local content and local manufacturing are also vital. These must all comply with stringent stipulations.

"Integral to the projects Brand Engineering undertakes is a philosophy of empowerment, local participation and transfer of skills," says Kriel. *"We are contributing extensively to development in the areas in which the renewable energy contracts are being conducted. We totally support local community upliftment, and we are training and employing previously disadvantaged, unemployed people for the various tasks being undertaken."*

Going forward Government's commitment to the liberalisation of the electricity supply industry is further reflected in the DoE's mandate that IPPs contribute 43% of new generation capacity by 2030. Brand Engineering will continue to support this mandate.

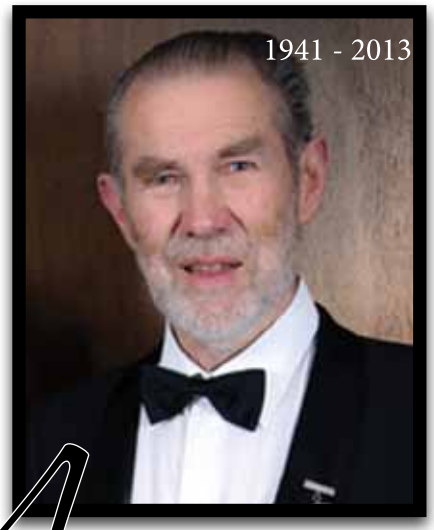
SOLAR ROOF TOP

Another initiative that the company is undertaking to further strengthen its role in the transition to green business and the renewable energy industry in South Africa, is that of solar roof top development. *"As is the case with renewable energy IPP projects, this leading edge roof top initiative can contribute dramatically to energy savings and green energy generation in South Africa,"* Kriel explains.

The concept is the same as that of the PV solar energy projects, but the panels will be located on roof tops in highly populated commercial locations. Brand Engineering has completed the first solar roof top at Black River Park in Observatory in Cape Town, which is expected to be the biggest roof top development in Southern Africa, and is in the process of concluding contracts for various other rooftop developments.

The company is totally committed to renewable energy in South Africa. It is proud to have diversified and expanded, and to be able to contribute significantly to the wide variety of renewable energy initiatives helping to ensure a bright new sustainable energy future.

IN MEMORIUM



Michael J Case

The South African Institute of Electrical Engineers has had the privilege of being associated with Michael James Case aka 'Mike' for over 50 years. It is appropriate at this sad time to pay tribute to Mike who has contributed hugely to the aims and objectives of the SAIEE.

BY | STAN BRIDGENS | JANE BUISSON-STREET | ROD HARKER

After Mike matriculated from Franshoek High School in 1959 he started as a Pupil Technican with the "old" South African Post Office (SAPO) in Cape Town while attending Cape Technical College. At the same time he met Glynne Bowen who in 1967 became Glynne Case.

To adapt a phrase, *"You can't keep a good Mike down"*; SAPO sent him off to do a BSc (Electrical Engineering) at the University of Cape Town (UCT) that he completed in 1966.

In 1970 Mike made the move to academia and became a lecturer at UCT where he completed his PhD in 1980 and was promoted to Senior Lecturer. 1984 saw the Case family making a move to Stellenbosch after Mike had taken up a Chair at the University of Stellenbosch.

At the age of 50, Mike decided he needed a new challenge and took up a position in the Faculty of Engineering at Rand Afrikaans University (RAU), now University of Johannesburg (UJ).

As with everything Mike immersed himself in what the highveld had to offer, including a deeper involvement in the Engineering Council of South Africa (ECSA) as well as becoming one of the most qualified tour guides in Gauteng for out-of-town visitors.

2001 saw Mike retiring from RAU for the first time which only lasted until 2007 when he started working at UJ's Doornfontein Campus as a consultant to the Department of Electrical and Electronic Engineering Technology and later as Head of the same department. He worked tirelessly to develop a new three-year bachelor's programme for technologists that will hopefully be introduced in 2016.

Mike's passion for engineering education lead to his involvement in a number of ECSA's education committees where his knowledge of foreign engineering qualifications and engineering education establishments, was unrivalled.

At least once or twice a year Mike and Glynne would head-off down to the Cape to go to the Cederberg. Invariably he would tell his colleagues that he was off to work on the radio network for the Senior Scout Adventure; as Mike had a deep-seated love for the outdoors, particularly the Cederberg, any excuse would do.

Mike joined the SAIEE on the 7th September 1962 shortly after graduating, as a Student Member. He became a Graduate Member in 1982, a Member in 1986, and a Senior Member prior to being elected as a Fellow in 1996. Mike was an active member of the SAIEE and sat on the Council for 20 years. He was also registered as a Professional Engineer with ECSA in 1984.

Mike was one of a kind who could put his hand to anything and make a success of it. He was one of the few people who was an excellent, innovative engineer as well as being a very good technician. He was never satisfied with the mediocre and insisted on the best solution. Rod Harker attributes this to the excellent and wide training Mike had at the Post Office Colleges and then rounded off with first class electrical engineering degrees.

More than anything else Michael James Case was a gentleman and a family man. Our sincerest condolences goes out to his wife Glynne, his children, Jennifer, Abigail, Robert and David and four grandchildren. We will miss your wisdom, calmness and sense of humour.

To use Mike's own words *"I was born in Cape Town in 1941 sometime just after the Rinderpest and have lived happily ever after!"* wn

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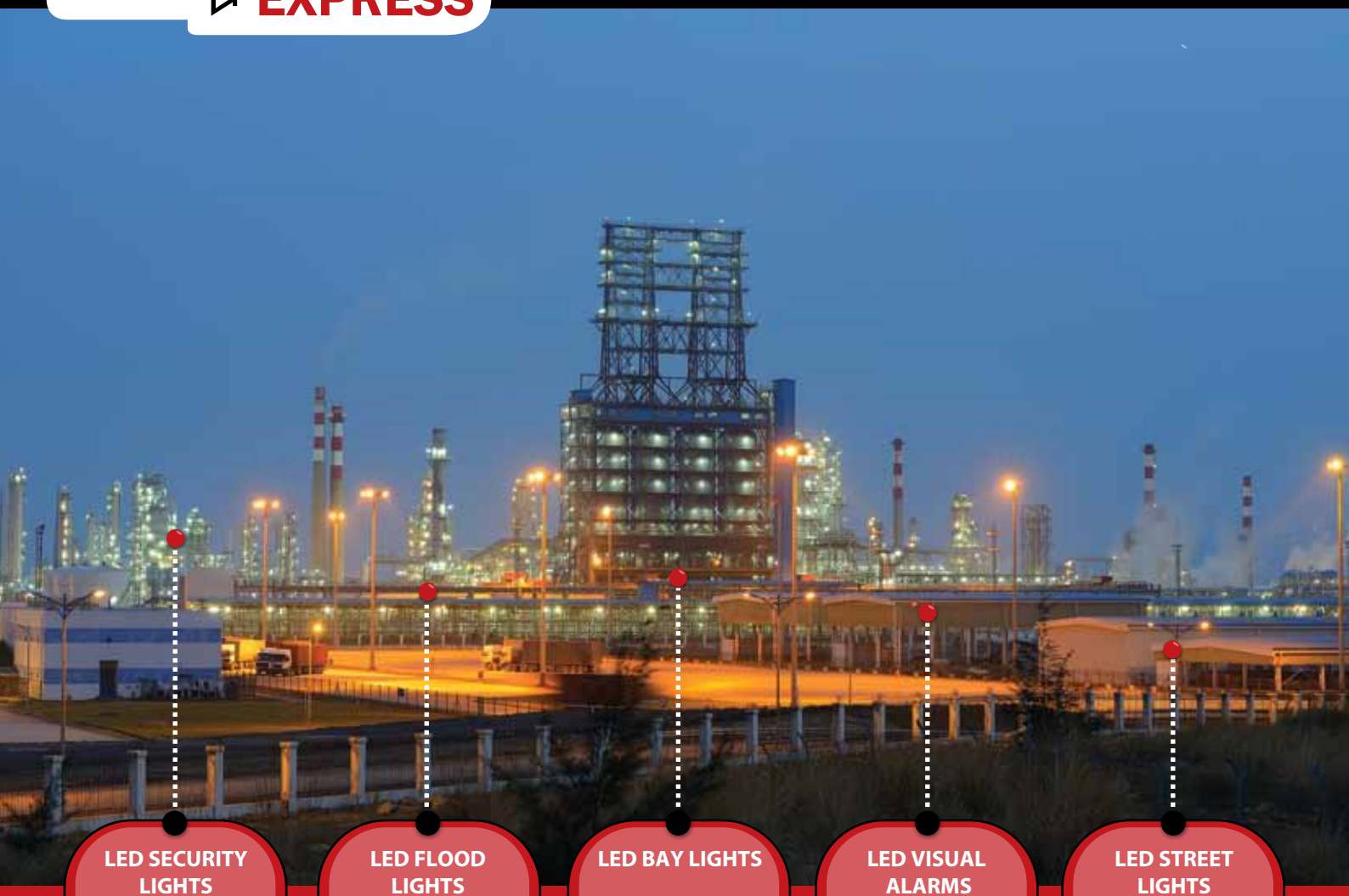

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Hydrogen Fuel Cells

INNOVATION FOR THE 21ST CENTURY

In 1839, Sir William Robert Grove, a Welsh judge, inventor and physicist, conceived the first fuel cell. He mixed hydrogen and oxygen in the presence of an electrolyte, and produced electricity and water. The invention, which later became known as a fuel cell, didn't produce enough electricity to be useful.

BY | MARY BELLIS

In 1889, Ludwig Mond and Charles Langer, who attempted to build a working fuel cell using air and industrial coal gas, first coined the term *"fuel cell"*. Another source states that it was William White Jaques who first coined the term *"fuel cell"*. Jaques was also the first researcher to use phosphoric acid in the electrolyte bath.

In the 1920s, fuel cell research in Germany paved the way to the development of the carbonate cycle and solid oxide fuel cells of today.

In 1932, engineer Francis T Bacon began his vital research into fuels cells. Early cell designers used porous platinum electrodes and sulphuric acid as the electrolyte bath. Using platinum was expensive and using sulphuric acid was corrosive. Bacon improved on the expensive platinum catalysts with a hydrogen and oxygen cell using a less corrosive alkaline electrolyte and inexpensive nickel electrodes.

It took Bacon until 1959 to perfect his design, when he demonstrated a five-kilowatt fuel cell that could power a welding machine. Francis T. Bacon, a direct descendent of the other well known Francis Bacon, named his famous fuel cell design the *"Bacon Cell"*.

In October of 1959, Harry Karl Ihrig, an engineer for the Allis-Chalmers Manufacturing Company, demonstrated a 20-horsepower tractor that was the first vehicle ever powered by a fuel cell.

During the early 1960s, General Electric produced the fuel-cell-based electrical power system for NASA's Gemini and Apollo space capsules. General Electric used the principles found in the "Bacon Cell" as the basis of its design. Today, the Space Shuttle's electricity is provided by fuel cells, and the same fuel cells provide drinking water for the crew.

NASA decided that using nuclear reactors was too high a risk, and using batteries or solar power was too bulky to use in space vehicles. NASA has funded more than 200 research contracts exploring fuel-cell technology, bringing the technology to a level now viable for the private sector.

The first bus powered by a fuel cell was completed in 1993, and several fuel-cell cars are now being built in Europe and in the United States. Daimler Benz and Toyota launched prototype fuel cell powered cars in 1997.

Maybe the answer to *"What's so great about fuel cells?"* should be the question *"What's so great about pollution, changing the climate or running out of oil, natural gas and coal?"* As we nearing the second decade in the new millenium, it is time to put renewable energy and planet-friendly technology at the top of our priorities.

Fuel cells have been around for over 150 years and offer a source of energy that is inexhaustible, environmentally safe and always available. So why aren't they being used everywhere already? Until recently, it has been because of the cost. The cells were too expensive to make. That has now changed.

Hydrogen Fuel cells

continues from page 35

In the United States, several pieces of legislation have promoted the current explosion in hydrogen fuel cell development: namely, the congressional Hydrogen Future Act of 1996 and several state laws promoting zero emission levels for cars. Worldwide, different types of fuel cells have been developed with extensive public funding. The United States alone has sunk more than one billion dollars into fuel-cell research in the last thirty years.

In 1998, Iceland announced plans to create a hydrogen economy in cooperation with German carmaker Daimler Benz and Canadian fuel cell developer Ballard Power Systems. The 10-year plan would convert all transportation vehicles, including Iceland's fishing fleet, over to fuel-cell-powered vehicles. In March 1999, Iceland, Shell Oil, Daimler Chrysler, and Norsk Hydro formed a company to further develop Iceland's hydrogen economy.

In February 1999, Europe's first public commercial hydrogen fuel station for cars and trucks opened for business in Hamburg, Germany. In April 1999, Daimler Chrysler unveiled the liquid hydrogen vehicle NECAR 4. With a top speed of 90 mph and a 280-mile tank capacity, the car wowed the press. The company have since then, launched a few more fuel-cell vehicles and are involved with the H_2 Mobility Initiative.

In August 1999, Singapore physicists announced a new hydrogen storage method of alkali doped carbon nanotubes that would increase hydrogen storage and safety. A Taiwanese company, San Yang, is developing the first fuel cell powered motorcycle.

Suzuki's fuel cell scooter gets mass-production approval - but should you want one?

How it works is that hydrogen is being ducted from a high-pressure tank in the scooter's underbelly to a fuel cell stack little bigger than a shoe box under the seat.

It isn't being burned; instead an electro-chemical reaction is separating the hydrogen atom's proton and electron - like horses from their coach - and making them run around an electrical circuit, producing energy.

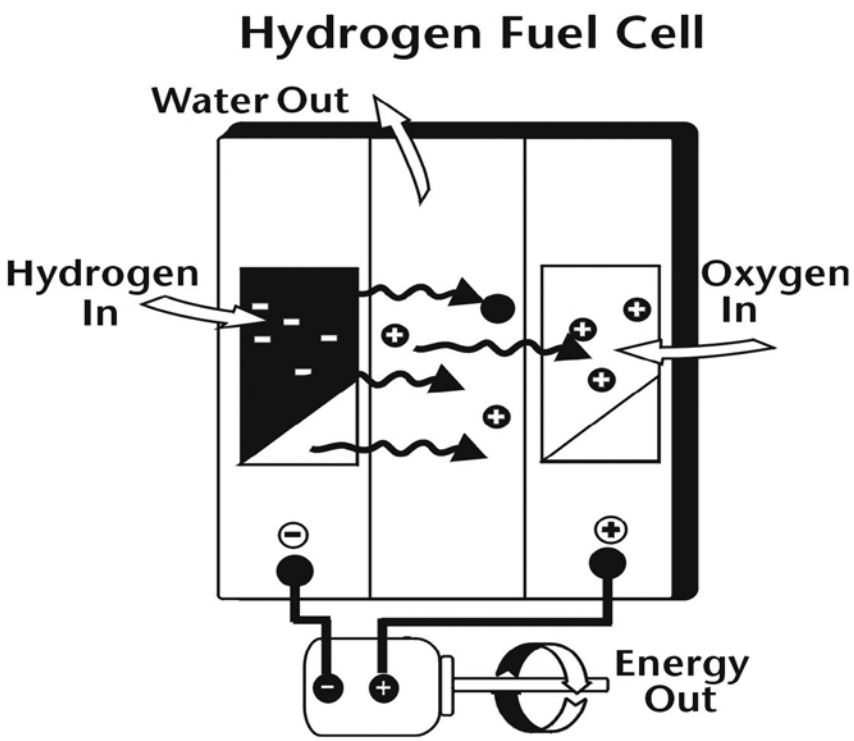
It's happening simultaneously in scores of fuel cells - stacked inside their container like "After Eights" in a box - resulting in an electrical power output of around 2.5KW - or a little over 3bhp.

Some of that power is being fed directly to the electric motor attached to the back wheel, some is charging a lithium-ion battery which provides the balance of drive required for accelerating - around 11bhp in all.

It isn't the stuff of petrolhead dreams, but it's right on the money for a 125-class commuter.

Where do we go from here?

There are still issues with hydrogen-fuelled engines and power plants. Transport, storage and safety problems need to be addressed. Greenpeace has promoted the development of a fuel cell operated with regenerative produced hydrogen. wn



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How the Hydrogen Economy works

BY I MARSHALL BRIAN I BSEE I BCOMPSC

It seems like every day there is a new announcement in the news about cars powered by fuel cells. The promises are tantalizing, since using hydrogen in existing engines can actually clean the air and fuel cells have the potential to increase the efficiency of cars while significantly reducing air pollution.

At the same time, there have been news stories for decades about the problems associated with petroleum. Everything from oil spills to ozone depletion to global warming gets blamed on our dependence on fossil fuels. These two forces are leading the world toward what is broadly known as the hydrogen economy. If the predictions are true, over the next several decades we will all begin to see an amazing shift away from the fossil fuel economy we have today toward a much cleaner hydrogen future.

Can society actually make this shift, or will the technological, economic and political barriers keep us dependent on petroleum and other fossil fuels for the next century and beyond? In this article, you will learn about the benefits of a hydrogen economy, along with its potential problems. We will also examine some of the technology that would make the transition possible.

PROBLEMS WITH THE FOSSIL FUEL ECONOMY

Currently, the United States and most of the world is locked into what could be called the fossil fuel economy. Our cars, trains and planes are fuelled almost exclusively by petroleum products like petrol and diesel. A huge percentage of our power plants use oil, natural gas and coal for their fuel. If the flow of fossil fuels to the United States were ever cut off, the economy would come to a halt. There would be no way to transport the products that factories produce. There would be no way for people to drive to work. The whole economy, and in fact the whole of western society, currently depends on fossil fuels. While fossil fuels have played an important role in getting society to the point it is at today, there are four big problems that fossil fuels create:

Air pollution - When cars burn petrol, they would ideally burn it perfectly and create nothing but

carbon dioxide and water in their exhaust. Unfortunately, the internal combustion engine is not perfect. In the process of burning the petrol, it also produces:

- Carbon monoxide, a poisonous gas
- Nitrogen oxides, the main source of urban smog
- Unburned hydrocarbons, the main source of urban ozone
- Catalytic converters eliminate much of this pollution, but they aren't perfect. Air pollution from cars and power plants is a real problem in big cities.

ENVIRONMENTAL POLLUTION

The process of transporting and storing oil has a big impact on the environment whenever something goes wrong. An oil spill, pipeline explosion or well fire can create a huge mess. The Exxon Valdez spill is a well-known example of the problem, but minor spills happen constantly.

GLOBAL WARMING

When you burn a gallon of gas in your car, you emit about 20 pounds of carbon dioxide into the atmosphere. If it were solid carbon, it would be extremely noticeable -- it would be like throwing a 5-pound bag of sugar out the window of your car for every gallon of gas burned. But because the 5 pounds of carbon comes out as 20 pounds of invisible carbon dioxide gas, most of us are oblivious to it. The carbon dioxide coming out of every fossil fired power plant and car's tailpipe is a greenhouse gas that is slowly raising the temperature of the planet. The ultimate effects are unknown, but it are strong indications that we are experiencing dramatic climate changes that affect everyone on the planet. For example, melting glaciers and polar ice caps raise the sea level, causing flooding of coastal cities. Fresh water dilution of the polar ocean waters can cause the sea currents to change.

That's a big side effect that could cause Iceland, Ireland, England and France to experience much cooler weather. Similar changes would be expected for northern areas of both coasts of North America.

How the Hydrogen economy works

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DEPENDENCE

The United States, and most other industrialized countries, cannot produce enough oil to meet demand, so they import it from oil-rich countries. That creates an economic dependence. When Middle East oil producers decide to raise the price of oil, the rest of the world has little choice but to pay the higher price.

ADVANTAGES OF THE HYDROGEN ECONOMY

In the previous section we noted the significant, worldwide problems created by fossil fuels. The hydrogen economy promises to eliminate all of the problems that the fossil fuel economy creates. Therefore, the advantages of the hydrogen economy include:

- The elimination of pollution caused by fossil fuels - When hydrogen is used in a heat engine or fuel cell to create power, it is a completely clean technology. The only by-product is water. There are also no environmental dangers like oil spills to worry about with hydrogen.
- The elimination of greenhouse gases - If the hydrogen comes from the electrolysis of water, then hydrogen adds no greenhouse gases to the environment. There is a perfect cycle -- electrolysis produces hydrogen from water, and the hydrogen recombines with oxygen to create water and power in a fuel cell.
- The elimination of economic dependence - The elimination of oil means no dependence on the Middle East and its oil reserves.
- Distributed production - Hydrogen can be produced anywhere that you have electricity and water. People can even produce it in their homes with relatively simple technology.
- The problems with the fossil fuel economy are so great, and the environmental advantages of the hydrogen economy so significant, that the push toward the hydrogen economy is very strong.

TECHNOLOGICAL HURDLES

The big question with the hydrogen economy is, "Where does the hydrogen come from?" After that comes the question of transporting, distributing and storing hydrogen. Hydrogen tends to be bulky and in its natural gaseous form.

Once both of these questions are answered in an economical way, the hydrogen economy will be in place.

We'll look at each of these questions separately in the following sections.

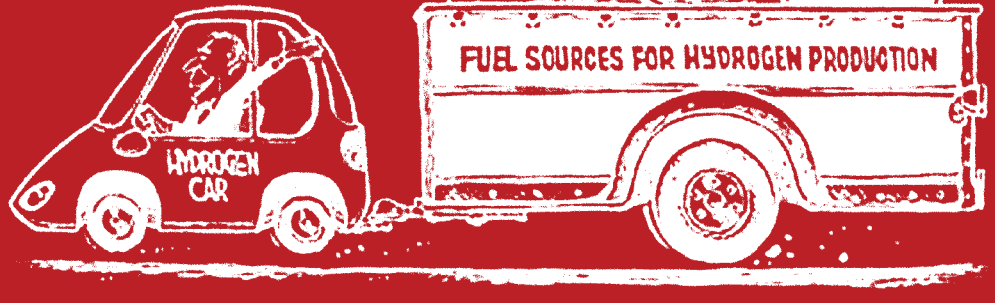
Where does the hydrogen come from?
One of the more interesting problems with the hydrogen economy is the hydrogen itself. Where will it come from? With the fossil fuel economy, you simply pump the fossil fuel out of the ground and refine it. Then you burn it as an energy source.

Most of us take oil, petrol, coal and natural gas for granted, but they are actually quite miraculous. These fossil fuels represent stored solar energy from millions of years ago. Millions of years ago, plants grew using solar energy to power their growth.

They died, and eventually a small fraction of this biomass turned into oil, coal and natural gas. When we pump oil from the ground, we tap into that huge solar energy storehouse without paying the replacement price. Whenever we burn a gallon of petrol, we release stored solar energy. In the hydrogen economy, there is no storehouse to tap into. We have to actually create the energy in real-time.

There are numerous possible sources for the hydrogen such as:

- Electrolysis of water - Using electricity, it is easy to split water molecules to create pure hydrogen and oxygen. One big advantage of this process is that you can do it anywhere. For example, you could have a box in your garage producing hydrogen from tap water, and you could fuel your car with that hydrogen.
- Reforming organic substances - Oil and natural gas contain hydrocarbons - molecules consisting of hydrogen and carbon. Using a device called a fuel processor or a reformer, you can split the hydrogen off the carbon in a hydrocarbon relatively easily and then use the hydrogen. Reformers discard the leftover carbon to the atmosphere as carbon dioxide. This option is, of course, slightly perverse. You are using fossil fuel as the source of hydrogen for the hydrogen economy. This approach reduces air pollution, but it doesn't solve either the greenhouse gas problem (because there is still carbon going into the atmosphere) or the dependence problem (you still need oil). However, it may be a good temporary step to take during the transition to the hydrogen economy. When you hear about "fuel-cell-powered vehicles" being developed by the car companies right now, almost all of them plan to get the hydrogen for the fuel cells from petrol using a reformer. The reason is because petrol is an easily available source of hydrogen. Until there are "hydrogen stations" on every corner like we have gas stations now, this is the easiest way to obtain



hydrogen to power a vehicle's fuel cell.

- Reforming biomass - If the organic substance is sewage, garbage, agricultural wastes, or forest slash however releasing the hydrogen and venting the carbon dioxide is no worse than the natural result of having such wastes rot or burn into the atmosphere.
- Pyrolysis: Another technology for producing hydrogen is to break organic molecules into hydrogen and carbon. An oxidant free chamber can be heated to sufficient temperature to break hydrogen away from carbon and allow the carbon to be sequestered to build better solar collectors, wind and wave turbines, and wave machines for harnessing more renewable energy.
- The interesting thing about these comparisons is that there are numerous ways to supply the hydrogen needed. To have a sustainable hydrogen economy, the hydrogen must be derived from renewable sources rather than fossil fuels so that we stop changing the atmosphere with carbon particles and gases. Having enough electricity to separate hydrogen from water, and generating that electricity without using fossil fuels, will be the biggest change that we see in creating the hydrogen economy.

Where will the electricity for the electrolysis of water come from? Right now, about 68 % of the electricity produced in the United States comes from coal or natural gas. All of that generating capacity will have to be replaced by renewable sources in the hydrogen economy. In addition, all of the fossil fuel energy now used for transportation (in cars, trucks, trains, boats, planes) will have to convert to hydrogen, and much of that hydrogen will be created with electricity, as well. But it is possible to use hydrogen in engine-generators with heat recovery systems to double the energy utilization efficiency of conventional power plants.

Right now there are several different ways to create electricity that do not use fossil fuels:

- Nuclear power
- Hydroelectric dams
- Solar cells
- Wind turbines
- Geothermal power
- Wave and tidal power
- Co-generation
  (For example, a sawmill might burn bark to create power, or a landfill might burn methane that the rotting trash produces.)

In the United States, about 20 % of the power currently comes from nuclear and 7 % comes from hydroelectric. Solar, wind, geothermal and other sources generate only 5 % of the power. Nuclear power have waste disposal, potential terrorist dirty bomb problems along with political problems.

Nuclear plants require enormous subsidization, long lead times and 15 or more years of operation to provide energy payback of fossil resources used to mine, refine, and construct the massive power plants needed. Carbon dioxide and other fossil emissions required to prime the nuclear power pump comes first then after a long time there may or may not be an energy payback. Wind, wave and solar power systems currently have cost and location problems.

In the future, barring some technological breakthrough, it seems likely that one of two things will happen to create the hydrogen economy: Either nuclear-power or various forms of solar, wind, and wave power generating capacity will increase dramatically.

Hydrogen production is probably the biggest hurtle for the hydrogen economy. Once the technology is refined and becomes inexpensive, hydrogen engines and fuel cells will power farms, vehicles, homes, and factories.

How do you store and transport the hydrogen?

At this moment, the problem with putting pure-hydrogen vehicles on the road also encounters the storage/transportation problem. Hydrogen is a bulky gas, and it is not nearly as familiar to work with as petrol. Compressing the gas requires energy, and moderately compressed hydrogen contains far less energy than the same volume of petrol. However, solutions to the hydrogen storage problem are surfacing.

For example, hydrogen can be stored in a solid form in hydrides and in chemicals such as a chemical called sodium borohydride, and this technology has appeared in the news because Chrysler is testing it. This chemical is created from borax (a common ingredient in some detergents). As sodium borohydride releases its hydrogen, it turns back into borax so it can be recycled.

Once the storage problem is solved and standardized, then a network of hydrogen stations and the transportation infrastructure will have to develop around it. The main barrier to this might be the technological sorting-out process. Stations will not develop quickly until there is a storage technology that clearly dominates the marketplace. For instance,

How the Hydrogen economy works

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if all hydrogen-powered cars from all manufacturers used sodium borohydride, then a station network could develop quickly; that sort of standardization is unlikely to happen rapidly, if history is any guide.

There might also be a technological breakthrough that could rapidly change the playing field. For example, if someone could develop an inexpensive rechargeable battery or practical flywheel propulsion system with high capacity and a quick recharge time, electric cars would not need fuel cells and there would be no need for hydrogen on the road. Cars would recharge using electricity directly but it would be preferable for the electricity to be produced from renewable resources in part by hydrogen cogeneration systems that double the energy utilization efficiency of conventional power plants.

PROSPECTS FOR THE FUTURE

You will hear more and more about the hydrogen economy in the news in the coming months, because the drumbeat is growing louder.

The environmental problems of the fossil fuel economy are combining with breakthroughs in fuel-cell technology, and the pairing will allow us to take the first steps.

The most obvious step we will see is the marketing of fuel-cell-powered vehicles. Although they will be powered initially by petrol and reformers, fuel cells embody two major improvements over the internal combustion engine:

- Fuel cells may be about twice as efficient in some applications but this is also true of diesel engines converted to hydrogen compared to present petrol engines.
- Converted internal combustion engines and fuels cells can significantly reduce air pollution in cities.

Petrol-powered fuel-cell vehicles are an excellent transitional step because of those advantages.

Moving to a pure hydrogen economy will be harder. The power-generating capacity will have to be switched to renewable sources of energy, and the marketplace will have to agree on ways to store and transport hydrogen. These hurdles mean that many new jobs will be created as we convert the fossil fuelled Industrial Revolution to the Sustainable Prosperity Revolution. wn

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Hydrogen's false economy

BY I MARK PEPLOW I SCIENCE JOURNALIST

A sleek car glides past the undulating hedgerows of a country lane. The only sounds it makes are snatches of Vivaldi from the stereo, and the exhaust pipe emits nothing more noxious than water vapour. As it passes, a cloud of butterflies takes flight into the clean summer air.

Proponents of hydrogen-powered vehicles have long envisioned this as the future of motoring. But today, that dream is almost as distant as ever – and increasingly serves as a distraction in the quest to cut greenhouse gas emissions by replacing petrol.

At first glance, hydrogen looks like a suitable alternative. It has a higher energy density (by mass) than petrol, and could be distributed to filling stations through pipelines. And although specially designed internal combustion engines can burn hydrogen directly, hydrogen is even more efficient when it drives a fuel cell to generate electricity.

A decade ago, governments and funding agencies drew up ambitious plans to develop cheaper fuel cells and to enable cars to store practicable quantities of hydrogen. In 2003, President George Bush committed $720 million to the research effort.

By 2009, it was clear that hydrogen was no quick fix, and US energy secretary Steven Chu diverted much of the funding into battery research. It was the right move.

When the 'hydrogen economy' concept was coined in the early 1970s, advocates such as electrochemist John Bockris[1] expected cheap, plentiful nuclear power to produce hydrogen by electrolysing water. Using hydrogen as an energy carrier in this way made sense at the time – power-line losses made hydrogen a more efficient way to move energy over long distances, and battery technology simply wasn't good enough propel electric vehicles much faster or further than a milk float.

But nuclear accidents, although extremely rare, have made many governments wary of investing in extra nuclear power stations. And they have also exposed the hidden costs of nuclear power: cleaning up the accidents and dealing with radioactive waste.

So, instead, more than 90% of the world's hydrogen is produced from fossil fuels, through steam reforming of natural gas, for example, which also produces carbon dioxide. That carbon dioxide could be stored underground, but it isn't, because carbon capture and storage technology is not sufficiently well developed and the costs are astronomical.

CLEANING UP

Wind or solar power could be used to drive electrolysis plants, but isn't that clean electricity better used to feed today's more efficient power grids, and to charge lithium-ion batteries that far outstrip those available in the 1970s? The fuelling points for battery-powered cars are a relatively simple extension to our existing power grid, and new technology is reducing recharging times.

Hydrogen, in contrast, requires an entirely new supply infrastructure. That's why the only hydrogen car on the road was, until recently, the Honda FCX Clarity; just a few dozen drive around southern California – the only place in the US with a sufficient network of hydrogen filling stations. In February, Hyundai launched its Tucson ix35 hydrogen fuel cell vehicle, and hopes to make 1,000 of them for the European market. Compare that with the European commission's hydrogen roadmap, which forecasts an incredible 1 million hydrogen fuel cell vehicles by 2020.

Storing hydrogen on board a car also requires expensive pressure vessels or cryogenic systems. Chemists and engineers have worked hard to find alternatives, such as adsorbing hydrogen onto porous materials, or using hydrogen-dense molecules to release hydrogen on demand. For example, Matthias Beller at the University of Rostock, Germany, recently unveiled a ruthenium catalyst that can generate hydrogen from methanol at a relatively mild 65–95°C.

But while the ruthenium catalyst is a lovely bit of chemistry, it is not a breakthrough for the hydrogen economy: the reaction releases carbon dioxide, which is much harder to capture from millions of cars than it is at a single power station; the catalyst turnover frequency reached 4700/h, many orders of magnitude from practicability; and it relies on ruthenium, global stocks of which are thought to be only about 5,000 tonnes.

BLIND OPTIMISM

In February, the UKH_2Mobility partnership issued a report suggesting that 1.5 million hydrogen-powered vehicles could be on the road in the UK by 2030.

Yet even this optimistic report noted that the effort would only reduce carbon dioxide emissions by about 3 million tonnes – less than the world currently emits in one hour.

Hydrogen will undoubtedly find transport niches, but talk of hydrogen powering a substantial proportion of the planet's billion cars (and counting) is driven more by techno-optimism than evidence.

Faster and more significant impacts would come from improving battery technology, investing in clean electricity sources and developing carbon storage. The hydrogen economy is alluring, but it is a distraction from the important task of decarbonising our transport system. wn

REFERENCES

1 J O'M Bockris, Science, 1972, 176, 1323 (DOI: 10.1126/science.176.4041.1323)

Engineers.... unite!

SA's infrastructure is in poor state of repair. Don't take my word for it - look around and decide for yourself! Apart from the excellent initiatives for new infrastructural projects the existing infrastructure created over many years is in a serious state of disrepair.

BY I STAN BRIDGENS I PR ENG.

More importantly the competent resources to do this essential function are not in place and the impact is directly related to the quality of life for all South Africans. No matter your station in life – you are affected.

Every day there are typically 25 demonstrations in SA about lack of these essential services dealing with water, electricity, sewage, roads or refuse removal-taking as well as complaints about the associated services of billing and payments. In general, service delivery and the standards in many areas are unacceptable and dangerous to public health - thus the demonstrations that incidentally worsens the already poor state of the infrastructure. This type of vandalism is deemed justifiable because it would appear to the miscreants that it is the only way to be heard. 'Deaf ears', complacency or incompetence by those in authority is another problem for another platform.

It's may only be a matter of time before the communication systems, the bridges and the transport systems falter and possibly collapse and crime and lawlessness take hold as the norm.

Why has it been allowed to get to this stage?

Are we on a downward trend - on a road to where our children will inherit a quality of life such that they will seek an existence elsewhere?

Being a South African, and with the track record of which we are so proud – the transition from the apartheid system, the World Cup and our avoidance of the international banks financial fiasco in 2008 - there is evidence of our capabilities and capacity to address challenges.

There is no doubt in my mind that the infrastructure and service delivery problems can be addressed, although I believe we are on the verge of collapse of the essential services and the delivery system.

Infrastructure creation and maintenance require competent engineering personnel to engineer solutions. Plans, funding and talking about the problems make absolutely no progress towards

addressing the problems without the involvement of competent engineering personnel to interpret the discussion, design and implement the solutions. One can ask how much financial resources have been wasted by incompetence. To my mind, too much to be proud of, and totally out of character. This is not reflective of the proud nation that we are!

To start with, Local Government must be empowered with competent, experienced engineers at the helm of technical and engineering departments. This is needed at every municipality in SA, regardless of political ideology. These engineers need to mandated and authorized to get the job done - not be bullied by human resources or financial/procurement bureaucracy to achieve other objectives. The problem is that in many cases there are already persons in these positions, who are paid to take accountability. So the short-cut solution is to appoint experienced, misplaced engineers to oversee these positions in a consultative capacity, with appropriate authority for what? To get the job done!

Engineers unite! - a problem in itself as engineers do not easily agree because they are taught to think – but no matter - put your differences aside and face the common enemy, of decrepit infrastructure and present a common front of solidarity to offer a solution addressing the common enemy. Join Civilution - the congress that is creating a common front for engineers to address Civil Society issues.

Ask yourself - if we don't do it, who will talk for us? wn

For more information on Civilution contact Gerda Geyer geyerg@saiee.org.za

BY I DU TOIT GROBLER
INTPI(SA)(EE), PRING(EE), PRDIPLING(EM), BSC(ING) (ELEK)(PRET), FSAIEE, SMICMEESA

"Decades of Engineering Excellence" is a 216 page hardcover prestige coffee table publication of the Engineering Council of South Africa.

"Decades of Engineering Excellence"

Du Toit Grobler, a Professional Electrical/Electronic and Certificated Electrical and Mechanical Engineer, was requested to compile and edit a book which commemorate the excellence of engineering in South Africa over many decades.

The inspiration to publish the book came from the *"First Ten Decades"*, compiled and edited by Mike Crouch during the centenary year of the SAIEE.

The book provides a brief overview of engineering, mainly in South Africa but also globally. It covers the categories, disciplines and sub-disciplines of engineering which are predominantly practised in South Africa.

It also includes engineering achievements in various disciplines and combinations of disciplines in South Africa, and includes tertiary education of engineering practitioners. It makes reference to the statutory and voluntary legs of the engineering profession in South Africa.

The main body of the book consist of 5 chapters, with comprehensive reference lists:

1. Engineering;
2. Engineering achievements in South Africa;
3. Engineering education in South Africa;
4. The Engineering profession in South Africa; and
5. The Engineering Council of South Africa

Forewords and messages were written by the Minister of Public Works, President of ECSA, CEO of ECSA and Compiler and Editor of the book.

Annexures consist of the ECSA Code of Conduct and a comprehensive list of abbreviations and acronyms used in the book.

The contact details of ECSA cover: Recognised voluntary associations (VA), CBE and councils of the built environment professions, government departments, tertiary educational institutions including traditional universities, comprehensive universities, universities of technology, further education and training colleges and SETAs (168 contact details). Current South African legislation pertaining to engineering (17 references) are also available in this book.

The alphabetical index provides a quick reference to persons and topics mentioned in the book.

The excellence of engineering described in the main body of the book is supplemented by the profiles of companies and bodies that supported the publication of the book as sponsors. A total of forty one sponsors made contributions in platinum (2), gold (5), silver (5) and bronze (29) categories.

Sponsors include: One government department, industry, engineering companies, consulting engineers and project managers, tertiary educational institutions, voluntary associations, one built environment council, landscape architects and one individual.

The profiles of sponsors appear in alphabetical order and the roll of honour of all sponsors in alphabetical order by category of sponsorship. The SAIEE is one of the bronze sponsors of the book.

THE BOOKS CONSISTS OF:

352 Photos and Pictures
18 Tables and Graphs
5 Diagrams

"Decades of Engineering Excellence" will serve as a source of information. It will introduce learners of all ages to Engineering and will encourage them to take up one of many rewarding career paths in Engineering. This book should be made available in the libraries of all secondary and tertiary educational institutions and public libraries in South Africa and on the internet.

ABOUT THE COMPILER AND EDITOR:

du Toit is a multi-category, multi-disciplinary engineering professional.

He is dedicated to the promotion of the engineering profession. He is the sole sponsor of the words *"ingenieurswese"* (engineering) and *"ingenieursprofessie"* (engineering profession) in the *"Woordeboek van die Afrikaanse Taal (WAT)"* (Dictionary of the Afrikaans Language).

CONTACT DETAILS:

If you are interested in obtaining a copy of the book, contact du Toit on 083 666 6855 or du.toit.grobler@gmail.com

Mobile Learning helps Organisations to Stay Ahead

While the significance of employee development has long since been established, businesses often find themselves having to delay sending their employees away on training courses, due to time and monetary constraints.

BY I KIRSTY CHADWICK I FOUNDER I THE TRAINING ROOM ONLINE

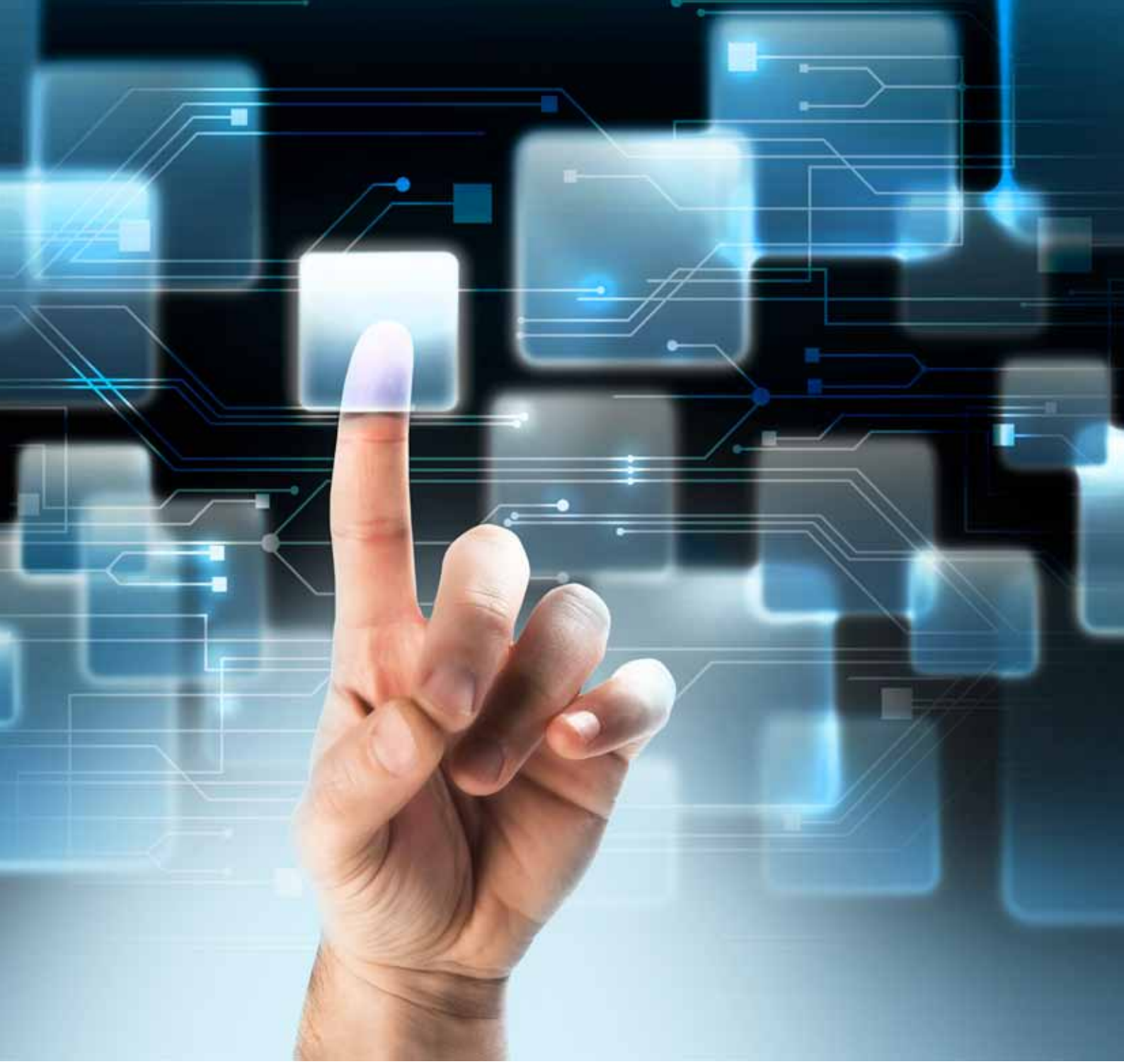
According to the National Research Business Institute in the USA, 23% of employees leave their jobs because there are no opportunities for development or training within the company. Training is a crucial part of any successful business because it improves productivity in the workplace and ensures a competitive edge in the market, while also empowering staff through increased knowledge.

Corporate training is a $200 billion industry, while e-learning represents $56.2 billion of this amount, and is likely to double in size before 2015. E-learning solutions are highly customisable and supporting technology is developing at such a fast pace that there's almost no limit to its scope and possibility. E-learning makes learning faster, more engaging and friendlier on the budget.

Employers can no longer afford to send their employees off to training workshops which take them away from their post. Instead, they require employees that are always on top of their game. As computers become increasingly essential as educational tools, technologies continue to develop and become more portable and cost-effective - mobile learning is a perfect example of this. Mobile devices allow for immediate communication and can be particularly beneficial during down-time at work or while travelling.

Evolving markets and high employee turnover are driving the need for learning that is accessible at any time and anywhere. Knowledge gaps can be uncovered through online assessments and training courses can be updated relatively quickly and easily to incorporate any 'missing' information.

Most importantly, mobile learning can give any organisation a competitive edge by allowing employees access to vital information at the instant they require it.



Following the success of the African budget smartphone, Microsoft produced a smartphone targeted specifically at the African mobile market, which was released in February 2013. Since the launch of this smartphone, there has been a dramatic increase in the number of students and even staff making use of smartphones to assist learning. According to eLearning Africa's News Portal, smartphone growth in Africa has increased by 43% every year since 2000. Based on current figures, if the use of smartphones in Africa follows the same path as feature-phones have, then they should hold 40% of the African mobile market by 2018.

Mobile learning is a way to give the learner more control over how their learning is structured. The always-available nature of this form of learning empowers students to take their own initiative and plan learning activities according to their personal goals and needs. No two learners are the same, therefore they are unlikely to absorb and process information identically. Through mobile learning, students are able to personalise their learning experience, in turn making it more enjoyable. In order to keep the content exciting and to maximise learning, classroom and field knowledge can be integrated, with the help of visual and auditory components.

Mobile Learning helps Organisations to Stay Ahead

continues from page 53

Thanks to mobile learning, organisations are now able to deliver targeted information on-demand. Individuals are provided with immediate knowledge, irrespective of geography. According to Ambient Insight, the worldwide market for mobile learning reached $3.2 billion in 2010 and is expected to reach $9.1 billion by 2015.

If your organisation is considering mobile learning, it is important that you have a suitable plan in place and that you determine why this form of learning could be beneficial, you also need to be aware of all the changes that would need to take place in order to incorporate mobile learning into your business. Assessment of your organisation's needs is essential if you hope to achieve success through mobile learning.

Let's have a quick look at the questions that we need to ask ourselves and our shareholders before going mobile.

1. What common problem(s) will mobile learning help to solve within your organisation?
2. Are there people within your organisation who don't currently have access to resources, for which mobile learning will be a great help?
3. Does your organisation have the technology that is needed to support the mobile learning infrastructure?
4. Can your current learning system be converted into mobile learning?
5. Does your organisation have the e-learning tools that are needed to develop a mobile learning application?
6. Does your organisation have the time that is needed to produce a mobile learning course?
7. What are your financial restrictions?
8. Will the transition to mobile require change management?
9. How can content be optimised for mobile learning?
10. How will you evaluate the effectiveness of mobile learning within your organisation?

Once you have answered these 10 questions, you should have more or less and idea of what is required in order to make mobile learning a success within your organisation.

We live in a very competitive world where employees need to be equipped with the right knowledge, tools and capabilities in order to effectively drive productivity and sales within this environment. Productivity within the workplace can be driven by empowering employees – this encourages them to make their own decisions and to take responsibility for the results of those decisions, it generally leads to a happier work environment for everyone.

Mobile learning solutions deliver information at the point when it is required, enabling employees to make better, well-informed decisions and satisfy customers. When a client doesn't understand how something works, like a piece of machinery for example, the employee can then take out their mobile phone and show the customer exactly what he is referring to. This will help the customer to understand and it will also empower the employee.

Mobile technology is evolving at a rapid pace, which is encouraging the shift towards mobile learning. Let's have a quick look at a few of the advantages of mobile learning.

1. Convenience - Mobile learning can take place at any time and anywhere.
2. Control – Learners are able to direct their own learning initiatives.
3. Always available – Learning can take place whenever the learner requires.
4. Support – The use of mobile devices for learning provides the learner with support when dealing with clients on the floor.
5. Self-paced – No two learners are the same, everyone learns at a different pace. Mobile learning allows the student to move ahead or to spend a little more time on a section of learning they are having difficulty with.
6. Access – Apart from the major benefit of having information at their fingertips, learners are also able to interact with industry experts and professors online.
7. Language & Literacy – Mobile learning is able to overcome language and literacy barriers by using a combination of visual and auditory components.
8. Nuggets – Instead of learning for hours on end and risking the possibility of information overload, learners receive small nuggets of information at a time.
9. Empowering – Learners feel empowered because they have information available to them whenever they need it.
10. Barriers – Technical barriers are eliminated because the learner is already familiar with their own device.
11. Productivity – After the initial setup of mobile learning, it can be delivered across many different platforms and employees can learn off-site and still continue with their daily work.
12. Cost-effective – Mobile learning is cheaper than booking classroom training for employees and information can easily be sent out to mobile devices.

13. Options – There are various learning options available for different learning styles. Game-based learning is a good example of this as it has the ability to keep students focused, even if they have a short attention span under normal circumstances.
14. Testing – Knowledge can be assessed through online assessments and quizzes.
15. Time – Learners are able to access study material whenever they have a moment to do so, therefore the time that it takes to complete a course can be significantly shortened.

Training and developing your employees is about putting the right tools in their hands. The most powerful tool that we have at our disposal is knowledge, which is why courseware needs to be delivered in a way that will help learners to absorb and understand that knowledge in the best and easiest way possible. Mobile learning enables employees to access world-class training from anywhere they choose and has the ability to give any organisation the edge they require in order to stay ahead of the competition. If whether to use mobile learning is the question, the answer is YES! wn

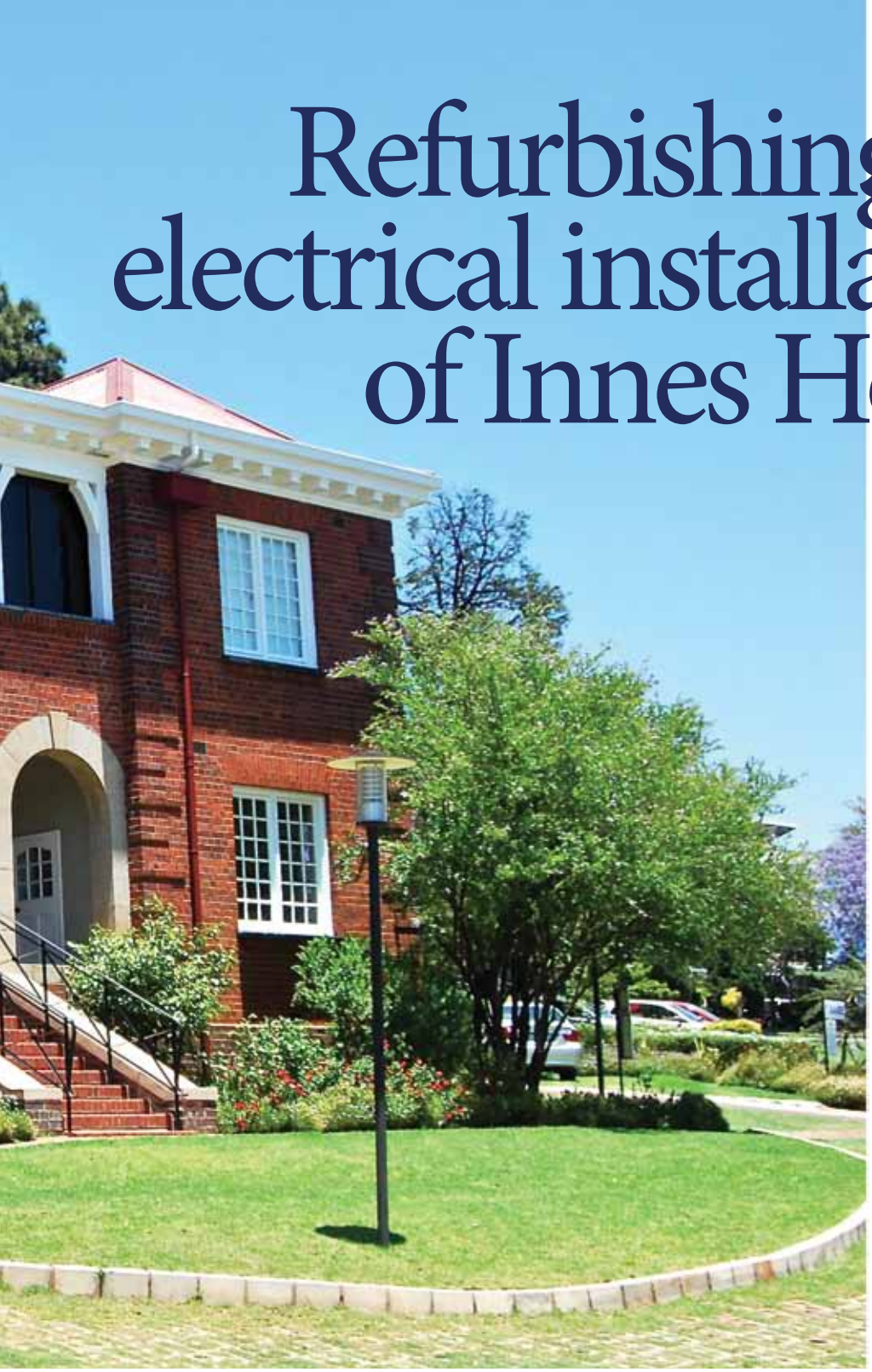
Earn CPD Credits

Along with rooms being used to display exhibits made up of artefacts from the Historical section's collection, there will be an office and conference suite requiring modern electrical fittings and telecommunication equipment.

Luigi Salemi of Vox Populi Architects, who designed the new SAIEE office block, was appointed as the Principal Agent for this project. One of his major challenges was the age of Innes House (over one hundred years).

Any renovation work carried out had to comply with the requirements of and approval of the Provincial Heritage Council. In addition, the electrical installation in the building needed to be upgraded to meet modern standards as

Refurbishing the electrical installation of Innes House



After the completion of SAIEE House, Innes House, which for many years housed the Secretariat of the SAIEE, was vacated and the SAIEE Council decided that that this building should be renovated prior to being fitted out as the Institute's Museum.

BY I BILL BERGMAN I F SAIEE

well as to meet the requirements of the Historical Section of the SAIEE.

The electrical consulting firm Bergman Fisher Associates (BFA) was appointed to work with the architect and the Historical Section Committee, to develop the electrical requirements for the interior of Innes House.

The brief at the start of the project was to design and install an electrical installation which was to be flexible enough for a museum as well as allowing for the needs of modern offices and conference rooms. At the onset no decision had been made as to which rooms were going to be used as museum display areas or which rooms would be used as office/meeting rooms.

After a tender process a building contractor was appointed and work on the renovation of Innes House commenced. Electrical drawings and supporting documentation were also prepared then after another tender process, an electrical contractor was appointed to execute the work. The electrical contractor had to work very closely with the appointed building contractor because

Refurbishing the electrical installation of Innes House

continues from page 55

there was going to be certain structural alterations made to install certain items.

One must keep in mind the history of the building and who occupied the house through its lifetime. Innes House was built specifically as the residence of the first Director of the Meteorological Observatory in Johannesburg. Although Sir Herbert Baker designed the house it was built by the Department of Public Works (PWD) using red brick and not Baker's hallmark stone. Robert Thorburn Ayton Innes and his family then took occupation of the building in 1910.

The electrical wiring, position of lights and switched socket outlets (SSOs) were installed to suit a family household. Being a double storied house two distribution boards had been installed originally; one on the ground floor which was also the main distribution board and the second as the first floor sub-distribution board. One can only imagine that the main isolators were of the cast-iron clad type and that the sub-circuits must have been protected by means of porcelain fuses, as this was the norm for that era.

However, at some stage the building, which was maintained by the then Union of South Africa's, PWD, had been rewired and the old distribution boards replaced. Surface mounted circuit breakers were fitted to the "new" distribution boards. At an even later date earth leakage relay units as well as lightning surge arrestors were fitted.

In 1990 SAIEE took over the building and converted it into its administration office block. This meant the house was now being used as offices so additional SSOs were fitted, where required, for computers and other office equipment. Being an old building with a double volume entrance/ reception area the house was cold in the winter therefore additional wall heaters were installed as well.

These alterations were installed using surface mounted twin and earth polyvinyl chloride (PVC) cable connected to existing SSOs or from any other convenient electrical point. The existing SSOs that were originally installed in the sitting rooms, dining rooms and bedrooms were installed at 1200mm above finished floor level (AFFL), whereas the new add-on SSOs where installed at about 300mm above floor level. This meant that the surface cables ran down walls and along the skirting boards.

Furthermore, in the interest of security, an infra-red security system was installed with surface wiring running in all directions. Additional lighting was also installed and again the supply to these lights was taken from the nearest light point using surface twin and earth PVC cable.

While preparing the tender documentation, the existing installation was examined by the consultants. During this inspection it was found that at some stage the PWD had rewired the installation and that the wiring was all in steel conduit. The rewiring must have been relatively recent since the wiring was of the PVC insulated type and not Vulcanised India Rubber (VIR) as one would have expected. The surface mounted distribution boards had circuit breakers fitted which bore the inscription "U of SA, PWD".

There was also an old vibrator type bell annunciator panel, which did not work, in what was originally the kitchen.

The challenge was to restore the building as close as possible to its original state yet new technology had to be employed so that it could be used as a museum and for administration purposes. Two problems arose, one was that museum display cabinets will be used, that would in all probability require built-in lighting. The second was that these cabinets are to be portabl; they could be placed in one position one day and moved at a later date to another position.

This meant that the wiring connecting the display cabinet lighting would have to be inserted in the socket outlet closest to the cabinet. This could lead to the possibility that the cable from the cabinet could "snake" across the floor and become a hazard to persons walking over the wire in that room. It would also look untidy. Then there was the problem of the lighting. Again at this stage no-one could determine where the cabinets would be placed and there was a requirement to spotlight certain cabinets or other displays while the general lighting was to be maintained.

The aforementioned problems were solved in the following manner.

Firstly all the add-on wiring, SSOs, light fittings and cables were removed. This included the surface wiring and infra-red detectors used by the security system. In order to overcome the problem of not knowing were SSO's would be required in the future; a power rail track system was sourced and installed on all perimeter walls in each room. This system uses a socket out unit which can be clipped into the power rail where required. It can also be removed at will and repositioned which makes the positioning of SSO's very flexible.

Old Distribution Board

Old Annunciator Panel

Circuit Breakers on old distribution board.

This power track was installed 300mm above the existing wooden skirting. The feed for these tracks was taken from existing SSO points on the wall (which was installed at 1200mm AFFL) which meant the wall had to be chased to allow the connection to be made at the track's connection block at skirting level. This is where the electrical contractor had to work closely with the building contractor who had to repair the wall chase and paint the wall accordingly. Similarly where surface cables and heaters were removed, the building contractor had to repair the walls as close as possible to their original state. Fortunately, the co-operation between the two contractors was good and the work progressed smoothly.

The lighting problem was solved by installing a suspended lighting track with an LED strip light mounted on top to illuminate upwards and bounce the light off the ceiling. The lighting track can also be fitted with LED spotlights that can be positioned where-ever required. Fortunately before the light fittings were ordered, the Council decided that three rooms on the first floor would be used as offices and conference rooms. The luminaires required for these rooms differ from those of the "museum" areas and are more in keeping with a modern office.

The SSO power track was also installed along the perimeter walls in these rooms as SSOs can be positioned to suit. An additional duct, which complements the power track, will be installed at a later date to accommodate any data cabling in this area. The reception area of the house, which is double volumed, relied upon lighting from light points under the first floor balcony walkway. These lights were replaced with the suspended track and LED system but it was felt that the double volume lacked "presence" so a chandelier was installed to establish a "good feel" by breaking up the sheer vastness. Light fittings other that those already mentioned for the museum and office areas needed to be chosen with great care to suit the style of the building. These were for the stair cases, wash rooms, the Engel nook, and the three porches. All of these light fittings and chandeliers were selected and then approved by the Architect. In the meantime the Architect sourced light switches more in keeping with the aesthetic essence of the building. Wherever possible, energy saving lamps were installed. These included LED, compact fluorescents (CFL) and energy efficient fluorescent.

The existing switchboards and the alarm annunciator panel were removed and handed over to the Historical Section who will display them in the future as part of the museum's exhibit.

The distribution boards were replaced with flush mounted type fitted with modern isolators, circuit breakers and earth leakage units. Fortunately the fault current at these boards was known and the switchgear sized accordingly.

A new wireless security system has also been installed.

All-in-all the new installation, with the exception of a few hiccups, was completed successfully, thanks to the close co-operation of the Architect, SAIEE Facilities Committee, SAIEE Historical Section and the contractors. wn

November

COMPILED BY | JANE BUISSON-STREET
SMSAIEE | PMIITPSA

One of four months with the length of 30 days. November was the ninth month of the ancient Roman calendar. November retained its name (from the Latin novem meaning "nine") when January and February were added to the Roman calendar.

1 November

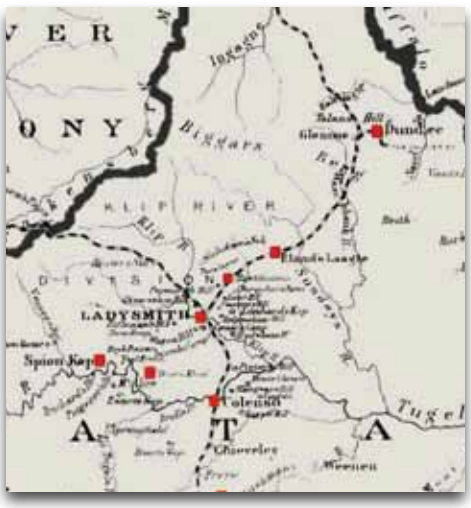
1512 The ceiling of the Sistine Chapel, painted by Michelangelo, is exhibited to the public.

1896 A picture showing the unclad (bare) breasts of a woman appears in National Geographic magazine for the first time.

1922 The first radio licences go on sale in Britain at the cost of 10s (50p, R8,00)

1967 Rolling Stone magazine makes its debut, the first national rock 'n roll periodical in the US.

1991 The nuclear power station needs electronic devices such as those used at airports, but there is not even a machine to make passes for the staff."



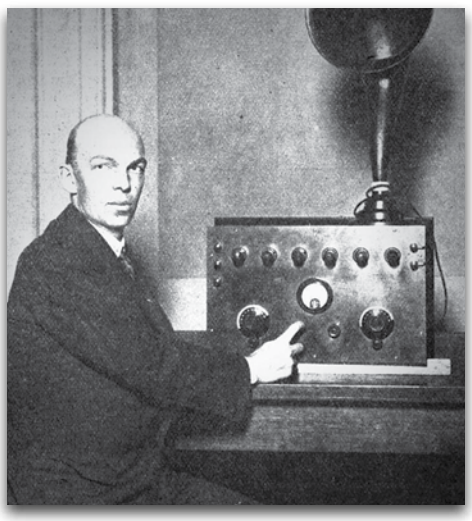
2 November

1899 The Boers begin their 118 day siege of British held Ladysmith during the Second Boer War.

1936 The world's first regular high-definition (405-line) TV service was introduced by the British Broadcasting Corporation today. An estimated 100 TV owners, all living within a radius of 25-miles (40 km) from the studios at Alexandra Palace, north London, saw the Postmaster General perform the opening ceremony.

4 November

1890 The Prince of Wales travels on the Underground from King William Street to the Oval to mark the opening of the first electrified underground railway station.



6 November

1935 Edwin Armstrong presents his paper "A Method of Reducing Disturbances in Radio Signalling by a System of Frequency Modulation" to the New York section of the Institute of Radio Engineers.

1956 The construction of Kariba High Dam on the Zambezi River begins.

1975 The Sex Pistols play their first-ever gig amid scenes of mayhem at London's St. Martin's College of Art. After ten minutes the college's social secretary pulls the plug on them.

1987 Rail passengers have often wished that TV screens on station platforms would show something more interesting than train times. Today passengers on Patna Station, India, suddenly saw a pornographic movie on the screens. The official explanation was that a "mistake" had occurred.

9 November

1945 Birthday of Moeletsi Mbeki, South African economist

1988 The Pentagon took the wraps off the Air Force's new attack plan today, the Lockheed F-117A. It is a sinister, all-black aircraft that employs the latest stealth technology – radar-absorbent materials and a "faceted" surface that deflects radar signals at odd angles. The aircraft's key feature is that it can supposedly arrive undetected over a target.

13 November

1914 A patent has been taken out today for an item of female clothing to be known as the "backless brassiere". In contrast to the all-embracing undergarments of the `victorian and Edwardian eras, the brassiere covers and supports the breasts only. Mrs Mary Phelps Jacob constructed her prototype out of two handkerchiefs and baby ribbon. Mrs Jacob has been making brassieres for a number of her friends for some years and has only now been persuaded to patent her idea.

1914 General Botha's forces vanquish the rebel commandos of General Christiaan de Wet in the Orange Free State, leaving the way clear to march on the German colonists in South-West Africa.

17 November

1880 The first three British female graduates receive their Bachelor of Arts degrees from London University.

1970 The unmanned Soviet spaceship, Luna 17, lands on the moon.

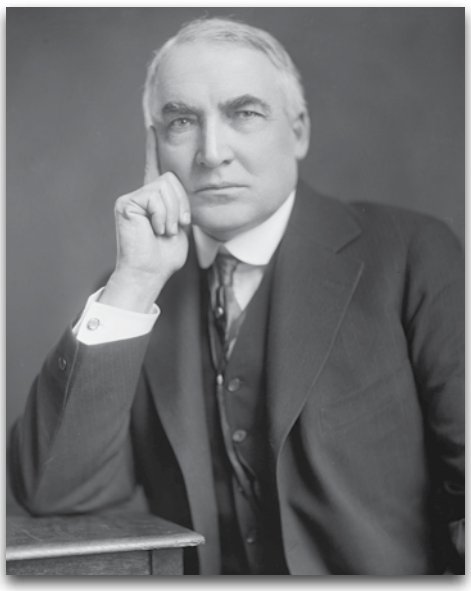
20 November

1900 "Something that everybody wants to have read and nobody wants to read". Mark Twain defines a classic of literature.

1926 At the Imperial Conference in London today the oldest colonies of the British Empire – Canada, Australia, New Zealand, South Africa and Newfoundland – were granted the status of self-governing dominions, masters of their own destinies and of equal status with Great Britain.

22 November

1946 A revolutionary new pen which will write 200 000 words without refilling, blotting and smudging goes on sale in Britain today at £2,75. It is the invention of Ladislaw Biro, an Hungarian journalist, who was inspired by the quick-drying printer's ink he saw in Budapest before the Second World War. The business end is a rotating ballpoint, connected to a capillary tube which holds the ink.



23 November

1921 US President Harding bans doctors from prescribing beer.

26 November

1966 The world's first tidal power station was opened by General de Gaulle today on the Rance Estuary near St. Malo in Brittany, France. Albert Caquot first drew up plans to harness the power of tides in 1955 but the scheme was considered to ambitious and was therefore rejected. At the cost of FF420 million, the 2640 ft. (850 m) barrage contains 24 turbo alternators that produce 544 thousand kW.

30 November

1872 The first-ever international football match takes place at Hamilton Crescent, Glasgow, between Scotland and England. wn

Hydrogen: the characteristics of the A-Bomb

As an Interior Designer who has spent the last five years at home raising two budding engineers, I am well qualified to know a whole lot of nothing about Hydrogen. But let's not throw the baby out with the bath water just yet; let's look at what I do know about Hydrogen, its characteristics and uses.

BY | ANGELA PRICE

I know for starters that it makes up two parts of a water molecule. At standard room temperature and pressure Hydrogen is: colourless, odourless, tasteless, non-toxic, non-metallic, and highly combustible.

This makes it something of a 'camouflage chemical'…hard to spot. It's no wonder therefore that a plebeian like me gives little thought to Hydrogen on a day-to-day basis. However, after some reflection, I realised that there are a number of situations where one interacts with Hydrogen on a daily basis.

The first thought that came to mind was that I recall using Hydrogen Peroxide to soak re-usable nappies - as part of my campaign to save the planet by not using disposables. It should be mentioned that this campaign lasted a whole three days, after which time I began chanting the phrase 'convenience has a price'. As you may have realised by now, I know little about Hydrogen, but nappies….ah, now there's something I know a lot about.

And after thinking about it, I realised that there is a strong link between hydrogen, chemical warfare and…nappies.

After 5 years in the trenches of this battle zone (aka my home), I consider myself something of a chemicals expert. 'Why is that?' you ask. Well, I handle hazardous items and nuclear waste on a daily basis. In fact, now that I think about it, I am practically running a nuclear weapons site.

Allow me to elaborate.
Hydrogen is of course, famously (or infamously) tagged to its own 'baby' – the Hydrogen bomb (H-bomb). In our home we have what we call the 'A-bomb' (no, not THE A-bomb, this one is manufactured by our young son Andrew). Much like the H-bomb, this little package, when off-loaded in the 'drop zone', has the ability to level a room and most certainly to clear it. These 'A-bombs' are nuclear and debilitating.

I have often commentated to friends that the US military could save themselves a lot of work and money if they harnessed the simple 'power of the poop'. I firmly believe that the contents of a few soiled nappies, when launched at or dropped on some unsuspecting enemy, would have devastating results – changing the meaning of 'chemical warfare' as we know it.

Did you know that by the time they reach two and a half, the average child will have used approximately 6500 nappies, which equates to 10 tons of waste…generating about 630kg's of Methane. Methane (CH4) - is another chemical compound made up primarily of Hydrogen molecules…

So back to our 'A-bomb', which is now commencing stage two of its chemical warfare operation. Neatly parcelled up in a disposable nappy, it sits waiting in the trolley bin for the unsuspecting garbage man (or here in SA, the even less fortunate trolley-man). And as it sits, it begins to peculate in the black garbage bin, generating Methane.

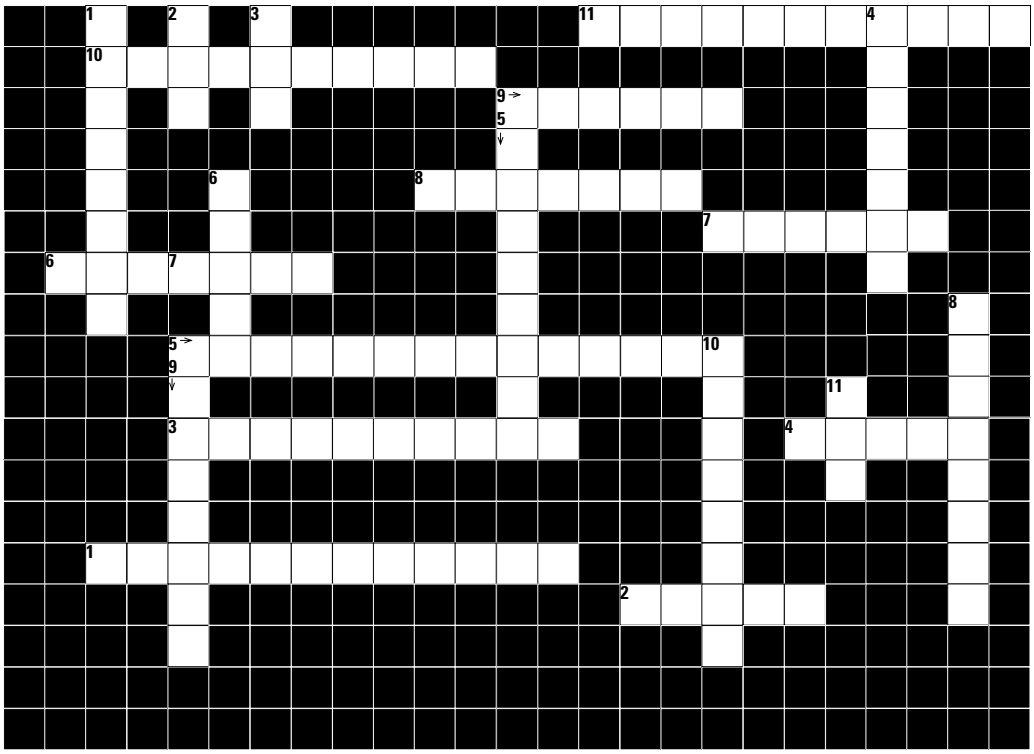
I do not know the exact characteristics of this chemical compound but due to its origins I think it's safe to guess that it is not odourless!! I also know that it is just as deadly and dangerous as its cousin Hydrogen.

Now freshly reminded of the stats about disposable nappies, landfills, methane generation and the resulting climate change, I am off in a frenzied attempt to get my little A-bomber to aim for a specific target – in this case the toilet bowl. wn

Have some fun and stand a chance to win R1000.
Complete the November issue crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, November 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 **30 November 2013**. The winner of R1000 will be announced in the February 2014 issue of the **watt**now magazine.

R1000 win

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



ACROSS

1. What did the discoverer of Hydrogen called it at first? (9,3)
2. See 4 down. (5)
3. Name 3 characteristics of Hydrogen. (10)
4. What does PEM fuel cells need to operate successfully? (5)
5. In 1766-81, who was the firs to recognize that hydrogen gas was a discrete subtance? (5,9)
6. Postive electrode (7)
7. See 4 down (6)
8. What is the most common isotope of hydrogen? (7)
9. See 8 down. (6)
10. Name of the airship which caught fire on 6 May 1937. (10)
11. See 5 down. (11)

DOWN

1. What type of element is Hydrogen (8)
2. What is Hyrdrogen's atomic number? (3)
3. Polymer electrolyte membrane. (abbr.)
4. Hydrogen has many uses, though it's mostly used for processing _____ _____ and is used in the production of _____? §(7)
5. Name 3 characteristics of Hydrogen. (9)
6. Negative electrode. (6)
7. The atomic symbol for Hydrogen (1)
8. What does PEM fuel cells need to operate successfully? (8)
9. Hydrogen and Fuel cell Technologies and Alternatives Public Awareness, Demonstration and Education Platform (abbr.)
10. What are Hydrogen compounds commonly called? (8)
11. See 5 down. (3)

September issue answers:

ACROSS

1 Electroactive **2** ZMP **3** Muscle
4 Generation Robots **5** Frubber
6 Actuators **7** Unicycle
8 Capuchin **9** Pneumatics

DOWN

1 Polymers **2** Vaimos
3 Urbie **4** Leonardo Da Vinci
5 Pleo **6** Famulus **7** RMP
8 Wire **9** UAVS

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. Closing date for entry is 30 November 2013. 7. The winner will be announced in the February 2014 issue of the **watt**now magazine. 8. The Managing Editor's decision is final and no correspondence will be entered into.

2014 Membership Fees

Council meeting held on 02 August 2013 approved subscription and entrance fees as from 01 January 2014 will be as per schedule indicated below.

Grade of Membership	Annual Subscriptions paid before 28 February 2014		Annual Subscriptions paid after 28 February 2014		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	125	88	156	110	156	110
After 6 yrs study	804	563	1,005	704	1,005	704
Associate	804	563	1,005	704	1,005	704
Member	889	622	1,111	778	1,111	778
after 6 years	1,039	727	1,299	909	1,299	909
after 10 years	1,087	761	1,359	951	1,359	951
Senior Member	1,087	761	1,359	951	1,359	951
after 6yrs/age 40	1,178	824	1,472	1,031	1,472	1,031
Fellow	1,178	824	1,472	1,031	1,472	1,031
Retired Member (By-law B3.7.1)	499	349	618	436	n/a	n/a
Retired Member (By-law B3.7.3)	nil	nil	nil	nil	n/a	n/a

1. Entrance fee for all grades of membership is R750.00 *(except for Students, which is free).*
2. Transfer fee to a higher grade is R450.00 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 6 and 10 years respectively are equal to the fees at the next higher grade.
4. Members elected after June 2014 pay a reduced membership 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 membership fees".* Members who comply with the requirements of By-Law B3.7.3 may make written application to Council for exemption from 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, subject to Council decree, be struck-off the SAIEE membership role.

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 membership.

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