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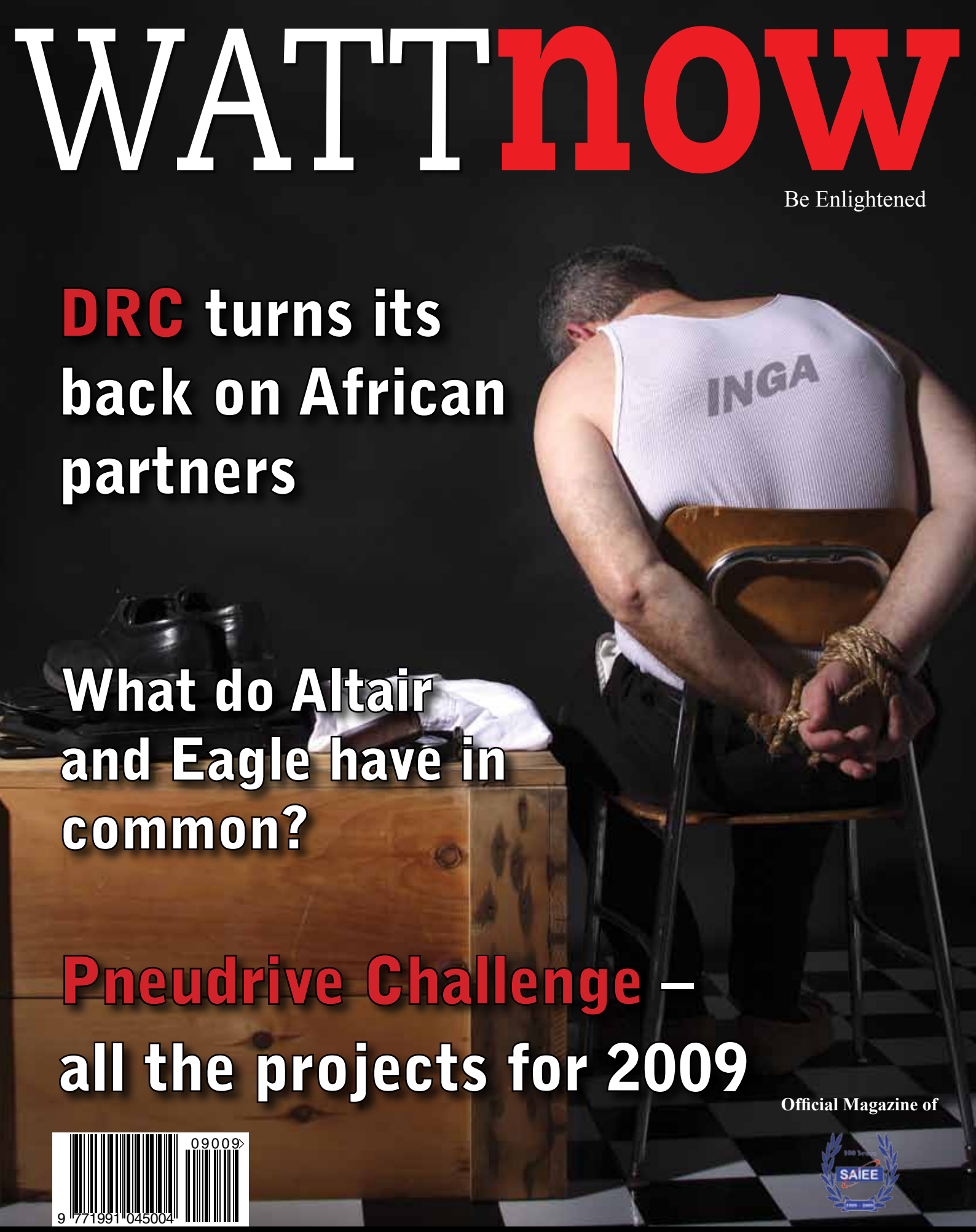

DRC turns its back on African partners

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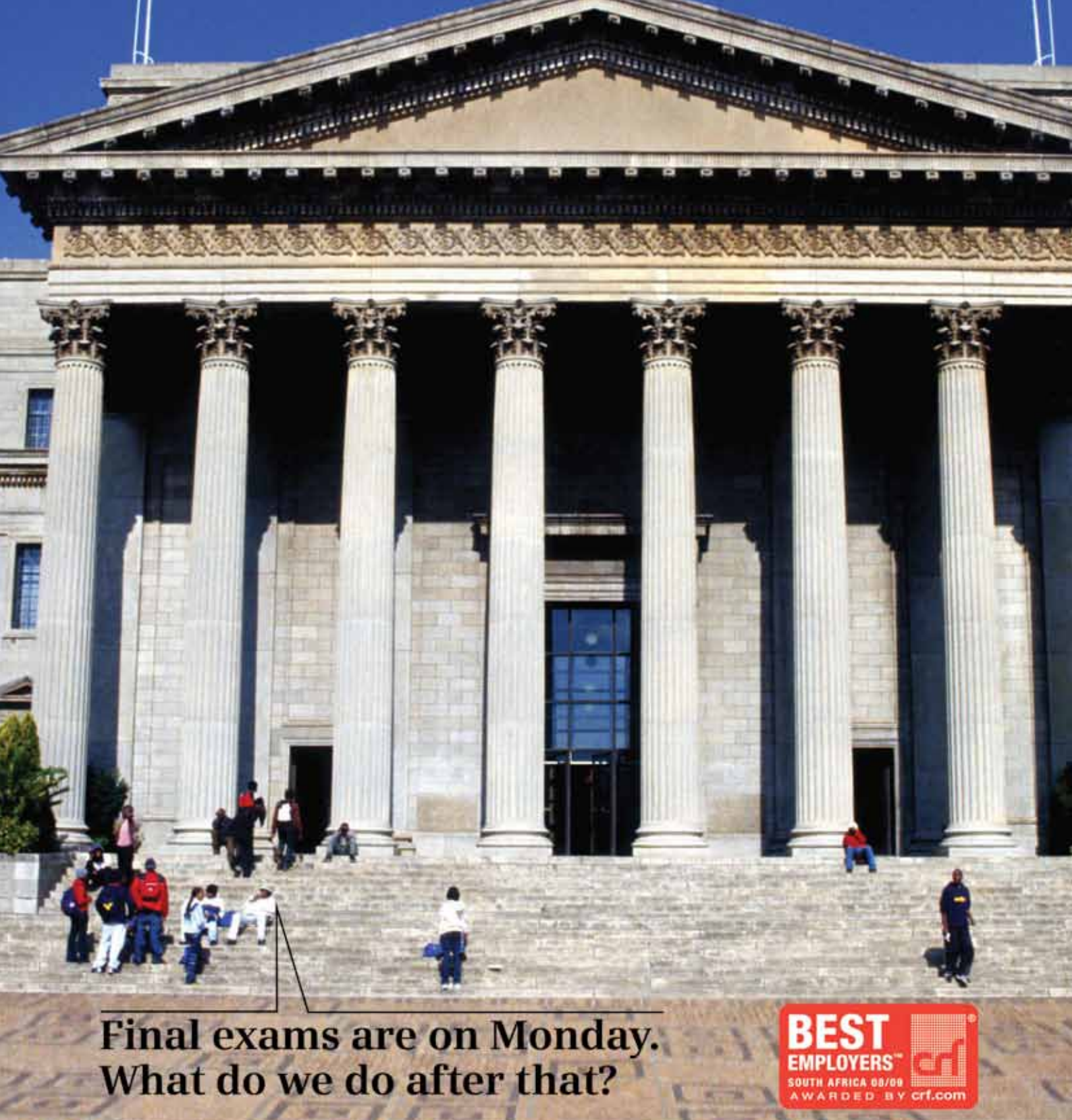

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DRC spurns its African partners

The Democratic Republic of Congo has effectively turned its back on its African partners, walked away from a partnership agreement to jointly develop the Inga Three power station – as the first step towards the Grand Inga – and will now go ahead with the project independently.

Basically, the DRC has told rest of southern Africa to get lost.

One might say that the DRC has every right to do so too. After all, the Congo River is in its territory, the Inga Three site is on its sovereign land and the development will use its own resources. None of these facts is wrong and no-one would dispute the DRC's right to make its own choices.

But if we scratch beneath the surface it's immediately apparent that the decision is based on greed and avarice; it's based on the fact that the DRC clearly wants to control its resources so that it can sell energy at any price, on terms it deems favourable.

It is much the same attitude as those foreign colonial powers – such as Belgium and Britain – adopted in the 19th Century. They disregarded treaties, pillaged mineral and environmental resources, enslaved parts of the population and spread dissension and disease in the name of colonial development.

And look at where that ended for the foreign colonial powers.

One thing that Africa needs more than anything else is proper regional co-operation. South Africa has proved this over the years and the Lesotho Highland Project is just one example of this. There are many others.

In my view, all major new projects in the energy, water or natural environment sphere should be seen as a regional development rather than an isolated one for the good of only one group.

Obviously, my views are not shared by the DRC, which has chosen to grab whatever money is on offer now and who cares about relationships, regional development or a long term future. It's sadly typical of so much of Africa.

And, a lack of regional co-operation has plagued the continent for almost as long as human endeavour has existed. Ancient examples include the Zimbabwe Ruins and the old slave buildings while recent examples include the hydro-electric schemes of Kariba and Cahora Bassa, the TanZam railway, the Benguela railway, and so on. Regional co-operation is something that Africans seem to dislike.

And yet, Africa most urgently needs strong regional co-operation for the benefit of everyone on the continent. There are just too many problems, too many shortages and too much hardship for countries to continue on a isolationist's path in the hope that they might survive.

And, when major projects are being developed the partner countries must understand their dual role of being both benefactor and beneficiary. That's what's called the common good.

By reneging on the four partners countries in the Western Corridor project the DRC has slammed the door on regional co-operation and chosen to take walk the path of isolation. What it fails to understand, perhaps, is that it is part of Africa, that it has neighbours on three sides and is not an island unto itself.

It's just a matter of time, I believe, before the DRC tries to negotiate some sort of deal with Angola, Botswana, Namibia or South Africa. It might be for energy, it might be for fuels, it might be for a common monetary union or a customs union. There will be a need for regional co-operation but I'm not sure how many of the DRC's neighbours will want to co-operate with it.

Fortunately there are other sites and options for new electricity generation projects: The Zambezi and Kunene Rivers may be suitable; solar concentrating thermal power may be a solution for Nambia if sites are erected in the Namib desert or in Botswana and South Africa around the Kalahari. The important thing is that the four remaining partners in the Western Corridor project can, and will, continue to work together for the common good.

Unlike the DRC, which for hundreds of years has remained that heart-broken, dark continent so aptly described by Joseph Conrad and many others like him.

That darkness is the DRC choice and Inga One and Two illustrate this now and no doubt Inga Three will shortly do so too.

And, while some things change in Africa; the DRC, it seems just remains the same.

Both dark and shameful.

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5> WATT'S GOING ON?

South African researcher recognized as Green Talent; Mobile devices need malware protection; Fraud on the increase worldwide.

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South African researcher recognised as a Green Talent

South African researcher Aluwani Nemukula has been recognised as a green talent by the German Federal Ministry of Education and Research (BMBF). He is one of several talented young scientists from around the world who took part in an Environmental Technology Competition run by the BMBF.

The competition took place for the first time this year and set out to find outstanding scientific talent in the field of environmental technology. The winning scientists were selected because their research is making a long-term contribution to resolving global challenges such as climate change, diminishing energy resources and large-scale environmental pollution. A jury of renowned German experts selected a total of 15 winners who will be invited to a one-week science forum in Germany at the end of August.

Nemukula is currently working on his dissertation on the production of biodiesel from microalgae. A total of 156 young scientists from 43 different countries applied for one of the 15 places. There were nine applicants from South Africa alone.

"We are delighted to have received so many outstanding applications from around the world. This response reflects the great international interest in Germany as an environmental technology location. With the 'Green Talents' competition, we can help ensure that promising new environmental technologies are deployed more quickly", said Federal Research Minister Annette Schavan, patron of the Green Talents competition.

"This competition is all about taking on joint responsibility for our future," she added.

Germany is one of the world's leading environmental technology locations. In early September, the Green Talents will visit German universities, research institutes and companies and get to know exemplary projects from different fields of technology. There will also be a symposium at which the Green Talents will meet young German scientists. Jury member Professor Hans Joachim Schellnhuber, Director of the Potsdam Institute for Climate Impact Research and Chairman of the German Advisory Council on Global Change (WBGU), said:

"The innovative spirit of young scientists is a basic prerequisite for the Third Industrial Revolution, which we are about to face. If we want to meet this challenge successfully, we need all the fresh ideas we can get."

Strong partners in environmental research, South Africa and Germany have reached a high-level political agreement to conduct a strategic dialogue on research and sustainability. Cooperation between the countries includes a range of different research topics. Through its funding programmes, the BMBF supports projects in water research, climate research, energy research, biodiversity research, Antarctic research and marine research.

The 'EnerKey' project is an example of a successful German-South African collaboration. It focuses on finding and implementing innovative solutions for urban energy supply and use in order to promote sustainable development in the South African region of Gauteng.

The winners and their fields of study for Green Talents – The International Forum for High Potentials in Green Technologies the competition were:

Juliana Aristéia de Lima, Ph.D., State University of Campinas, Brazil Research focus: Sustainable management in the chemical industry; Akintunde Babatunde, Ph.D. (Nigeria), University College Dublin, Ireland Research focus: Wastewater treatment; Saumita Banerjee, M.E. National Environmental Engineering Research Institute Nagpur, India Research focus: Biotechnology for the use of biomass as a renewable energy source; Antonio Carlos Caetano de Souza, M.A., São Paulo State University, Brazil Research focus: Fuel cells and the use of biomass as a renewable energy source; Nuwong Chollacoop, Ph.D., National Metal and Materials Technology Center, Thailand Research focus: Biofuels; Caetano Dorea, Ph.D. (Brazil), University of Glasgow, UK Research focus: Water and environmental engineering; Natalia Konstantinovna Fisher, Dipl. Ing., Russian Academy of Sciences, Russia Research focus: Treatment of groundwater and untreated water; Kerem Güngör, Ph.D., Abant Izzet Baysal University, Turkey / University of Wisconsin-Madison, USA Research focus: Biological systems engineering; MA Xingmao, Ph.D. (China), Southern Illinois University Carbondale, USA Research focus: Remediation in the context of bio- and nanotechnology; Carlos Alberto Martínez-Huitle, Ph.D. (Mexico), Federal University of Rio Grande do Norte, Brazil Research focus: Wastewater treatment and electrochemistry; Aluwani Nemukula, Ph.D., Durban University of Technology, South Africa Research focus: Use of biomass as a renewable energy source; Nihar Ranjan Samal, Ph.D., National Institute of Technology Durgapur, India Research focus: Water and wastewater treatment; Sharifah Rafidah Binti Wan Alwi, Ph.D., Technological University of Malaysia Research focus: System analysis; Yang Bo, Ph.D., Shenzhen University, China Research focus: Water technologies; Zhou Minghua, Ph.D., Nankai University, China Research focus: Water and environmental engineering

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Mobile devices need malware protection

Many companies in South Africa are starting to roll out mobile devices to boost the productivity of their workers. However, the lure of empowering employees and making them more efficient by using smartphones should be balanced with the need to secure the information that can be accessed on them according to Deon Liebenberg, regional director of Research in Motion.

He warns that network administrators must pay close attention to the new security risks that mobile devices such as smartphones are prone to, and ensure that they have the right measures in place to protect the enterprise.

One threat that is growing in significance, mobile malicious code, has the potential to run undetected on a smartphone and wreak havoc within a corporate network.

"Viruses, trojans, worms, and spyware - collectively referred to as malicious software or malware for short - can be calibrated to load themselves onto vulnerable smartphones with poor security, and run without user knowledge or action. Once they've burrowed their way into a smartphone, malware programmes can cripple the device by effectively using all its available memory," he claims.

"A more dangerous malicious programme could transmit itself across the wireless network, bypassing some of the corporate network security systems, and potentially damage or infiltrate other components of the corporate network," he says.

Most enterprises count on real-time anti-virus scanning software to prevent the transmission and proliferation of malware on computers. However, smartphones are different kettle of fish insofar as they are constrained by finite memory, processing power, and battery life. This means that the standard computer network approach of detecting malware using a large, frequently updated, local database or a constant connection to an online database has to be tailored.

Liebenberg says a better solution is to proactively prevent loading or running unauthorised code. This can give system administrators the ability to perform the following actions:

- Specify exactly which applications – trusted, corporate-approved applications only – are permitted on the device.
- Prevent third-party applications from using persistent storage on the device.
- Determine which resources, such as e-mail, phone, and device encryption key and certificate store, third-party applications can access on the device.
- Restrict the types of connections, such as network connections inside the firewall that a third-party application running on the device can establish.
- Block all third-party applications from loading onto and running on the device.

E-mail attachments that users open on smartphones can contain viruses and other malware. Proactive solutions using a malware-detecting attachment service employ renditions rather than supporting native files. In this scenario, the user can still view and manipulate the data, but the file is not opened natively on the device itself.

"This measure is designed to prevent malicious applications from accessing data on the device. If a wireless solution includes a remote, protected server to perform attachment-related actions, the attachment-processing server can still be vulnerable to attack. However, it is easier for the IT department to manage and update software on this server rather than on a smartphone, which can help prevent these attacks - plus the server is not constrained by processing power or battery life," he says.

The corporate firewall is a critical component in protecting an organisation's data and can guard against attack or malicious use. Ensuring that data sent to and from a smartphone is housed within a firewall can safeguard corporate information as encryption technology can be used, eliminating the opportunity for tampering. It is also advisable to that the wireless network is secure to maintain confidentiality, authenticity, and integrity of the data transmitted.

"To protect their mobile devices and networks from malware, CIOs should invest in mobile solutions that have security baked into the devices and supporting infrastructure," he says.

The lucky winners for 2009

PneuDrive Challenge 2009

1st University of Stellenbosch

Glass Handling Gantry Robot

Below: Richard Hamman, Theuns Greyvenstein, Thinus Ras, Jacques Visser

2nd University of the North West

Waste Management System

Hanno Snyman, Oswalds van Ginkel

3rd University of KwaZulu Natal

Cricket Bat Hardening Production System

Matthew Bronner, Dylan Scott

Special thanks to every entrant in the competition. The entries were of a very high standard.

Thanks to our judges:

Left to right: Richard Späth – Bateman (Project Manager) • Paul Strzalkowski – SEW Eurodrive (Electronics Product Manager) André Badenhorst – SAR Electronics SA (Project Manager) • Dale Oosthuizen – Abtech (Technical Director) • Chris Oliver - Festo Didactic (Sales and Development Engineer)

Information on PneuDrive Challenge 2010 will be available later this year.
Let us know if you want to be part of it!

For further information or queries please contact

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Fraud on the increase worldwide

Bernard Madoff, Allen Stanford and California money manager Danny Pang may be the latest examples of outrageous fraud. But what about the little guys? The administrator, middle manager or the sales representatives?

It doesn't take a high-profile, multibillion-dollar scandal to rock an enterprise. These days, when employers are cutting salaries, staff and bonuses – and staff are uncertain about their future job security, more employees are committing fraud, according to a study by the Association of Certified Fraud Examiners.

More than half of fraud examiners surveyed said that the level of fraud has slightly or significantly increased in the previous 12 months compared to the level of fraud they investigated or observed in years prior.

US organisations lost seven percent of their annual revenues to fraud between 2006 and 2008 at an estimated total cost of $994-billion, according to the ACFE. That's a slight increase from the five percent loss reported for the two-year period ending in 2006.

What's more, about half cited increased financial pressure as the biggest factor contributing to the increase in fraud, compared to increased opportunity (27 percent) and increased rationalisation (24 percent). Fraud can include minor things like expensing personal items or major, fraudulent billing schemes carried out over months or years.

Making matters worse, retrenchments are affecting organisations' internal control systems, according to the ACFE study. Nearly 60 percent of companies say they had experienced staff leaving the companies during the past year and more than a third said their company had eliminated some controls for preventing fraud.

The ACFE study says the warning signs of company fraud include:

- Excessive or inappropriate contact with a particular vendor, or a familial relationship between an employee and vendor. Sloppy record-keeping can also mask illicit activity.
- An employee who is living beyond his or her means or is known to be having financial difficulty may become desperate enough to commit fraud.

Fraud examiners expect that number to rise during the next 12 months, especially embezzlement cases and an increase in Ponzi schemes investigated by the SEC, says Bruce Dorris, ACFE programme director. "The credit market is drying up and there's not as much capital to raise for those types of frauds, so you're going to see a lot more reporting" as investors realise they've been defrauded.

In these tough economic times, CSOs need to harden their defences against fraud.

Embezzlement accounts for 70 percent of fraud cases. "That's employee theft across the board," from C-level execs to administrative staff, Dorris explains. That's anything from fabricating vendors to charging payments, to corporate credit card misuse, taking petty cash "down to stealing pencils, pens and notepaper."

Vendor fraud is also on the rise. Examiners are detecting fraud schemes in contract and procurement areas, where, for example, a vendor suddenly shows a marked increase in contracts over the previous year – especially low dollar amount, no-bid contracts, which may indicate kickbacks to employees.

Data fraud cases continue to concern employers, but now many employees who fear losing their jobs are using stolen client lists, marketing data or company secrets to leverage new jobs. Some 59 percent of employees who leave or are asked to leave a company are stealing company data, according to a report by the Ponemon Institute, and two-thirds of them admit to using their former company's confidential, sensitive or proprietary information for new employment.

But even without economic pressures and downsizing, data theft "certainly is an issue that has existed and continues to exist" on a daily basis, says Lisa Sotto, a partner and head of the privacy and information management practice at Hunton & Williams, which represents companies who have suffered a security breach, often by rogue employees.

Some fraud schemes have taken up to two years to detect. Illegal activity can be detected faster by having policies and procedures in place that include audits and monitoring, data access control, physical security, employee education and discreet ways to report fraud.

Surprise audits continue to prove effective in catching fraud. "If they know that corporate security is doing audits on the first Tuesday of the month, they take care of everything on Monday. But if they don't know they're coming, they're more likely to catch a fraud in place," Dorris says. Also, when employees know that a surprise audit looms, "they're less likely to [commit fraud] because the opportunity has been removed."

Employees should have access to confidential data on a need-to-know basis. Review access rights weekly or quarterly, and terminate access immediately for any employee leaving the company. Make sure everyone has the right levels of access, and mask some of the data for some levels of access. Audit log software can also document who logged into what documents and systems, when and whether they made changes or exported files.

Internal controls are effective only if they are implemented from the top down. The "tone at the top" dictates the effectiveness of any fraud control programme, Dorris advises. "If C-level officers show integrity and honesty and are forthright with employees and customers their companies become more successful and there is less likelihood of fraud."

Rules for the Pneudrive Challenge 2009

The 2009 Pneudrive Challenge, a design competition for third and fourth year university students studying engineering at eight universities, resulted in six entries from these institutions. The standard of entries was, according to co-sponsors SEW Eurodrive and Festo, exceptionally high.

Unlike the previous competition, students were provided with specific project guidelines by the organisers. These included:

- The design of a product handling application using pick-and-place technology to move products between five and 15 metres;
- Elements such as speed, positioning, accuracy, acceleration, deceleration, repeatability and cycle time are all part of the requirements;
- The designs had to be energy efficient and had to include energy efficiency calculations;
- The designs were required to incorporate a combination of SEW Eurodrive and Festo products but bonus points were allocated for groups using the SEW electric cylinder and/or the Festo proportional valve.
- Additional bonus points can be earned by groups that provide proof of successful connecting, programming, operating and testing of the issued products.
- The design submissions have to be comprehensive and detailed with an introduction, a description of the design, a list of products used, the rationale for and unique features of the design. Students had to include a project management plan, an energy efficiency report and a detailed budget proposal.
- The students were encouraged to work in groups (to a maximum of four people) and were advised to form partnerships with different engineering departments.
- All the designs become the property of Festo and SEW Eurodrive.

The winning team will be given an all expenses paid trip to Germany for a period of up to ten days and the winning institution will receive Festo and SEW Eurodrive equipment to the value of R100 000.

The judges for the competition are: Peter Erasmus, a director of Directech, Richard Spathe, an engineer with Bateman, Paul Strzalkowski, electronics product manager at SEW, Andre Badernhorst, project manager with SAR Electronic SA, Dale Oosthuizen, technical director at Abtech and Chris Olivier, sales and development engineer at Festo Didactic.

Automatic sorter

With environmental protection issues, greenhouse gases and climate change influencing the lives of ordinary people, students at the North West University (Potchefstroom Campus) decided to design an environmentally friendly machine that can be used to sort waste products according to the type of materials used.

The students, Hanno Snyman, studying for a B.Eng Mechanical, and Oswald van Ginkel, studying B.Eng Computer and Electronic, submitted their design for this machine as an entry for the 2009 Pneudrive Challenge.

According to the document produced by the two students, in order for the machine to be able to sort waste products according to material type, several tests to determine the properties of each item would have to be carried out.

To resolve this predicament the students decided to use a colour-coding process to sort receptacles (such as bottles, cans and so forth) with, for instance, glass carrying a blue marking, tin a red one and so forth. The colour code could be applied to the receptacle at a specific height, allowing it to be read by a Festo colour sensor.

The material would then be sorted and placed in bins using a pneumatic gripper mounted on a trolley powered by an electric motor.

The design comprises:

- A frame, made from steel tubing and a conveyor belt and supported by a 3 mm piece of sheet metal that is 3 m long, to allow for the placement of appropriate bins collected to sort the waste. This collection point can be extended to incorporate additional bins to collect other types of material.
- The conveyor belt will transport bottles to the colour sensor, the distance meter for sizing and finally to the gripper for sorting. The conveyor design uses a Movigear motor connected via SNI.
- The positioning arms are used to size and orientate the bottle or can so that it can be lifted by the gripper. For the object to be colour-scanned and sized, all objects should be orientated the same way and at the same place. To achieve this, the positioning arms are used to force the object against the left arm no matter where it is placed on the conveyor belt. The positioning arms can accommodate objects from 50 to 300 mm in diameter.
- The gripper's arms are designed to pick up objects that are in a horizontal or vertical position. Its arms have a rubber surface to ensure that waste can easily be picked up. The waste material is light (within 30 N of weight) and because of this the linear module will not have any difficulty lifting the object.
- To achieve a high sorting rate, the trolley must be capable of moving rapidly, but this means that the gripper is going to face

North West University

for discarded receptacles

significant linear movement. The solution chosen was to use eight wheels (on the trolley) designed to clamp the trolley to the guiding rod.

- The pulley system ensures there is a constant connection between the compressor, the linear module and the gripper.
- All the electronics for the unit are housed in a steel cabinet to protect against any liquid spillages during operation.

The sorting process has 13 different phases and starts with an object being placed on the conveyor belt before it is positioned for colour reading and sizing. It then moves past the colour sensor where it is classified before reaching the distance sensor that determines its dimensions.

The gripper is positioned in such a way that it will be in the centre of the object. The second distance sensor reads the object and when the distance is less than this sensor's height above the conveyer belt the object is in place and the conveyor belts stops.

The gripper closes its jaws over the object and, using a pneumatic arm, retracts to lift the object upwards off the conveyor belt. The trolley then moves across the suspended bar while the second colour sensor seeks the colour on the frame that is the same as the colour on the object that had been previously determined.

It stops at the corresponding point and the gripper opens its jaws, allowing the waste to fall into the disposal bin below that contains objects made from the same material. The trolley then moves back to its home position, ready for the next object to be sorted. When the third distance sensor reads a point that is less than 0,3 m, the trolley stops and the motor is deactivated. The pneumatic arm extends and the process starts again.

The system is controlled by a PLC and the students claim that it can be adjusted to suit virtually any waste handling scenario where such technology is required.

For the pulley system, the students decided not to use the standard Festo spiral tube but designed their own new system instead. The motor used to operate the trolley is connected to a pulley that rolls up the air tube. The size of the pulley must be calculated to ensure that the length of the rolled up tube is the same as the distance travelled by the trolley.

The advantage of this is that more than one wire, air tube or electrical feed can be moved without getting entangled or in the way of workers. It also increases the life of the cabling as the pulley system is highly repeatable and efficient. Using the colour positioning system is, according to the students, a neat solution and the way it works is that when the colour sensor on the conveyor belt reads a colour, for instance red, it sends this information to the colour sensor on the trolley.

On the frame above each disposal bin a colour card can be inserted so that if the trolley is transporting a red object, it reads the colour card above the trash can, compares it with the colour determined earlier and stops at the correct point.

The advantage of using this system is that one bin can be removed, another card inserted, a new bin set in place and a range of different waste materials can be sorted and picked. The conveyor system can be considerably longer than just the four disposal bins in this design and, as long as there is a colour card for the corresponding bin, the waste material will be correctly sorted.

The students estimate that such a machine will cost just over R180 000 to build.

North West University

‘Bottling’ design experience into production

A group of students from the Nelson Mandela Metropolitan University produced a detailed design concept for a bottling production line as its entry for the 2009 Pneudrive Challenge. The group comprised Linton Ritchie, David Minné, Drew van der Riet and Ahsan Ahmed.

In the introduction submitted for this competition, the students set out their goal to design an effective production line to transport empty two litre bottles along a predetermined length and then provide a method to reject and remove faulty bottles, fill and cap suitable bottles, label them, off load the filled and labelled bottles into a crate and place the crate on a conveyor.

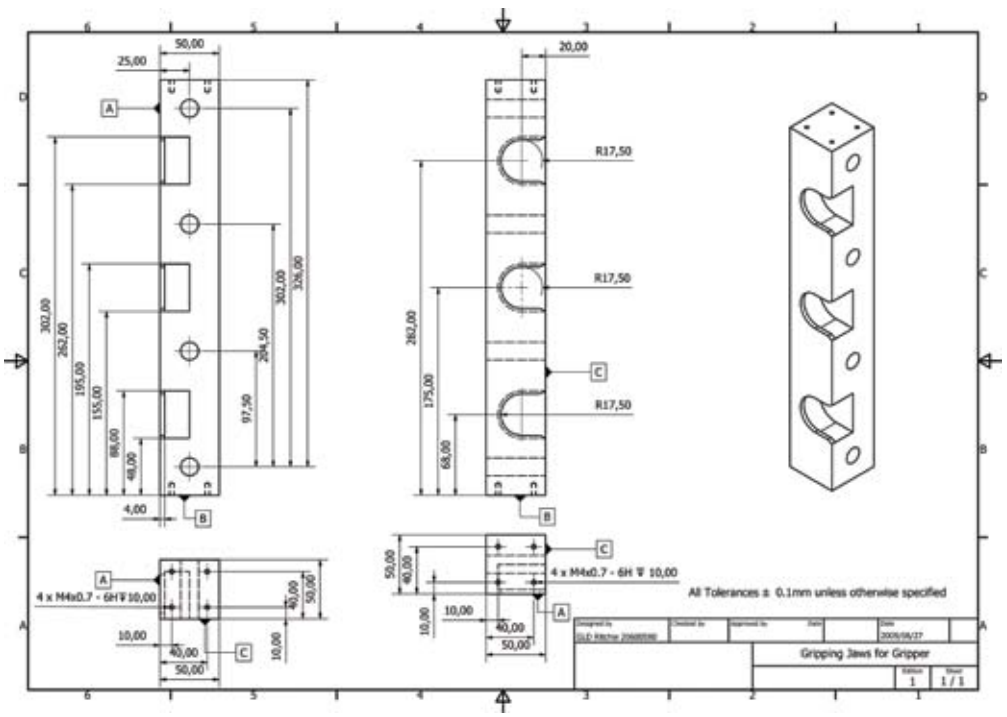
The design of the bottling plant allows it to run at variable speeds but it is capable of producing a crate of six bottles every 2,7 seconds (s) when operating at peak capacity. The design comprises:

- An input, output and crate conveyor system that allows for linear speeds of between 0,11 m/s and 0,5 m/s. The first space screw on the conveyor allows for rejection analysis and maintains a predefined gap between each bottle. An inspection unit for rejection of bottles is provided and flawed bottles are ejected by a pneumatic rejection cylinder into a rejection bin. The second spacer screw determines and reduces the gap between bottles for efficient filling of each unit.
- A rotation disk is used to complete the filling, capping and labelling of each bottle. Once the bottles have completed this process, they are diverted onto two parallel conveyor belts and using a simple, centre positioned support, bottles converge on either side of the belt in a uniform pattern.
- Once there are three bottles on either side of the conveyor belt, a signal is sent to the pick-and-place robot. The gripper attached to this robot lifts six bottles at a time and deposits these directly into a crate alongside the conveyor.
- Sensors and pneumatic blockers collect the crates while extruding rollers create the necessary friction to separate each crate on arrival at the filling point.

Two PLCs are used to control the system. The first controls the KUKA Robot for the pick-and-place mechanism and the gripper, while the second or master PLC controls everything else.

The rejection unit has a cylinder that is 110 mm long and receives feedback from the inspection process. Its process time is 0,1 s and it can exert a force of at least ten Newton (N), even though an empty two-litre bottle weighs just 65 g. The cylinder extends, when it receives the appropriate signal from an inspector, to eject the bottle into an awaiting receptacle. A 5/2-way spring return valve is used to extend and retract the rejecting cylinder.

For the crate collection, a blocker cylinder with a stroke of 125 mm and a process time of 0,1 s is used. The default position of the cylinder is in the extended position and it can withstand forces of 200 N. Spring-supported rollers are used to slow the second crate moving along the conveyor to create a gap between the first and second crate. The cylinder also uses a 5/2-way spring return valve to extend and retract the crate collection cylinder, which extends into the gap, halting and positioning the second crate.



A sensor is used to determine when a crate is in the correct position. If there is no crate, then the sensor transmits a 'false' signal, indicating that there is a gap between the crates. The crate positioning sensor sends a signal to the master PLC which sends a signal to the KUKA robot signifying that the crate is ready to be loaded. The robot gripper collects six bottles, positions them correctly and then releases them into the crate. This cycle can be achieved in 2,7 s.

The gripper design uses two fluidic muscles to close the clamp and comprises two moving end pieces and a fixed centre piece. Springs are used to open the clamps and the fluidic muscles act as dampers. There is a tolerance of three millimetres on the bottle perpendicular to the centre piece and one millimetre along the centre support.

The pick-and-place system controls the electro-pneumatics of the gripper. Clamps are closed in the default position for safety purposes so that bottles will not be dropped in case of a power failure. To control the fluidic muscles, two Festo proportional 5/3-way valves with directional control are used and this control is provided by an analogue current output from the PLC. By varying the current, the valve is varied.

For the conveyor system, two motors are used. The first, a 0,37 kW 400 V 3-phase 4-pole motor, coupled to a speed reducer and a gearbox with a step down ratio of 18.9, is used to move products along a 160 mm conveyor. The second motor, a 1,5 kW 400 V 3-phase 4-pole motor, coupled to a speed reducer and gearbox with a 9.07 ratio is used to drive the crate conveyor, which is 320 mm wide and carries higher loads.

The students chose to use the Movitrac B series of drives with an output of 0,37 kW and 1,5 kW for driving the motors at the start-up and shut-down procedure. A PROFIBUS interface was needed for communication with the controllers and this is provided as an integral part of these drives.

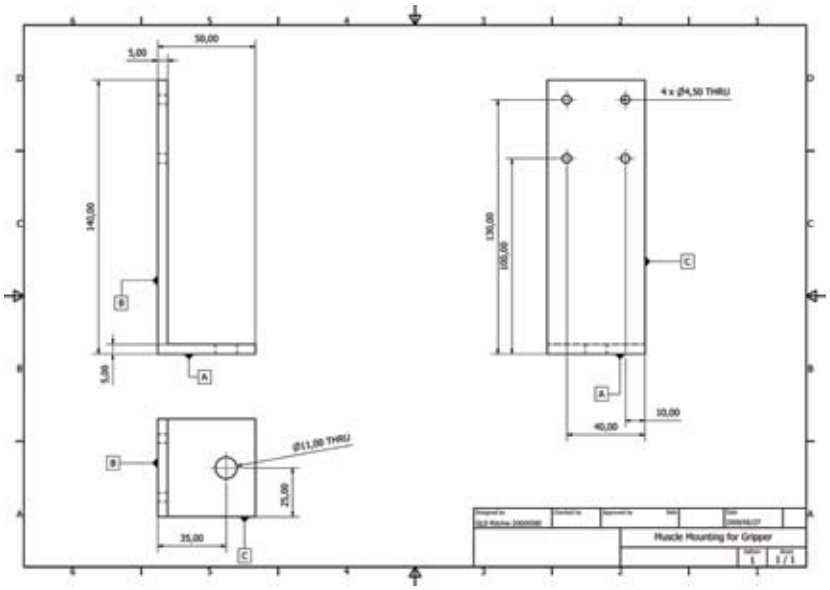
The KUKA robot, with a 30 kg payload and a 35 kg supplementary, load was chosen as it can complete a full rotation in 1,2 s, considerably quicker than the time of 2,7 s required for the picking-and-placing of the bottles. The students contend that this should increase the reliability of the robot arm. It has a positioning accuracy of between 0,1 and 0,5 mm, allowing for very fine tolerances in the design of the conveyor railings and grippers. The positioning is based on a full load at maximum rotational speed. The robot is an integrated system with all motors, control systems, drivers and hand wheels incorporated into it, reducing installation and commissioning times.

The conveyor system was a modular design from Bosch Rexroth with head drives, return units and chains in five sizes. The 160 mm and 320 mm sizes were used. The maximum tensile force that can be applied to the chains is 1 250 N. For this design it was unnecessary to use a central drive unit and SEW motors drive the conveyors.

The gripper design allows for the bottles to be securely held but is flexible enough to allow the bottles to be placed in crates that have minor damage. It is more secure than suction cups and has a larger tolerance for correct positioning during the lifting and placing cycle. The students point out that the gripper design may damage bottles if the railings are incorrectly set, making it essential for precision positioning of the railings during setup.

The spacer screws allow for quick separation of tightly-packed bottles and protect them from toppling. By changing the pitch of the spacer screws, the space between bottles can be altered. However, the students point out that the design used means the screws require custom machining and must be driven by a belt-drive motor, increasing the costs of the unit.

The total cost of this system, including VAT has been estimated at just over R1,3-million.



CPUT's modular educational tool

A storage and retrieval station was designed by a team of four students at the Cape Peninsula University of Technology (CPUT) to complement Festo's flexible manufacturing system (FMS), an education tool sold by the company and used at universities around the world.

Five different concepts were considered by the group participants, Kyle Janse van Rensburg, Karl Drögemöller, Pierre Louw and Don Seage. In terms of the submission, the students point out that the pick-and-place technology used is relatively standard but their innovation comes from how the storage facility eases the process, saving time and energy.

All five design concepts were submitted. The FMS comprises a conveyor-based assembly plant with different stations that distribute, test, assemble and sort various components.

The existing station does not have a storage facility and the pick-and-place technology conveys components to the storage facility and then conveys the desired components back to the conveyor.

The modular production system used in the Festo FMS allows users to program different stations to perform particular tasks using controllers.

According to the students, the modular production system stations assume an extremely wide range of tasks in an automated model factory.

This production system includes stations for distributing, testing, processing, handling, buffering and sorting. Complex assembly processes include tasks such as assembling a complete pneumatic cylinder comprising a body, piston, spring and end-cap.

As part of their design, the students chose a modular system with clear interfaces for mechanical, electrical and software-related tasks, allowing for modifications in any future developments.

The high modularity ensures that individual stations and modules are manageable as training workstations so that they can meet the requirements of different learning levels.

The concepts submitted by the students were:

- Concept Karl – a small, quick and efficient automated pneumatic and electric pick-and-place system controlled using a Festo PLC with a valve bank incorporated into it. The system is bolted to a motor-driven conveyor-based assembly line to assemble pneumatic cylinders. It removes cylinder housings from a rotary magazine and places them on a conveyor-based assembly line. It is designed to be used in a classroom environment. It comprises a gripper, a linear drive and a rotary storage device.
- Concept Pierre – is very similar to the Karl in layout but the operation is entirely different because instead of the rotary storage magazine being raised and lowered, the linear drive is moved to ensure the component is the correct height for the next part of the assembly. The linear drive is mounted on top of two electrical cylinders to allow for vertical and horizontal movement of the gripper, mounted on a 180° pneumatic rotator. This design ensures the correct placement of components.
- Concept Don – is similar to the other two design concepts but uses a linear drive supported by guide rails at each electrical cylinder. This allows for greater precision of the gripper when picking up or dropping off components.
- Concept Kyle – while similar to the Pierre, this design has an improved rotary storage device that allows the gripper to reduce its movement, saving energy and time. The rotary storage device uses a piston mounted at its centre to push the component from the bottom of the magazine and into the open, making it easier for the gripper to approach and retrieve it. The gripper is mounted vertically onto the piston suspended from the linear drive, negating the need for the gripper to be rotated in order to approach and handle the component.
- Concept SRS (Storage and Retrieval System) – is a combination of Don and Kyle and includes guide rails that allow for accurate placing of the gripper, improving its precision.

Having compared and evaluated the different designs, the students chose, as their final submission, Concept SRS since it is time and energy efficient and is the least expensive in terms of the components used.

According to the submission by the CPUT students, the SRS is a simple, innovative product that opens the door for students to develop their own stations. Sub-systems in the SRS comprise:

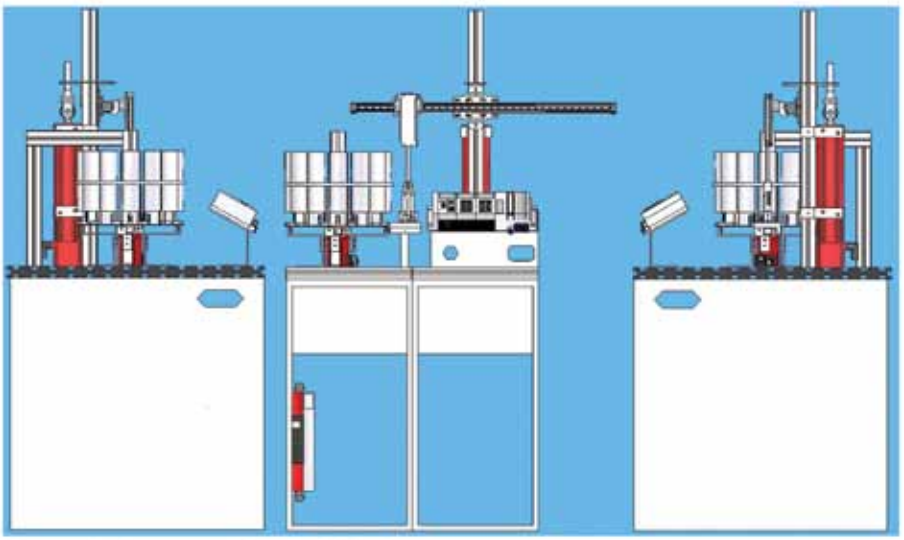
- A pneumatic gripper that was modified by attaching a sensor plate to the rear of the unit. The sensors are used to determine the colour of the component, allowing the storage device to pre-position itself to accept the part. The gripper is bolted to a piston arm via a piston-gripper connector.
- The cylinder is mounted to the linear drive via a mounting adapter made from a sheet of aluminium with a boss in its centre to locate it on the linear-mounting-adapter.
- The linear drive sub-system allows parts to move horizontally and vertically and is attached to the gripper via the mounting-adapter. A slider is mounted inside a mounting bar with a channel that

prevents the drive from toppling forwards. The vertical movement is achieved using an electrical cylinder rather than a pneumatic cylinder, which is commonly used in the classroom environment.

- The rotary storage device uses plastic, see-through tubes and the gripper drops components into the storage tubes. A base plate prevents components from falling through the tube. The components are then ejected from the tubes using an ejection cylinder. There are 12 tubes in the rotary storage device. A ring, bolted to the base plate, keeps the tubes upright and steady. The storage device is bolted to an SEW servo motor that is able to rotate so the ejected component ends up in the correct holder.
- The mounting platform is, in the words of the students, the 'foundation of the concept, pulling the facets of the design together'. The PLC valve bank and VSD are mounted to the platform. The VSD controls the servo motor while the PLC, the 'brain' of the system, receives inputs from the sensors, decides what action to take, and then sends a signal to the VSD or to the actuators and the electrical cylinder.

Referring to the market for the SRS, the students contend that because a new modular production system station is developed every two years for the World Skills Competition and then marketed to various institutions as a tool for educating technicians, the SRS would introduce a new component for the system that would be vital in technician training.

This market segment is seen as being particularly significant as it introduces emerging engineers and technicians to the SEW and Festo product ranges at a time when they are being taught and will ensure, say the students, that they are top-of-mind when, as trained technicians, they enter the workplace.



Storage and Retrieval Station.

Complete FMS.

Knocking 'sense' into a cricket bat

Students from the University of KwaZulu-Natal's mechanical engineering department devised an automatic knocking-in machine for manufacturers of cricket bats as their entry for the 2009 Pneudrive Challenge. The students, Matthew Bronner and Dylan Scott, appear to have had some experience with the tedious process of knocking-in a new cricket bat.

Referred to as the Cricket Bat Hardening Production System, it sets out to automate the process of knocking-in a new bat. Traditionally, it is a tiresome and labour intensive process using a mallet to knock the surface of the bat, compressing the fibres on the face, the edges and the toe, and knitting them together to form a harder barrier that can withstand the impact of a cricket ball typically travelling at more than 140 km an hour.

According to the students, the hardening is essential to prevent cracking or fracturing of the surface, thus enhancing the life and performance of the bat. Expensive manual machines can be used by customers who've bought a cricket bat to perform the essential knocking-in but the difficulty with these systems is that the manual nature of the process doesn't create uniform hardening.

From a marketing point of view, the students say that there is no automated cricket bat-hardening machine available on the market today and, in terms of the modular design submitted for the competition, the production system can be incorporated as a module into existing production lines. The design done by these students comprises two phases: the placement and transportation of the bat and the machining process to harden the surface.

The hardening process of the willow blade has three elements:

- Oiling – where a thin film of raw linseed oil is even applied to the surface. The oil helps to maintain moisture levels within the blade and reduce the chances of cracking or splitting. It helps to prevent water from penetrating the bottom of the blade, causing the toe to swell. A light coat of oil must be applied to the face, edge, toe and back of the blade, avoiding the splice.
- Rolling – to provide a smooth, flat surface on the blade by compressing the wood fibres and toughening it for use. It prevents seam marks and minor indentation on the blade that may, in time, damage it.
- Hardening – otherwise known as knocking-in, which simulates a hard cricket ball hitting the blade squarely. Using a manual process it is necessary to start by hitting a cricket ball softly but repeatedly for about two hours. Then a bat mallet, a cricket ball attached to the end of a stick, is used to repeatedly strike the face of the bat for about eight hours. An important part of this process is to knock-in the edges by turning the bat along the handle's axis and hitting the edges at about 45° with the mallet or ball.

The students (possibly because they've had to go through this process themselves) decided that a controlled, mechanised and automated process for hardening the surface of a cricket bat would be infinitely more desirable than the current processes.

After a detailed examination of the design, engineering and tooling specifications – where four or five concepts at a time were tested – the design of the machine was finalised. It included the pick-and-place stipulation laid down in the rules.

The first step is to pick up a cricket bat and place it in the correct position before moving it to the knocking-in position. Thus the X-axis of travel moves the bat a distance of seven metres. The function of this axial movement is not only transport, but the axis is used for performing tasks on the bat. For instance, the bat will be placed on a carriage, transported to the knocking-in section and then passes will be made up and down the face of the bat while incrementally changing to achieve an even knocking-in over the entire face.

Because of the forces applied to the bat, the track system must withstand forces in all directions other than that of the X-axis itself, which is restricted by the X-axis drive unit. To achieve this, students selected four plain linear bearings implemented in a rectangular configuration from torsional or linear forces.

The carriage itself has two round crossbars to allow the upper carriage to travel along the Y-axis. One diagonal cross member, made up of flat bars, will be used to prevent deformation of the rectangle. On each of the four corners, the frame is mounted on a bearing housing, which also provides a mounting point for the cross round bars.

The open plain linear bearings are fitted on a supported round bar that is fixed to the ground. The round bar is fastened to the support track and the support track is, in turn, fastened to the ground by means of a Rawl bolt, or chemical anchor, into the factory floor (usually a concrete screed).

Movement along the Y-axis by the upper carriage is needed to ensure an even knocking-in process over the entire surface and not just in one line down the centre. The movement is achieved using two round bars in the lower carriage. They are similar to those used in the X-axis but are not supported along the length, rather on each side. This is possible as the face of the bat represents a short distance. The rules of cricket state that a bat can never be more than 108 mm wide. In order for the knocking-in machine to be used on all sorts of cricket bats, a travel distance of 150 mm is sufficient.

The upper carriage frame is made from four closed linear bearings,

also in a rectangular configuration, joined by various flat bars and rectangular tubing to form a structure on which a bat negative frame can be placed. Bearing housings, available off-the-shelf are used to connect the upper and lower carriages and to provide a connection to the frame. The mounting brackets for the bat negative have been raised by means of a triangular frame to allow the integration of actuators needed to move the upper carriage in the Y-direction and to twist the bat negative about the X-axis.

When the carriage arrives at the point where the bat is picked up, linear drive lowers suction cups onto the surface of the bat. These cups are programmed to apply negative pressure to fix the bat to the system automated by the linear drive. The linear drive lifts the suction cup module, holding the bat, while the carriage moves away to the pick-up point.

When clear of the pick-up point, the linear drive lowers the bat into position on the bat negative and the suction cups release it. It is then lifted into position so the various knock-in procedures can be performed. The same process will be programmed in reverse at the drop off point, lifting the bat from the negative and placing it in its final position.

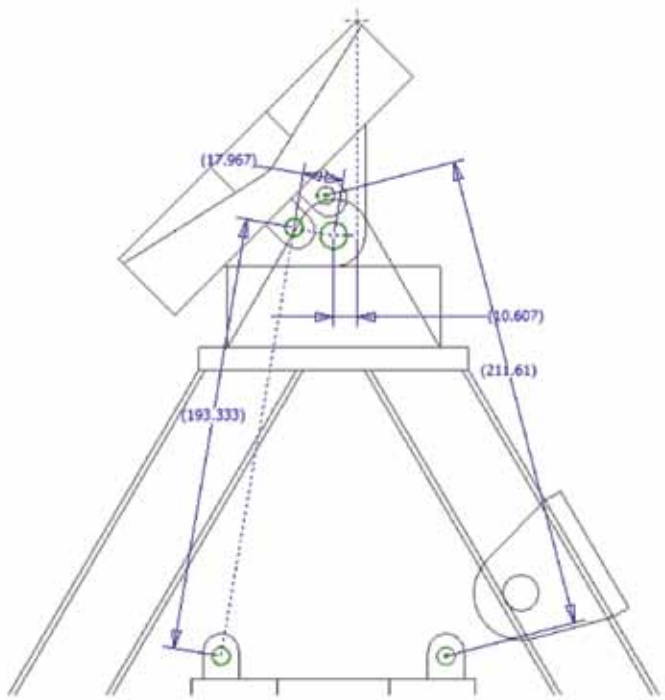


Diagram illustrating the geometry pertaining to the mechanical connections and forces in the bat tilting mechanism.

During the knock-in procedure, the bat must move through a 45° angle to prepare the edges and this is achieved by twisting the bat and the knocking-in device. This is done because the knocking-in mechanism has to be rotated about the Y-axis to knock-in the toe of the bat. Moving the mechanism about two axes would have been more complicated.

The actuators chosen for this design comprise two fluidic muscles, controlled by a proportional valve. On the input of the proportional valve there are three inputs, an upper and lower limit, and an analogue voltage set point input. When knocking-in the bat at 45°, the set point analogue voltage input is set to the upper value and when the bat has to be positioned at -45°, the input is set to the lower value.

This holds the bat firmly at 45° or at -45°, as built into the design. When operating at 0°, the bat is flat and knocked-in at the normal angle to the bat face plane and the input value is switched to a value that can be calibrated using a potentiometer at a midpoint between the upper and lower values. This allows easy calibration of the angle and provides firm support as there is equal pressure in both fluidic muscles.

For the rolling and knocking-in process the cricket bat is mounted in the trolley system and moved to the first machining station. This provides the pre-hardening of the surface through lowering a roller onto the surface at a low pressure as specified by the controller (so as not to cause an indentation). The pressure can then be increased according to the programmed instructions signalled to the controller.

The trolley is set in motion below the bat and moves in the axis perpendicular to the shaft of the roller (about 650 mm of movement) depending on the size of the bat. When it reaches the end of the sweep it is sent a signal to reverse the motion and roll the bat back up. While this is being done about 20 ml of raw linseed oil is sprayed over the bat after every second pass. This lubricates the roller and helps the willow fibres in the surface knit together.

The bat is rolled between ten and 20 times. It is important to bear in mind that if rolled too many times at too high a pressure, the bat will be over-compressed and less effective.

Once the first rolling cycle is complete, the roller is lifted off the surface and the bat is tilted by the trolley so that the edges can be rolled at least ten times. The roller then retreats and the trolley tilts the bat in the opposite direction to roll the other edge ten times.

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The trolley then levels the bat, raises the roller and moves to the next machining platform.

The bat is correctly positioned below the vertical hammer at a point just off the splice. The hammer is lowered to the surface and the bat position checked, before the actuator reverses it and loads the first knock, using the desired pressure to create a circular indentation on the blade. To ensure the bat has an even surface without ridges or valleys, the indentations must intersect in a circular pattern.

The hammer retracts when pressure is applied to the reverse side of the piston inside the cylinder. This reloads the cylinder and allows the trolley to precisely reposition the bat. The bat is moved only along the Y-axis at a distance of the radius of the indentation circle, ensuring that the next circle will adequately overlap the first. The radius is a function of the depth of penetration and so the pressure.

This action continues down the length of the blade.

Once the centre has been compressed, the trolley positions the bat in a negative radius length along the X-axis from the centre line. The first knock of a new row of indentations is then created on the bat's return run to the original starting point. Again, a suitable overlap is created. The knocking continues up the bat surface until the Y position of the original knock. The process is continued until half the width of the blade has been compressed. The trolley is then signalled to place the bat in the starting position for the knocking-in of the remaining half and the process is repeated on that section of the bat.

Once the face of the bat has been knocked-in, the edges need to go through the process. The bat is tilted along the axis of the handle by 45° and the left edge is raised for compression. Because the rolling process has been completed there is a small flat surface with no corners. The same process for the face of the bat is now used on the first edge.

Then, when the trolley reaches a pre-programmed position at the end of the bat a second programme is activated. This opens a valve on the valve terminal which retracts the compact pneumatic cylinder hinged to the sleeve mechanism of the knocker, forcing the knocker to rotate by 45°. The knocker is now positioned to knock the toe.

The knocking continues for the toe, with the knocker moving with precision to the next point to ensure uniformity of the surface of the toe. Once the toe has been knocked in, the compact cylinder lowers the knocker back to 90° and the previous programme is restarted. The bat is rotated by 45° and knocking continues along the other edge. Once complete, the surface, edges and toe have been sufficiently hardened and the bat is lifted by suction cups to move off the production line.

In summarising the submission made for this competition, the students conclude that the objective was to design a pick-and-place machine to move an object between five and 15 m, incorporate Festo and SEW products in the design, and to show an understanding of implementation and function in a materials handling environment.

"The design we chose must provide a high standard of repeatability, precision and accuracy and to achieve this we decided that the bat must not be touched by human hands. When assessing the final design it was evident that it would work, but would be extremely expensive. In a real-life situation it may be possible to reduce costs by using some parts of the design and swapping others for human involvement. This would still achieve a highly repeatable and accurate knock-in at a more reasonable price," the students wrote.

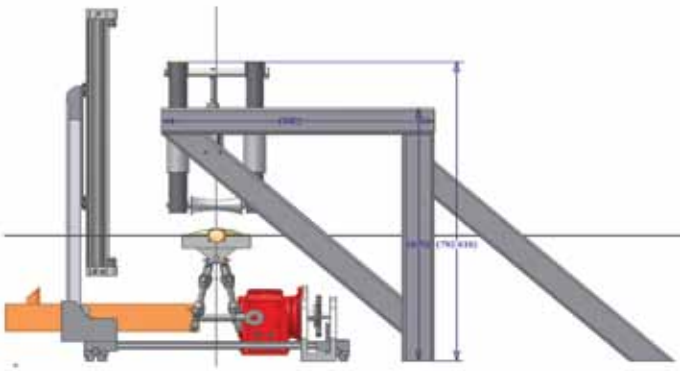


Figure (158)

Figures (158&168) represent the final dimensions of both machining platforms. Both frames m
of a 600mm cantilever beam that ensures that there is suitable clearance for the suction device t
past the frame. The two heights, although slightly different further ensure clearance fr
positioner, there is +/100-200m of space above both tools.

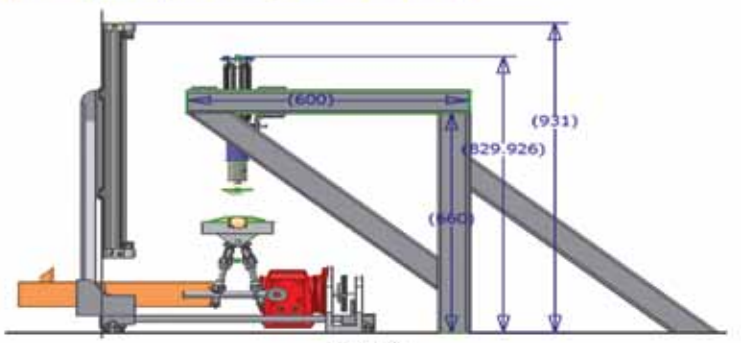


Figure (168)

Planter could plant a forest in a week

Students from the University of the Witwatersrand have designed a self-propelled tree seedling planter, capable of planting at the rate of a seedling every six seconds, for the 2009 Pneudrive Challenge. The seedling planter uses pneumatic and electric drive products from Festo and SEW Eurodrive.

The group, comprising John Dickens, Steven Dinger, Matthew Song and David Buchalter, have designed a machine that can handle seedlings with a gross mass of up to 4 kg with a base diameter of 170 mm and a height of less than 500 mm.

In terms of the design, the machine comprises a basic aluminium frame with a platform inclined at 10 to allow the seedling to move downwards under its own weight to the seedling-dispensing mechanism.

The dispenser uses a rotating cup and a trap door mechanism and is actuated by a Festo semi-rotary pneumatic drive with a strong angle of 60 . The frame is fitted to two skid-steered tracks to provide stability and traction. These tracks are individually driven by two standard SEW gear-motors.

The auger is attached to the front of the frame and is used to drill a 170 mm deep hole in just two seconds. The seedling planter operates on a battery pack comprising ten 12 V lead-acid batteries that are connected to a DC-DC converter that steps up the voltage to about 650 V and sources the inverters.

Movidrive inverters are used to drive the three gear motors. To increase energy efficiency, a regenerative braking system has been installed. The students point out in their submission that the DC-DC converter is similar to those used in many hybrid motor vehicles such as the Lexus, which uses a 228 to 650 V DC-DC converter in conjunction with two inverters to run the main traction motors.

To ensure that the machine is commercially competitive it has to be able to plant at least 600 trees an hour, or one tree every six seconds. The machine has been designed in such a way that the soil auger will drill holes to a depth of 170 mm every two seconds and the seedlings will be inserted into these holes in 2,5-litre bags that will biodegrade naturally.

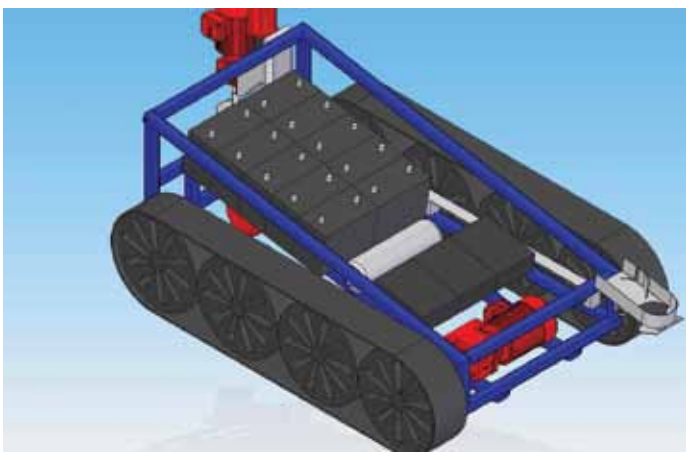
This design was chosen to circumvent the need for complex machinery to remove a bag from the seedling that has been planted. The seedling bags are approximately 170 mm in height and 170 mm in diameter and in order to drill a hole to that depth the students have used a 3 kW, 250 rpm gear-motor.

The auger unit is driven into the ground by a SEW electric cylinder with a 350 mm stroke and 200 mm/s maximum speed. Students have calculated that the stroke of the cylinder will be sufficient to drill a 170 mm hole, retract from it and, at the same time, have the necessary ground clearances. The top position of the auger can be adjusted for difference in terrain to provide a maximum ground clearance of up to 180 mm.

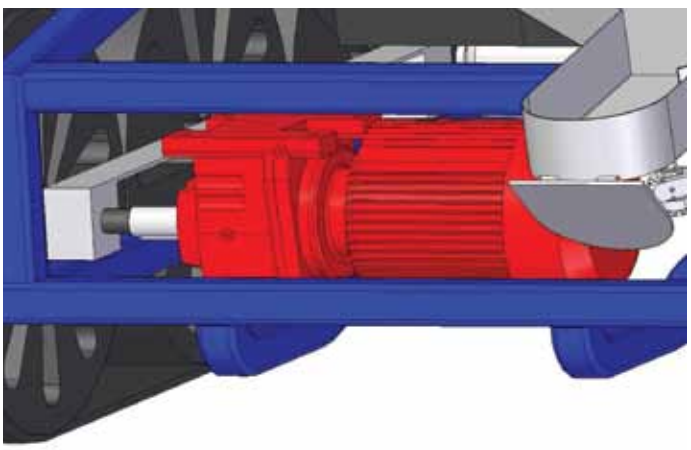
The students point out that as it takes two seconds to drill the hole, this leaves just four seconds to move, drop the seedling accurately into the hole and move to the next position so that drilling can begin if it is to achieve the required planting rate of 600 trees an hour.

The recommended spacing between trees is between 1,8 and 3,7 m. In order to cover these distances, the auger is driven from the front of the machine and the seedlings are planted from the rear of the unit. So the operation of the planter includes drilling the hole, moving forward by its length of 2 m, planting the seedling and then moving the remaining distance of 1,7 m (maximum) to the next planting position.

To achieve this, the motion of the planter is divided into three phases:



View showing the internal components of the seedling planter.



View of the motor driving the left track.

- The acceleration phase
- The constant speed phase
- The deceleration phase

Because the mass of the planter is large and the maximum speed of 5,44 km/h is low, the force required to accelerate the planter is assumed to be much greater than the frictional force. In formulating the design, the students decided to keep the three speeds equal. The acceleration was chosen to be the same magnitude as the deceleration phase. Moreover, the acceleration was equal to the movement of the planter between drilling the hole, planting the tree and moving to the next position.

The students assumed that in a worst case scenario, if the planter had to plant seedlings 4 m apart in a time of four seconds, the required acceleration would be 2,25 m/s. Using an assumed weight of the planter at 1 500 kg, the force required to accelerate the planter would be 3 375 N.

As the planter is driven by two tracks, control of the vehicle is simplified while its traction remains good, particularly in loose soil, which is what the students have assumed the working conditions to be.

A further assumption is that the machine will be planting seedlings in a straight row, so to accelerate in a straight line each track has to provide half the force or 1 690 N. The wheel driving the tracks has a 250 mm radius, so the torque required at the wheel is 423 Nm. The students took into account the frictional torque and calculated that a gear-motor with 500 Nm torque would be required for each track.

Using a 4 m distance between the trees, the students calculated that the planter would need to accelerate at 2,25 m/s for 0,67 s, translating into a top speed of 1,5 m/s equivalent to an angular speed of 57 rpm of the drive wheel.

Adding in a safety margin, the students decided to use a 4 kW 76 rpm, 500 Nm helical gear motor fitted with a 1 V sine/cos encoder, which would allow the planter to be accurately positioned.

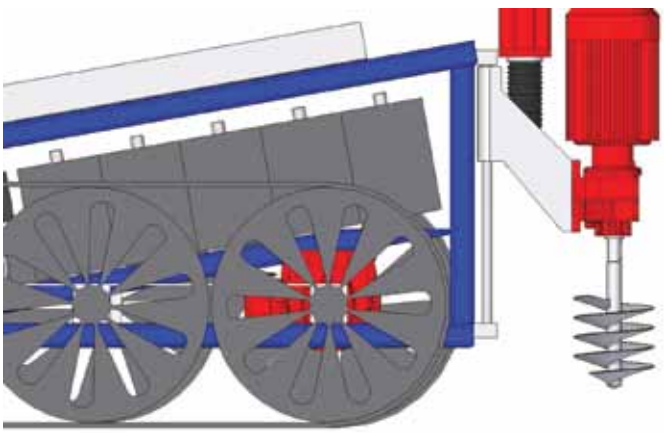
The machine is capable of carrying an inventory of 50 seedlings with a mass of 4 kg or less each. The inclined platform used in the design allows the seedlings to move under their own weight towards the dispensing mechanism. The dispenser consists of a trap door and a latch and cup angled at 60 to ensure that only one seedling is loaded at a time.

The trap door is spring-loaded and returns to its position once a seedling has been placed. The latch is rotated into place by a semi-rotary drive and the procedure is repeated when the next seedling moves into position due to the clearance created by the cup being rotated.

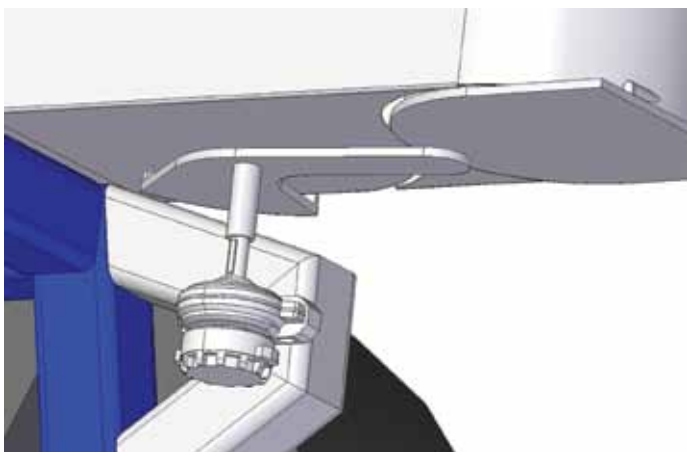
A 10 litre compressed air cylinder is used to power the pneumatic drive at a pressure of 12 bar, sufficient air capacity to plant the 50 seedlings. A regulator operates the semi-rotary drive at six bar, providing the required torque of 2 Nm. The semi-rotary drive turns at an angle of 60 with an air consumption of 33,3 ml per rotation.

The semi-rotary drive makes two rotations of 60 for each seedling that is planted and this means that the total air consumption to plant 50 seedlings is 3,3 litres, below the capacity of the cylinder, ensuring that the pressure of six bar is maintained.

The cost of building the seed planter has been estimated at almost R140 000.



The auger retracted to its highest position.



Bottom view of the seedling dispenser when locked closed.

Umshini Khulu Wami wins

A remarkable design for a glass handling gantry robot has won the 2009 Pneudrive Challenge and the four students from Stellenbosch University will soon be jetting overseas to Germany for a visit to the Festo and SEW Eurodrive offices for up to ten days.

Stellenbosch University – which won the competition last year as well – will receive products to the value of R100 000 from Festo and SEW Eurodrive.

The *Umshini Khulu Wami* – designed by Thinus Ras, Jacques Visser, Richard Hamman and Theuns Greyvenstein – takes its name from a Zulu phrase meaning My Big Machine and is a play on the controversial anti-apartheid song *Amulet' Umshini Wami* sung at public gatherings by President Jacob Zuma.

More than 90 percent of the world's glass is produced using the float glass process, a process based on floating molten glass on a bed of molten metal. The combined action of gravity and surface tension on the molten glass and metal results in the production of a glass sheet that is flat, parallel, uniform in thickness and free from imperfections in the surface finish. It is a continuous manufacturing process, producing a strip of glass that is typically between three and seven metres wide.

Because this is a capital intensive process, most factories have a large area where the glass is produced before it is cut to more manageable sizes, typically three by two metres.

The large sheets are cumber-some, difficult to transport, brittle and vulnerable to abrasions or cracking while being transported.

Investigations by the design team indicated that the most common solution for handling large sheets of glass is to use a manually operated gantry crane (the less expensive but more risky option) or an articulated robot made by German robotics manufacturer, KUKA, which is extremely expensive.

The students chose, instead, to design a multi-purpose industrial robot that would be a mix of the manually operated gantry crane and an articulated industrial robot, resulting in the design and development of the *Umshini Khulu Wami*.

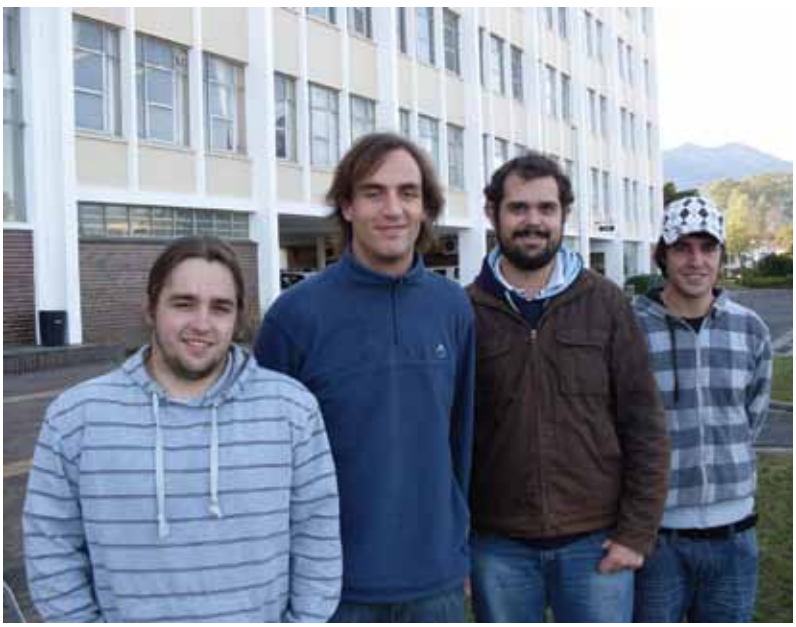
The design goals for the machine were:

- To offer greater capabilities and faster operation than a gantry crane.
- Be substantially less expensive than an articulated robot.
- To provide an alternative solution for factories that do not have the repetitive production capacity to justify an articulated robot but need a faster option than a gantry crane.
- The design should allow for retrofitting of the industrial robot to existing gantry cranes and it should operate using controls that are similar to those currently used on a gantry crane.

In terms of the design, the UKM can handle sheets of glass up to 2,5 by 2,5 m in size with a mass of up to 500 kg. The UKM must be able to move at speeds of up to 3 m/s with acceleration of 3 m/s along the inner and outer rails of the gantry.

The outer rails are supported by concrete or brick pillars or by brackets bolted to steel columns in the factory roof. In identifying how the machine would need to perform, the students examined the customer requirements and resolved to design a machine that could:

- Transport and stack large sheets of glass.
- Reach cycle times that are faster than those achieved from a manually operated gantry crane.
- Be less expensive than an articulated robot but adaptable enough to fulfil multiple roles in the factory environment.
- Be easy for a skilled technician or operator to re-program and operate in cyclic or fully automated mode, in manual crane mode or in a co-ordinate-based manual mode.
- Be easy to maintain and adaptable enough to be set up in different factory layouts using a modular design approach with each axis



The winners of the 2009 Pneudrive Challenge: Richard Hamman, Theuns Greyvenstein, Thinus Ras, Jacques Visser

Stellenbosch University

Pneudrive Challenge

acting as an independent system.

The students formulated a range of design specifications including key functions that covered:

- The main and minor axes translation sub-systems are used to move the glass.
- Vertical translation sub-system are used to lift or lower the sheets.
- The rotational sub-system is used to rotate a sheet.
- The glass-gripping sub-system that attaches to the sheet, transports the glass from one point to the next and then loosens it.
- A control system to ensure safety of the product and the operator.

The main axis translation sub-system moves the glass along an X-axis, constraining the translation along the Y and Z axes as well as allowing for rotation around all axes for the system as a whole.

Because of the large loads and long lever arms needed to provide 8 m of travel along a minor axis, it was necessary to use an 8 m unsupported inner I-beam constructed in such a way that it would support its own weight and the mass of the glass sheet along with all the other sub-systems, which meant that structural strength and stiffness were important design considerations.

The outer beams carry the entire load for the device and beam positions are likely to differ from one factory to the next. However, the outer beams must be able to take significant loads in all directions as a single beam is in shear and bending in two planes, has an axial load and is in torsion. Analysis of different profiles revealed that open sections lacked sufficient torsional rigidity and resulted in large angular deflections, which were undesirable as they decreased the accuracy of the setup.

Because of this a box profile was chosen for the outer beams to provide torsional stiffness. To connect the outer beams to the inner beams a guide rail and bearing block system was chosen because:

- It provides a low coefficient of friction, which increases the energy efficiency of the device.
- The bearings have excellent strength and can resist forces and movements in all directions.
- Wheels running on a flat surface provide very poor resistance to transverse loads.
- In order to ensure stability in all directions, three point contacts were required, indicating that at least three sets of wheels would be used.

Bearing blocks and guide rails with sufficient strength were only available from Rexroth, which is what the students used.

For the drive sub-system, the students looked at various options and chose a rack and pinion system rather than a wheeled system. The reason for this is that it offers greater accuracy for positioning, to limit its backlash, which is a function of the centre difference. To minimise backlash the students decided to use spacer plates machined to the correct size and then chose helical gears for simplicity and accuracy. Thus, the properties of the gear train provided a pressure angle of 20° and a helix angle of 25° with 14 teeth on the pinion and a face width of 28 mm.

A SEW servo motor was used as the actuator for rotation of the gear because of its controllability and accuracy and it provided the required velocity of 3 m/s and acceleration of 3 m/s, which was within the design specifications. Due to the helical gearing used, the students found the gears experienced combined radial and axial loading of a high magnitude. Moreover, a high degree of stiffness and running accuracy was also required from the bearings and students chose to use a double row of angular contact ball bearings supplied by SKF.

The drive brackets and drive tube assembly are bolted and welded together, machined in such a way as to be perpendicular to each other. Spacer plates are then mounted between the drive brackets and the drive tubes and, as these are customisable components, machined to the correct size once the rest of the assembly is in place.

A base plate allows for the mounting of all other parts to the box beam and the wedges and track are bolted to the base plate. Wedges are used for the accurate mounting of the guide plate. The minor axis translation system is virtually identical to the main axis translation system but due to the reduced loading, components are smaller. The identical drive units are used for both the main and the minor axis systems.

The vertical translation sub-system provides the actuation force for elevation of the end-effecter and the load. The end-effecter is attached to a square tube that runs through square bushings, which are subject to large loads and have to be made to specification.

The main tube has to resist the torque generated by the rotational sub-system and transfer it to the rest of the system. Square tube was used as it can locate to its bushing and resist torsion, is strong in bending and facilitates resistance of the inertial loads generated by acceleration or deceleration of the payload.

For the vertical assembly it was decided that the most viable linear actuator, based on the design considerations of rigidity, contribution to dead-length of the main tube and functionality, was a ball screw.

The configuration causes the least amount of additional dead-length but it is vulnerable to buckling. Servo motors were chosen for their accuracy and controllability. This is because, to achieve the speed and acceleration specifications the motor had to be rotating at an unattainably fast speed and, even using the fastest available servo motors (4 500 rpm) needed to satisfy the torque requirements, the design specification could

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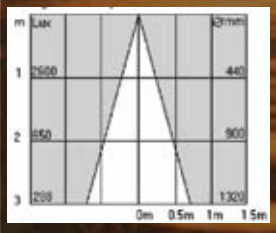
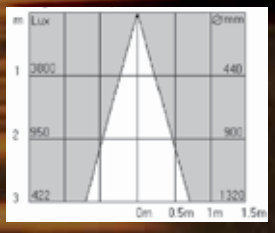
3,6 W LUMINOUS INTENSITY DIAGRAMS

MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
15 degree beam spread warm white 2800 - 3000 K

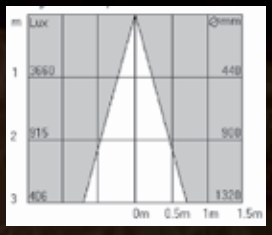


MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
15 degree beam spread soft white 4000 K

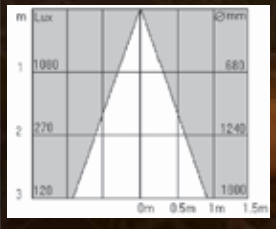


7W LUMINOUS INTENSITY DIAGRAMS

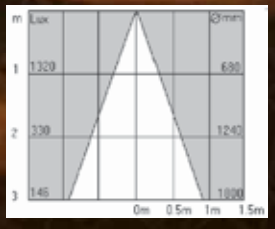
ARIII LED retrofit - source 3 x Cree or Osram LEDS - 700mA driving current
15 degree beam spread warm white 2800 - 3000 K



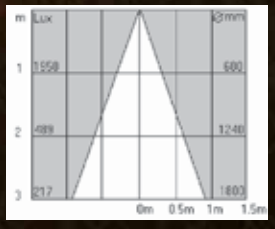
MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
30 degree beam spread warm white 2800 - 3000 K



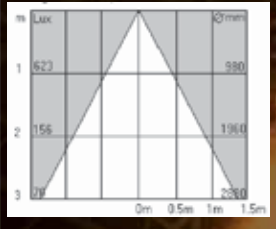
MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
30 degree beam spread soft white 4000 K



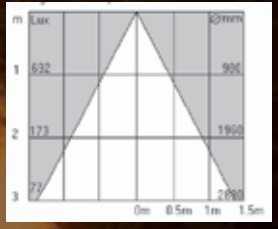
ARIII LED retrofit - source 3 x Cree or Osram LEDS - 700mA driving current
30 degree beam spread warm white 2800 - 3000 K



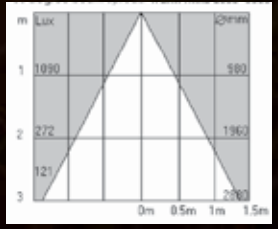
MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
50 degree beam spread warm white 2800 - 3000 K



MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
50 degree beam spread soft white 4000 K



ARIII LED retrofit - source 3 x Cree or Osram LEDS - 700mA driving current
50 degree beam spread warm white 2800 - 3000 K



For soft white 4 000 K, add 10% light levels.

not actually be met.

A decision was made by the students to accept the reduced performance of an acceleration of 0,4 m/s2 and a velocity of 0,416 m/s.

Because the flange that links the tubing to the translation ball screw is subjected to large bending movement, a particularly thick flange was required and had to be made by water-jet cutting a 40 mm plate and machining it to the correct profile.

The rotation sub-system is responsible for the azimuth and elevation rotation as well as the transfer of forces from the end-effecter to the rest of the system. The end-effecter arm connects the suction array to the main gantry system and the rotation and elevation systems are mounted on this arm. It rotates with the suction array and glass to ensure that the sheet is not obstructed by the motors or electric cylinders.

The end-effecter arm is made from rectangular tubing with a pulley housing welded onto the arm. For the calculations, the students assumed that the entire load would be carried by the vertical tubing but this is not so as other parts of the structure do carry some of the load.

A servo motor is used as the actuator for the rotation while a pulley system is used to transfer motor torque to the end-effecter arm via a timing belt. The students justified the use of the pulley system for the following reasons:

- The gearbox requires an idler gear, shaft and bearings and this makes it more complicated, whereas the design specification requires that the complete motor and transfer system rotates with the glass sheet, making accurate machining for proper alignment even more complex.
- Pulleys can work over a distance and do not require an accurate centre distance, greatly simplifying machining.

The complication with a pulley system is that it uses friction to transfer motion and slipping can occur so the students chose to use a timing belt to prevent slippage. To keep the design simple, the students decided to insert slots on the motor mounting, allowing it to be moved and vary the centre distance to achieve the required tensioning.

The device is welded to the structure and then machined to the correct tolerances.

SEW electric cylinders are used to control elevation so that the machine can successfully align with the glass sheet, prior to lifting it using the glass gripping sub-system. This system uses a three-by-four array of Festo suction cups, supported by a steel structure. All the force used to accelerate the sheet of glass is transferred through the joint between the suction array and the end-effecter.

The welded plate assembly supports the 12 suction cups, each with a diameter of 150 mm, and a vacuum generator is used to create the vacuum that pulls the sheet closer to the plate once suction has been applied.

To control the machine, various user inputs are required, some with a single piece of data and others with multiple pieces of data. The single inputs cover, for instance, the cycle time and the pause time between each cycle specified in seconds, the initiate and terminate cycles, the multi-cycle, apply, relieve or set vacuum and the single co-ordinate for travel line. Multiple data controls cover the pick-up position, the place position and the properties of each sheet.

In describing the operation of the UKW, the students outlined the different controls as follows:

- Cycle on command, a user-friendly, operator oriented control scheme using a single- or multi- cycle on command.
- The single command cycle is very basic allowing for one table to be loaded from one stack of glass.
- The multi command cycle allows the gantry to be activated when a button on the cutting tables is pressed. The gantry fetches a sheet from the corresponding stack and places it on a table and returns to a neutral, but predefined position, waiting for the next button to be pressed.
- Cyclic control. This is used when the cutting tables are automated and can be loaded in a pattern using a predefined time schedule and applies to single table cycling, multi table/ single destination cycling and multi table/multi destination cycling.

In summarising the advantages of the machines, the students contend that it achieves or exceeds all the stated goals while remaining a simple and elegant solution to handling large sheets of glass. Its modular design means that each axis can be operated independently and the design is adaptable for different roles in the factory.

Servicing is straight forward for any technician trained to work on a gantry crane. The device is more expensive than originally envisaged and, as with all automated machines, there is a risk of injury if it is operated in an area that is accessible by workers.

The students claim that the UKW fulfils a real business need, makes innovative use of the proportional valve, is a modular and adaptable device that is energy efficient and requires a relatively low level of technical expertise to service and operate.

Stellenbosch University

Watt Says

Dear Mr Hartdegen,

The WATTnow publication contains an impressive variety of technical articles that cover many subjects that are of interest to engineers. Unfortunately (fortunately ?), the result is, I am sure, that your readers read the publication rather more attentively than most, to ensure that they gain the maximum benefit from the articles.

Since WATTnow is the official magazine of the SAIEE, it must be assumed that most readers have a bit more than a fundamental knowledge of the basic sciences. Therefore, it is essential that the content of articles be factually correct. When an author makes a statement, or statements, that are clearly incorrect, then the credibility of the entire article becomes suspect, and ultimately the credibility of the magazine may be affected.

First, in the article entitled Creating an artificial 'Big Bang' and a man-made star.

At the bottom of the page the statement is made that: "The beryllium sphere...contains deuterium (hydrogen with one molecule) and tritium (hydrogen with two molecules)." This is not acceptable. Deuterium and Tritium are isotopes of hydrogen, containing one and two neutrons in their nuclei respectively. (References: The Natural History of the Universe, by Colin A Ronan, and Websters Seventh New Collegiate Dictionary.) The use of the word molecules is incorrect.

Secondly, on page 44, "Volcanoes, not meteors may have caused mass extinction."

At the bottom of the first column the writer states: "Some scientists believe, for instance, that the meteorite that struck South Africa and created the Vredefort Dome may have caused enough of a climatic catastrophe to wipe out the dinosaurs."

Now eminent geologists have established that the Vredefort meteorite struck about 2023 million years ago. Paleontologists on the other hand put the extinction of dinosaurs at 65 million years ago at the end of the Cretaceous period. I can, therefore, not accept that any reputable scientist would believe that dinosaurs went extinct from an event that occurred 1958 million years before.

(Reference: The Story of Earth & Life, by Terence McCarthy and Bruce Rubidge.)

Yours faithfully
Pierre Ballot Pr Eng.

And then another letter on the same subject

Hi Paddy,

Great title and interesting looking contents page (June 2009), however, when I started to read the first article of my choice "Creating an artificial Big Bang....."

The article talks about the "radioactive isotopes deuterium (hydrogen with one molecule) and tritium (hydrogen with two molecules)", firstly deuterium is not radioactive and secondly these are atoms so your author must mean with one and two additional neutrons.

Regards
Neil Robinson, Wear Check Africa

[Editor Replies: Thank you both for your comments. Firstly, I must point out that I am primarily a writer and as such I do my best to accurately reflect the recorded facts. The original article along with its own references can be traced to the BBC's online Internet site and having checked these sources, the article as published is accurate as reported there. Not being a scientist myself, I would have to defer to the people providing the information used. With regard to the Vredefort dome, in the first letter, the passage referred to does not state anywhere that meteorite was responsible for wiping out dinosaurs. It does state that the catastrophe that followed would have been huge and similar to the event that led to their extinction.]

Hi Paddy,

Thanks for the comprehensive and informative article on South Africa's petroleum pipelines in July WATTnow. One sentence, however, is puzzling. It reads: "Nersa says that it is not responsible for helping Transnet to recover the costs of its investments." This seems a total contradiction of Nersa's recent action in approving Eskom's application for an exorbitant tariff increase, based on the cost of catching up on the backlog in the building up of Eskom's infrastructure.
Am I the only one feeling confused here?

Regards
Tony Fisher, Retired SAIEE Member

[Editor Replies: The point that Nersa is making is that consumers have already paid Transnet for the costs of the original pipeline through levies that have been added to the fuel price over the years. Because the pipeline has been paid for, Nersa is not prepared to continue levying a charge for use of that pipeline. It is prepared to allow Transnet to recover the costs of the new pipeline through levies once the pipeline is complete and not before.]

Dear Paddy,

WATTnow is certainly an entertaining read but, as I get old and feeble, I am finding a lot of the statistical concepts difficult to grasp. For example, in the article on the beehive fence in the current issue, it is stated that, after introducing this deterrent, there were a "…150 percent fewer raiding elephants in a herd…". So, if a herd of 100 elephants returns, after the hives are installed, with 150% fewer members, how many are now in the herd? I will be most grateful if somebody can enlighten me.

Thanks and Regards
Roy Macey
Mace Technologies

[Editor Replies: Not all the elephants in a herd are raiders. Some of them are probably quite well behaved and give the vegetable patch a wide berth having been properly brought up by their mothers. However, several delinquents in a herd misbehave and raid the patch. The number of 'raids' reduced by 150 percent, not the number of elephants.]

Sir

Towards the end of last year my neighbour, who subscribes to WATTnow, offered me a copy to read. Do I really want to read the journal of SAIEE, which will be full of Ohms, Volts and things I remember from my school days? What I know of electricity is that the brown wire goes onto the right terminal and pressing the switch down turns the power on - providing Eskom plays ball.

Not to offend my friend, I accepted and intended returning it after a reasonable period. Well, what did I discover? A journal that is not filled with technical jargon, but instead contains a host of informative articles about everything going on around us.

He knows that I am hooked on WATTnow, which he delivers to me unopened the minute it arrives. In turn, I keep him well fed and have the Scotch handy when he is around just to ensure he does not cancel his subscription.

Many thanks and congratulations for producing something exceptional.

Yours faithfully
Happy Engela

[Editor Replies: And what a lovely surprise your letter makes for the entire WATTnow team too!]

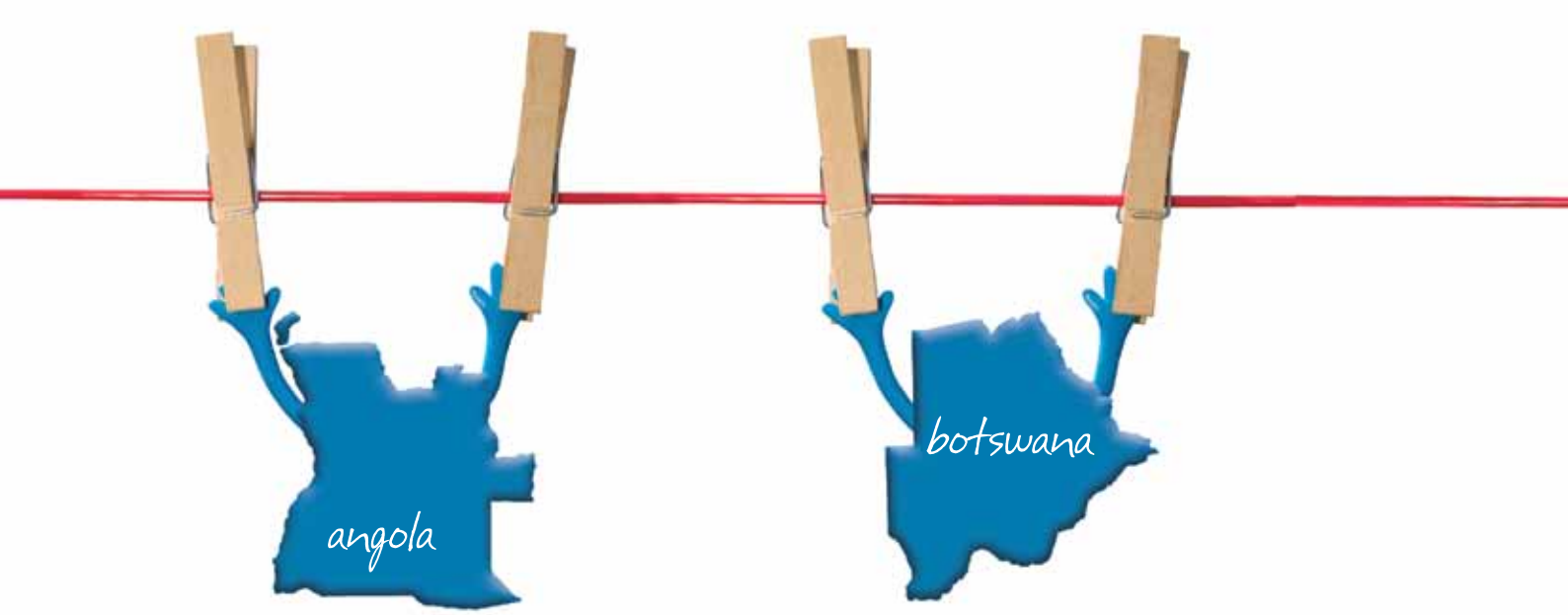
Hi Paddy,

I see that a snap survey of readers is being done and I received an e-mail from the SAIEE with the questions compiled for this survey. I notice, too, that the answers go directly to ECSA, which means you probably won't see them until later. So for your information I have enclosed my closing comments as follows:

"I honestly feel that WATTnow is brilliant just as it is with its current format and wouldn't like to see it change. I think that it is vitally important for engineers to keep abreast of developments that are not just of an engineering nature, but rather those that have the potential to really impact and change life the way we know it! Please don't mess with WATTnow. it is not broken and doesn't need fixing! If you try to change it, you will be fighting against me and I want you to know that I never give up or give in!"

Best regards,

Roger Couzens Pr Eng
Natcom Electronics (Pty) Ltd



DRC hijacks the Inga projects and turns its back on Africa

The Democratic Republic of Congo has effectively hijacked the Inga Three hydroelectric scheme from its partner countries, Angola, Botswana, Namibia and South Africa, and development of the multinational electricity generation power plant has been suspended. It is believed that Inga Three will now be developed by the DRC itself.

The two other hydroelectricity plants on the Congo River, Inga One and Two, are not functioning and there is some doubt that the Congo will be able to erect, commission and sustain the Inga Three power station based on its track record of poor maintenance, poor infrastructure and an enormous lack of technical skills needed to keep a power station working.

At a special breakfast briefing session organised by the South African Institute of Electrical Engineers, Westcor's chief executive, Pat Naidoo, confirmed that different political aspirations among the DRC's politicians had contributed to the collapse of the five country partnership.

To complicate matters, Naidoo alleged that BHP Billiton – which plans to set up two huge new aluminium smelters near the Inga Three site – had circumvented the Westcor partnership and entered into direct negotiations with the DRC, despite an earlier undertaking that it would not do so.

The concept of using the Congo River to generate vast quantities of electricity for the southern African region is not new. Almost 20 years ago when I interviewed the former Eskom chief executive, Dr Ian McRae, he was talking about the potential of the Congo River to provide sustainable electricity to a huge multinational power grid that would supply electricity to all the southern African states.

"McRae's dream to transform southern Africa into an energy intensive valley using different renewable energy resources to produce electricity at the world's lowest cost must continue under the dynamic leadership of people who have the vision to embark on such projects and make them work," says Naidoo.

"Inga Three represented such a vision but political mandates, changed political agendas and individual greed have undoubtedly contributed to the collapse of the Inga Three project for Westcor," he said.

Much preparation work for the project had been done by the five member countries of Westcor and the partners recognised at the outset that it would be a high risk venture involving substantial funding to bring it to fruition.

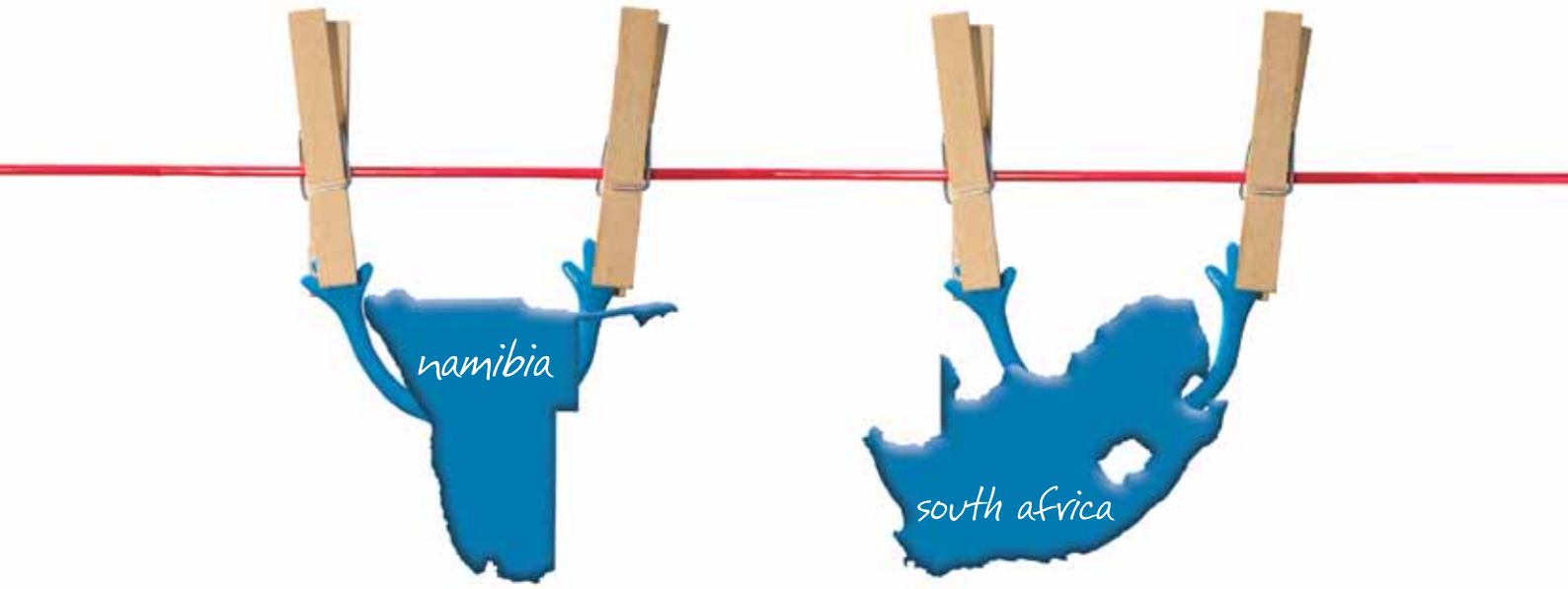
"At the outset, the Westcor partners each agreed to put $100 000 into a fund for the initial desktop research for generating electricity from the Congo River and distributing it via high voltage power lines to Angola, Botswana, Namibia and South Africa, along a distribution network that runs down the western side of the continent," he said.

The political risks of the project were high from the outset considering that the DRC itself remains in a state of political turmoil with sporadic but vicious battles still taking place in pockets around the country, even though an international peace keeping force has been deployed to halt military action.

Although Laurent Kabila is the recognised President – at least by the international community – internal political battles are continuing with opponents challenging Kabila's leadership and disputing his right to govern the region.

Meanwhile, neighbouring Angola must transform itself from a country ravaged by civil war for more than 27 years into a functioning, peaceful state that can provide for its 12-million people. Angola's infrastructure is in tatters and has to be rebuilt from the ground up; roads and bridges have been blown away by years of war; the rural regions are infested with millions of land mines; agriculture production has ceased and corruption at all levels of political and economic activity is endemic.

Angola's electricity supply infrastructure is virtually non-existent, its telecommunications infrastructure is largely limited to a few cities and the railway transportation infrastructure is in ruins. It will take



decades to rebuild Angola, despite the fact that the country is one of the richest in Africa with extensive oil and gas reserves, huge mineral deposits and fantastic agricultural potential.

The combined political instability of both Angola and the DRC was recognised as one of the major risks for the Westcor project at the outset, but during negotiations with the partner countries there was an assurance that the political agendas would not be allowed to interfere in the greater goal of providing sustainable supplies of electricity to the southern African region.

Clearly these assurances were without substance or value.

Another of the major considerations for Westcor's partners was Africa's extremely fragile environment for power generation and transmission. This is not limited to the complex ecological systems that might be affected by such a major project but also takes into account the diversity of the different populations that live in remote areas of the DRC, Angola, Namibia, Botswana and South Africa.

The logistics of the project are enormously complicated too. Not only are high voltage power transmission lines needed to carry power from Inga Three down the western side of Africa but additional distribution lines need to be connected to a local distribution grid in each of the member countries.

In places like South Africa, Botswana and Namibia – where a distribution network does exist – the problems are not as complex as those in the DRC itself or in Angola. Both these countries have to build an electricity infrastructure from nothing across distances of thousands of kilometres.

The next important consideration was the sustainability of electricity supply from the Congo River itself. Westcor's goal was to create a primary energy supply that was natural, renewable, and repeatable and one that would generate cash flows for the member countries for time immemorial.

So the Inga Three project was to be designed as a modular system that could expand from one generating plant to 24 plants or more and could eventually supply at least 50 000 MW of electricity to the member countries.

The site chosen for Inga Three – at the existing Inga One and Two sites – is 225 km from Kinshasa and 150 km east of the DRC's coastline. The power plant would comprise a number of small generating plants arranged in parallel using a turbine generator and power transformer to produce between 220 MW and 250 MW each.

Westcor intended to set up a local factory in the DRC to manufacture and assemble turbines, generators and power transformers and to maintain the new plant. It also intended to restore Inga One and Two to full operational condition at its own cost.

For the transmission of electricity, a combination of high voltage alternating current and high voltage direct current were to be used and the existing technology for the 400 kV and 765 kV lines would be deployed to carry electricity to the member countries.

The goal was first to provide power to Kinshasa, then to Luanda in Angola and to BHP Billiton's new Banana smelter in the DRC itself. As generating capacity increased, so additional power would be fed into the Namibia and Botswana power grids with South Africa, 3 000 km to the south, eventually receiving 3 000 MW of power carried along 800 kV high voltage direct current lines.

As Naidoo points out, much of the detailed planning had not been undertaken by the Westcor partners who were more concerned with the principles of putting such an infrastructure together than with the detailed engineering design or funding processes. However, it was immediately clear that the Congo River's flow of water would readily be converted into a huge cash flow for the countries involved in the project.

And, most importantly of all, it would supply sufficient energy to satisfy the energy needs of each country involved in the project.

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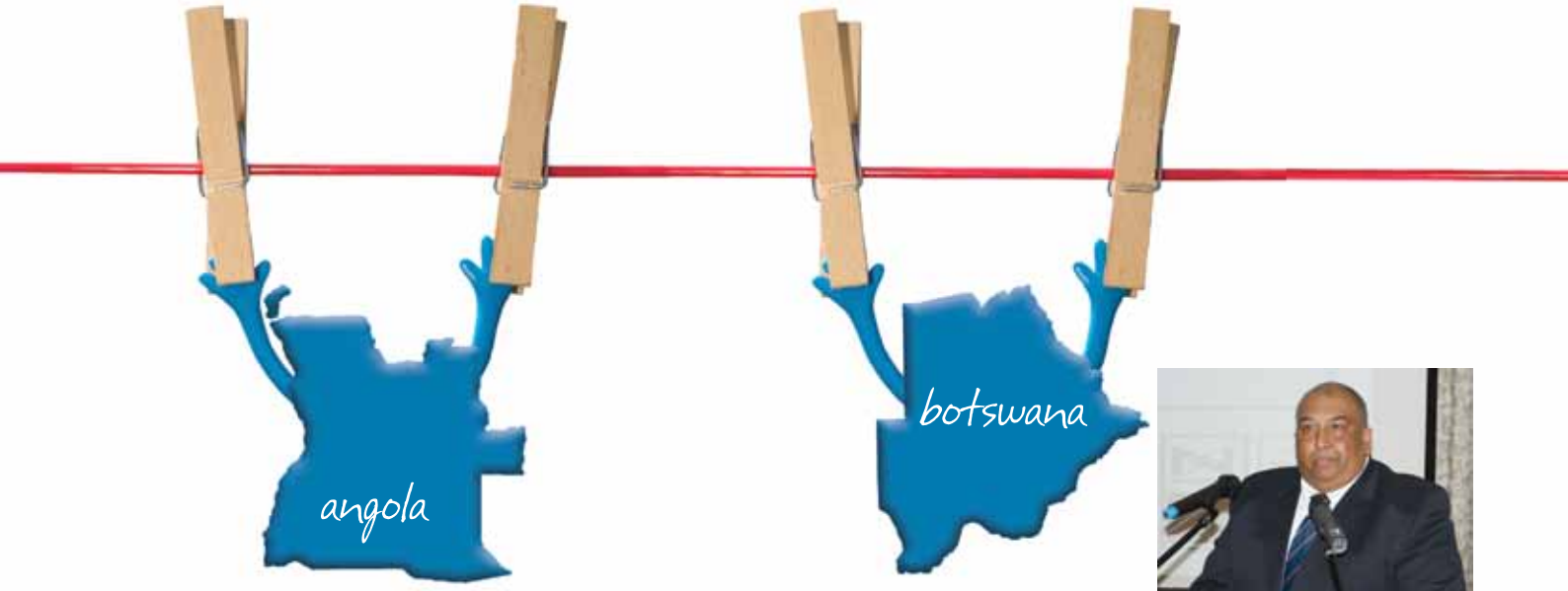

Pat Naidoo of Westcor.

The Congo River has an exceptionally regular flow all year round providing a constant flow rate of 30 000 m3/s, which is enough to provide 15 000 MW of electricity all year round. The Westcor calculations show that for each 10 000 m3/sec flow, 5 000 MW of power can be generated.

Furthermore, if dams were built along parts of the Congo River it would be quite easy to increase the flow to 80 000 m3/sec – with minimal environmental impact – to generate at least 40 000 MW and this was the concept behind the Grand Inga project that will probably never materialise either.

From a financial perspective, Westcor was structured as a no profit, no loss company to provide electricity at a fixed rate of five US cents per kilowatt hour for the duration of the contract. It would have just five customers (the partners in the company) and the power allocation for 2015 when the project was due to be operational was broken down as follows:

- Eskom – 3 000 MW
- SNEL in the DRC – 1 000 MW
- ENE, (Angola) BPC (Botswana) and Nampower (Namibia) 1 000 MW each.

The Inga One and Two plants would generate 5 000 MW and would be used by the DRC for its domestic purposes.

In terms of Westcor's plan, transmission lines comprising three 400 kW HVAC would run from Inga to Kinshasa, to BHP Billiton's Banana smelter and to Luanda in Angola while a new 800 kV HVDC line would be erected to supply power from Inga to Botswana, Namibia and South Africa.

The Congo River's water flow would translate into cash of $2,2-billion a year and of this, the DRC itself would received $500-million for use of its water and Angola, Botswana and Namibia would receive $210-million for servitudes allowing the lines to cross these lands. The operation and maintenance of Inga Three was estimated at $210-million a year. The cost of building the Inga Three power station and erecting the transmission lines is enormous but Westcor estimates that it would take just five years to repay the capital for the power station and eight years to pay for the capital cost of putting up the transmission lines.

Once other projects such as the Grand Inga project, capable of generating 35 000 MW were operational, the cash flow from the Congo River would amount to $18-billion a year using 50 700 MW machines.

As Pat Naidoo points out, Westcor's main role would be to act as the engineering company and keep the plants running so that it could sell its power at a wholesale rate to member countries, thus providing each of the partners with affordable energy in bulk.

"This project was supposed to be the foundation for economic growth and prosperity for the whole region and we had made sure that it was a project for Africa, conceptualised by Africans for the greater good of the continent as a whole.

"The DRC has, through its devious political manoeuvrings, hijacked this project entirely and, if it goes ahead, the Westcor partners will probably refuse to negotiate with the DRC or buy any of the power it may, at some time in the future, offer to sell the partners," said Naidoo.

As a result of the collapse of the Inga project, Naidoo says that new projects are being considered by Westcor, including a power plant in Angola known as Medico Kwanza capable of generating 6 000 MW and a hydroelectric plant on the Kunene River in Namibia that can generate 1 600 MW.

Naidoo says that Westcor now plans to approach Mozambique, Zimbabwe and Zambia for concessions to explore the development of hydroelectric sites along the Zambezi and Chobe Rivers and possibly even approach the DRC for a concession to explore the Grand Inga projects as well.

Clearly Westcor is not going to stop working on its dream to supply wholesale electricity to countries in southern Africa but there is some certainty that the partners will need to refrain from political agendas and curb their own individual greed before any large scale project will get off the ground.

If African countries maintain a selfish stance, wanting to control energy production and sell it at a large profit to neighbouring countries then the concept of building and using shared resources will rapidly evaporate. South Africa has shown, through its participation with Mozambique and Lesotho, that shared resources can be used for the benefit of all parties and it is this attitude that must be adopted by other countries in the southern African reason.

However, without the political will, all future projects will grind to a halt or will lie idle and unproductive as Inga One and Two in the DRC have proved beyond doubt.

Powertools for the industrial user – innovations abound

At an open day in Houghton late last month, the Bosch and Skil Masters teams unveiled their soon-to-be-launched range of power tools and accessories for the industrial user. Peter Middleton tells of the hands-on experience.

On arrival at Foxwood House, on a very cold day in Houghton, we are handed a beanie and a pair of fingerless gloves and split into small groups to be escorted around several different product workstations – all except disciplines of them, outside. First up for our group, Juergen Lauer of Bosch demonstrates the Skil Masters range of industrial power tools – in the shade, outside.

We politely listen to Lauer, as he shows us the design features of the Skil range – soft grey gripping points on black handles, red easy to identify controls and tough steel bodies. He shows us the adjustable front handle, the ambidextrous on/off control and the keyless chuck that allows quick tool-less changing of all kinds of drills, driver bits and other accessories.

We all move a little closer to get a better look.

Lauer goes on to describe a typical industrial problem with a heat gun. The nozzle gets hot making it very difficult to remove. He twists an insulated quick release ring and the nozzle drops off, without the need to touch it. But the really clever bit, Lauer tells us, is the heat overload protection.

Heat guns are notorious for cutting out when the heat builds up too much. You then have no option but to wait until it cools down before continuing. The Skil Masters heat gun has constant heat control, which protects the element from overload and allows work to continue.

When the temperature gets too high, the heating element switches itself off, but the motor continues blowing cold air over the element and through the hot nozzle. This hits a chord for me because I have experienced heat gun problems in my DIY past, during the painful process of removing wallpaper. I would certainly have benefited from both a quick release mechanism and some heat control.

Lauer shows us a Skil jigsaw, which incorporates the company's Vibration Reduction System – VRS. An active counterweight moves in opposition to the jigsaw blade to balance out vibrations caused by the reciprocating action.

Lauer switches the jigsaw on and places it on top of a beer glass. He lets go. His recklessness has no consequences. Lauer describes how vibrating jigsaws can 'run-away'. I find myself understanding exactly what he means as I always have to wrestle-down my 'ordinary' jigsaw to control the very bouncy action.

Next up is a gouge-free belt sander with a sanding frame to prevent the belt from digging in. He demonstrates its effectiveness by removing the guard. Then he invites us to try it out. With the guard on, none of us is able to dig the edges into the wood, and we did try.

We are moved on, when the next group arrives, down to the bottom of the garden to the accessories stand, where another Swiss gentleman by the name of Armin Siegenthaler is waiting at a display of drill bits, hole saws, grinding discs and saw blades.

He shows a drill bit called the X5L Hammer Drill bit. It has a length of tungsten-carbide bonded onto the tip of the fluted steel drill. Siegenthaler tells us that these can drill through the hardest reinforced concrete and are ideal for brickwork and granite. Almost as an aside, he tells us that they can also drill through the steel reinforcement bars (rebars) embedded in concrete.

Again, I find myself hearing a solution to a problem personally experienced. I routinely seem to hit steel when I put up curtain rails. I tried the drill-bit out on a piece of metal-backed concrete using a standard hammer drill. The bit makes a clean hole through both.

A diamond-tipped tile and marble drill is next to be demonstrated, along with the pressurised water cooling bottle and a suction-based drilling guide. I drill a clean 6,0 mm hole into a 20 mm tile using a hollow diamond-tipped bit – a completely painless process. I once tried and failed to buy a drill-bit for tiles – my towel-rail mounting holes are consequently drilled through grout lines at odd heights.

Other accessories at the stand include: a hole cutter, also diamond tipped, for granite work surfaces; a Rapido MultiConstruction cutting disc that can be used to cut metal, Inox steel, non-ferrous metals, stone, marble, PVC and soft tiles; a universal, iron-free, 3-in-1 grinding disc that can cut at 90°, grind at 30° and finish at 15° with one disc; and the Swiss-made Endurance range of sabre saw blades for heavy metal applications.

We are moved inside next, to the measurement tool workstation, where Peter du Bruyn is waiting for us. He is holding a pocket-sized laser rangefinder, a DLE 70 Professional. He points it at the opposite wall where we see a red dot.

This is the modern version of a tape measure, he tells us, but much easier to use. You aim it across the distance you want to measure and read the measurement off the LCD display. My 10-year old could do it. This tool measures distances of up to 70 metres with a typical accuracy of 1,5 mm. It can also determine areas and volumes, from two and three consecutive measurements respectively, or indirect heights using the Pythagoras principle.

It includes a wall-area function for painters, decorators, tilers or drywallers, capable of

The GDR 10,8 V-LI – the world's most compact cordless impact driver.

Juergen Lauer highlights key design features of the Skil Masters range of industrial power tools.

A Skil jigsaw with VRS – Vibration Reduction System – balanced on top of a beer glass while switched on. An active counterweight moves in opposition to the jigsaw blade to balance out vibrations caused by the reciprocating action.

calculating the entire area of several walls from a single height measurement and the cumulative lengths of the walls.

Du Bruyn moves quickly on to demonstrate a line-laser, the BL 2L Professional for indoor alignment work. This laser projects visible horizontal, vertical or cross lines onto surfaces up to 10 m away – a modern substitute for both the spirit level and the plumb line.

Levelled within four seconds, the line laser projects precise horizontal and vertical laser lines onto walls, or from floors to ceilings, together or individually, with a deviation of 3,0 mm over a distance of 10 m. De Bruyn demonstrates its floor to ceiling function.

With the tool standing on a table against one wall, a red line is drawn from the floor one metre in front of the device, all the way up the opposite wall, across the ceiling and one metre down the back wall. If inclined lines are required, for a stair rail for example, the line-laser can be manually set to the required angle using the pendulum lock function.

Never again do we need to argue about whether the pictures on our walls are level and straight or not.

Our final stop of the morning is again outside at the Bosch Blue display. Here, Craig Berridge, the product manager for the range, tells us enthusiastically about the wonders of lithium-ion battery technology.

The cordless range of power tools has become much lighter, has over 30 percent more capacity per charge and is no longer susceptible to the memory effect – batteries can be charged at any time regardless of the charging state, without shortening the service life of the battery.

In addition, lithium-ion batteries have hardly any self-discharge, and cell protection ensures a long service life of the battery packs by protecting them against total discharge, overheating and overload.

He demonstrates the Bosch Blue cordless screwdriver, the GDR 10,8 V-LI. It now has a lockable bit holder for universal use, which safely locks both long E6 and short C6 screwdriver bits as well as hex shank drill bits. In comparison to its predecessor, Bosch has increased the speed by 25 percent – it can now be varied from 0 to 500 rpm – and a motor brake now stops the screwdriver bit immediately when the tool is switched off – a real advantage when driving rows of screws – and for those, like me, who are starting to find it difficult to see screw heads in dark places, this new tool features three spot LED illumination.

Berridge then shows us a new large angle grinder, the GWS 24 LVI Professional, which is up to 20 percent lighter than comparable models on the market. This is a major advantage, he tells us, because weight is a crucial factor when working with large angle grinders, especially when working overhead or when the tool has to be held horizontally from the chest for lengthy periods of time.

The new Bosch angle grinders are also equipped with extensive protection features. The 'KickBack Stop' is a world first in large angle grinders – the tool shuts down in fractions of a second if the disc gets jammed. Berridge demonstrates by gripping the blade with pliers.

The grinder stops instantly. He then shows us the triple-control safety switch, which prevents the grinder restarting automatically after a power interruption. The machine must be switched off first before it can be restarted.

Thank you to Bosch and Skil for solving many of my own DIY problems. Now I know for sure that just a few more tools are all I need to achieve that professional look; perhaps the professionals I hire could use some advice from the Bosch and Skil Masters teams.

That way they'd do a really professional job without me having to watch them like a hawk.

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Turtles take a stroll at JFK International

It was not failed technology, a shortage of energy or a loss of communications that recently shut down the main runway at John F Kennedy (JFK) International airport outside New York for more than an hour, causing flight disruptions and inconveniencing thousands of passengers.

Instead it was that a group of 78 diamondback terrapin turtles that were determined to walk across the runway at their own pace regardless of whether a fleet of 747 jumbo jets was bearing down on them at speeds of more than 400 kilometres an hour.

The runway at JFK juts out into the bay and the turtles that live in the water there decided that it was time to move from one side of the bay to the next. The critters were not prepared to go the long way round, missing the runway and chose to walk across it instead.

So they started their route march on land.

It took authorities about 45 minutes to collect the turtles and safely transfer them to the other side of the bay before air traffic controllers were prepared to clear flights for take-off.

JFK International has not estimated what the financial impact of the delays amounted to but there is no doubt that hundreds of thousands of dollars would have been wasted on excess fuel used by planes waiting to takeoff or those circling the airport waiting for clearance to land.

The Port Authority of New York and New Jersey oversees operations at JFK International admits that it was responsible for closing the airport.

British teachers tell kids to read to their dogs

The British education department has advised primary school children to go home and read to their dogs so they can practice their reading skills and improve their literacy. The education authorities say that dogs make better reading companions because they don't laugh at a child's mistakes.

The authorities claim that research they have done shows that children who read to the family pet learn to read more quickly that those who read aloud to adults. One school has embarked on a pioneering scheme that uses Yorkshire Terriers, Labradors and Shetland sheepdogs brought into the classroom so that children can read to them.

Reading sessions at this school last for 45 minutes. Seven and eight-year-old children are encouraged to read to the dogs that lie patiently around the classrooms, looking bemused. According to Martin Ford, a teacher who helped to introduce the scheme says that the dogs have made a significant impact on improving the reading skills of children.

The scheme was organised by a charity called Caring Canines and now several other schools have appealed to the charity to provide them with dogs as well so they can be used as patient listeners.

Nick Seaton, chairman of the Campaign for Real Education has scoffed at the idea saying it represents a simple distraction that may be enjoyable but has little or no actual value.

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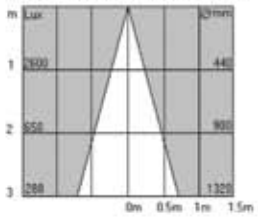

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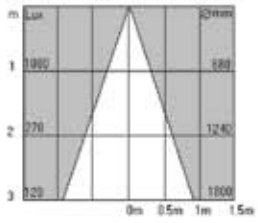

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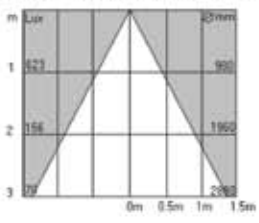

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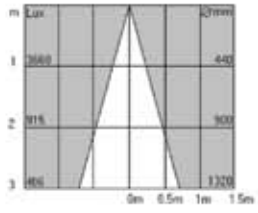

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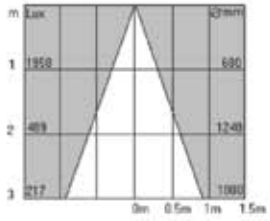

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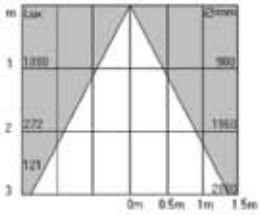

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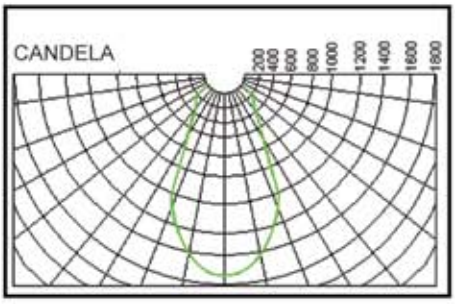

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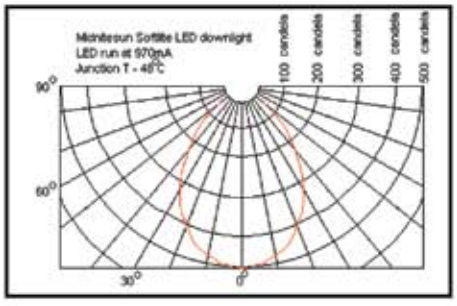

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Contact lenses help blind animals to see again

A German optical company has started manufacturing contact lenses for dogs, lions, giraffes, tigers and bears that are suffering from cataracts and cannot see properly. S&V Technologies uses acrylic intraocular lenses, which are adapted for each individual animal.

The firm has, since launching its contact lense service, had calls from Sea World in San Diego to provide a sea lion with lenses to correct blurry vision detected after he started battling to do his tricks.

In Australia, lenses have been fitted to a blind kangaroo living in one of the nature parks. The kangaroo is no longer blind. In a Romanian zoo, a visually impaired lioness has had her eyes corrected using these contact lenses.

It has also developed special lenses that will absorb ultraviolet rays that can be fitted to horses to treat "head shaker syndrome", an excruciatingly painful and life-threatening condition.

The acrylic intraocular lenses are implanted directly into the eye and this requires specialised training for the veterinarians who intend performing the procedure. It has already been widely used and has additional benefits over and above allowing the animals to see again.

For instance, Chinese authorities were puzzled by the sudden drop in the sex drive of a brown bear in one of the reserves. They discovered that because of his impaired eyesight, he had stopped fornicating completely and lost interest in female bears.

As soon as his eyesight was restored, his sex drive returned and he was proudly fathering new generations of brown bears.

The procedure is expensive but many zoos, animal trainers and domestic pet owners believe that it is justified. Animal trainers say that when animals start developing cataracts their performance declines because they cannot see properly and yet as soon as the eyesight is restored, the animals get to work. The lenses protect the hefty investment made in training a creature to perform to live audiences.

S&V Technologies was established by Christine Kreiner at Henningsdorf in Germany, a sleepy, riverside town that has become a high technology haven for many new ventures. The European Union and the German government provided one third of the start up capital needed to set up the company.

S&V remains a small company at this stage with a turnover of just £2-million a year.

Nazis developed stealth aircraft that could avoid radar

German engineers employed by Hitler's Nazi party during the Second World War designed and built a stealth aircraft that stopped radar from detecting it and if these craft had been brought into service by the Luftwaffe they could have had a dramatic impact on the outcome of the war.

A prototype of the Horten Ho 2-29 made a successful test flight late in 1944 but by then the war was almost over for the Nazis who were never able to perfect the design or produce more than a handful of the planes.

Now, a team of engineers has reconstructed the bomber from blueprints found in the Nazi records and, while it cannot fly, it demonstrates just how sophisticated the German designs were. Germany's technological expertise has widely been acknowledged as superior to anything Britain, America or any of the other nations were using at the time.

The engineers who worked on building a replica of the Horten Ho say that Luftwaffe chief, Hermann Goering had instructed designers to come up with a bomber that that would be capable of flying at more than 1 000 km/h carrying a payload of more than 1 000 kg over a 1 000 km distance.

The Horten brothers, Reiner and Walter, suggested that a "flying wing" would meet Goering's demands. The bomber was designed with a centre pod, made of welded steel tube, and was powered by a BMW 003 engine.

However, the most significant innovation from Reiner Horten was his idea to coat the plane with a mixture of charcoal dust and wood glue to absorb electromagnetic waves of radar.

They hoped that the combination of sculpted surfaces and the innovative coating would make it invisible to radar detectors. The replica was built by Northrop-Grumman at a cost of £154 000

Surprisingly, the first successful stealth aircraft ever built was the F-117A Nighthawk, which was made for the United States Air Force in the early 1980s.

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In addition, WATTnow gives its readers in-depth, topical coverage of many different issues that have a direct bearing on the engineering industries on which so much of the country's future development depends.

It is the official magazine of the South African Institute of Electrical Engineers and is distributed to members throughout the country.

It has also developed a Continuing Professional Development programme for all engineers and is the only publication able to provide Category One credits who are part of the WATTnow CPD Programme.

WATTnow also offers its readers a monthly in-depth article on the many fascinating aspects of engineering ranging from the development of South Africa's nuclear energy capacity to the use of coloured lenses to correct dyslexia.

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What dogs want – let them tell you themselves

Japanese inventors have made a device that they claim can detect a dog's emotions from its bark and can indicate if the pet is sad, joyful or frustrated among other things. It also has a repertoire of spoken phrases that it claims the dog will understand. The phrases include the request to "play with me".

Known as the Bowlingual Voice, the machine is available in Japanese stores at a cost of about $200 and is said to be significantly more technologically advanced than the first models that were launched seven years ago. It is currently only being sold through Japanese outlets and comprises a microphone placed around the dog's neck and a hand-held operating device.

When the dog barks, the microphone records the sound and sends the data to the owner's hand-held device, which translates it into what the dog is believed to be trying to say.

A speech synthesizer is used to create an audible phrase that is supposed to be an accurate interpretation of what the dog has just said. The audible sound is played back to the owner and converted into a text file, which is displayed on the unit as well.

An answering system is used to record the dog's bark when the owners are sick of it making a racket that they've gone away for the rest of the year.

The original Bowlingual was not a talking device but translated the dogs emotions into a picture drawn on a screen. More than 300 000 suckers actually bought the first machines and hundreds of thousands more will probably fall for the second generation device as well

Isn't there an old dog saying about a fool and his money . . . ?

Can't get up? Get an iPod bed shaker to rouse you

Some people really do battle to wake up in the mornings and there are tales of heavy sleepers resorting to two, three or even four alarm clocks to rouse them from the sweet dreams of restfulness – particularly in winter when it's cold and miserable outside.

Well, there's an ideal gadget that has been created for owners of Apple's iPod. It is a bed-shaker alarm, developed by New York-based iLuv, that can double as a docking device for the music player as it has speakers built into it as well.

The iMM153 bed shaker offers a buzzer, a choice of radio stations or any of the music loaded onto the iPod as a means to wake a heavy sleeper from his or her dreams. It also providers owners with an LCD screen, ten dimmer settings and an auxiliary input jack for playing music from devices other than the iPod.

The dual alarm clock will allow users to fall asleep listening to the radio or to the audio files of their choice and then wake them in the morning by shaking the bed while buzzing loudly, playing raucous music or blasting out some hearty morning announcer's get-me-up comments.

The bed shaker iMM153 will accommodate any of the iPod range from the mini to the latest iPod touch and it will charge these while they're connected to the dock. The iMM153 is available in a range of colours including pink, white and blue, and is priced at $60.

There is no indication of when these devices might be available through South African retailers but, given the vast propensity that so many government employees have to sleeping on the job, perhaps these units should be standard issue for anyone working in government departments anywhere in the land.

Of course, I'm not sure that there is a bed shaker strong enough to move some of the obese public sector workers the government insists on employing.

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Is a name all that Altair and Eagle have in common?

A new moon lander being built for its next visit to the moon in 2020 resembles the first moon landing craft used in 1969, and while John Connelly, chief architect of the Altair Moon Lander concedes that he wanted the craft to resemble something from Star Wars or Star Trek, it was not possible as the "physics kept getting in the way".

The new craft forms part of the United States space agency's Constellation programme and Connolly says that, like the Eagle craft that carried Neil Armstrong and Buzz Aldrin to the lunar surface in 1969, the Altair vehicle will be launched into space on the back of a heavy-lift Ares V rocket that is currently under development.

A command module will ferry it towards the moon and, like its predecessor, it will comprise a descent and an ascent stage. The large descent module, including fragile looking legs, comprises mostly an engine and the propellant tanks.

The smaller ascent module, on top of the descent vehicle, contains the life support systems and another engine that is used to get the astronauts back to the orbiting command module.

Of course, is not surprising that the new craft bears a resemblance to the first craft as the designers have been poring over the original design blueprints and have even drafted some of the original engineers who worked on Eagle to come back and work on the Altair module. The name Altair even shares strong links with Eagle. Altair is the brightest star in the constellation Aquila, which is Latin for eagle.

There are significant differences between the two craft. First, Altair is much larger and is able to deliver four astronauts and cargo to the Moon's surface. The module doubles as living quarters for the crew and has an airlock in it, which means that the whole cabin does not need to be depressurised each time an astronaut exits the vehicle.

It is able to sustain the crew for periods of up to six months and can carry more than 14 tons of cargo to the Moon's surface in a single payload. Another significant difference is that the Altair craft is able to land almost anywhere on the lunar surface thanks to Autonomous Precision Landing Hazard Avoidance Technology.

This system relies on a suite of sensors and technology such as a flash light detection and ranging module that provides high resolution topographic images of the surface prior to landing. The technology basically allows the astronauts to 'see' in complete darkness and be capable of detecting items that are about the size of a football.

The pilot is able to manoeuvre the Altair craft before touching down. The Altair craft and its airlock device are dumped on the Moon and not transferred back to Earth or jettisoned in space.

Dust cloud circumnavigates the world in less than two weeks

Dust clouds generated by a huge storm in the Taklimakan Desert in China took just 13 days to circle the Earth according to data compiled by a Japanese research team that has been studying data from a NASA satellite.

When this cloud started to circle the globe for a second time, the researchers found that it descended and started to deposit some of its dust into the sea. This, the scientists say, is clear evidence of how a natural phenomenon occurring in one part of the world can have an impact on environments thousands of kilometres away.

According to Itsushi Uno of the Kyushu University's Research Institute for Applied Mechanics, the Asian dust clouds from the Taklimakan desert usually deposit the dust into the Yellow Sea around the coast of Japan just as dust from the Sahara gets dumped in the Atlantic Ocean along the coast of Africa.

He says this study clearly shows, though, that some of the dust from the Taklimakan storm went straight into the Pacific Ocean only after it had completed a complete circuit of the globe. Dust clouds generally contain about five percent iron an important mineral for the oceans of the world. The Taklimakan desert is located in the north western region of Xinjiang.

The dust cloud rose to heights of between eight and ten kilometres, measured 3 000 m vertically and extended for up to 2 000 km horizontally. It stayed at that size for its first circuit around the globe because, says Uno, the atmosphere at those heights is very stable.

Researchers believe that dust particles trigger the formation of high-altitude cirrus clouds but scientist are still not sure if these clouds help to warm or cool the Earth.

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White phosphorous caged and tamed

Scientists have found a way to safely transport white phosphorous, an extremely dangerous chemical that bursts into flames on contact with the air. The chemical is often used on the battlefield to create a smokescreen and is also used as an incendiary substance in bombs, artillery shells and mortars.

The chemical has a more useful application as a component in weed killers, insecticides and fertilisers and its safe storage and transportation is something that has troubled manufacturers in many different sectors of industry.

According to Jonathan Nitschke, lead researcher of a team at Cambridge University in England, the team had created a container molecule capable of rendering the chemical harmless indefinitely until a signal agent, benzene, is applied to release it.

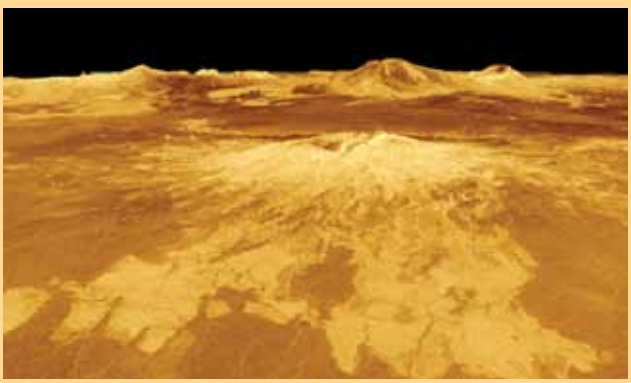
The so-called self-assembling molecular cage comprises iron ions held together by organic linkers and has been shown to encapsulate small hydrophobic molecules. Nitschke and his colleagues use white phosphorous molecules, which are hydrophobic, and neatly match the size and shape of the cage's cavity, making it safe to handle even when exposed to air.

The container molecule keeps phosphorous stable by confining it in a small space, ensuring that there is no room for a combustible reaction. However, when benzene molecules are added to the mixture, they push the phosphorous out of the cage and its hazardous properties return.

An abstract of the article, published in Science magazine explains how the process works: "The air-sensitive nature of white phosphorus underlies its destructive effect as a munition: Tetrahedral P4 molecules readily react with atmospheric dioxygen, leading this form of the element to spontaneously combust upon exposure to air.

"Here, we show that hydrophobic P4 molecules are rendered air-stable and water-soluble within the hydrophobic hollows of self-assembled tetrahedral container molecules, which form in water from simple organic subcomponents and iron (II) ions.

"This stabilisation is not achieved through hermetic exclusion of O2 but rather by constriction of individual P4 molecules; the addition of oxygen atoms to P4 would result in the formation of oxidised species too large for their containers. The phosphorus can be released in a controlled fashion without disrupting the cage, by adding the competing guest benzene."



Venus may once have had enormous oceans and continents

Data from a European probe that has been orbiting Venus suggests that the planet may once have contained oceans of water on its surface and even had a structure of plate tectonics similar to Earth. Moreover, the Venus Express sent infrared maps back to Earth showing clear evidence of heat variations in surface rocks.

Scientists believe that some rocks in highland areas are cooler than those in other areas suggesting that the composition of the rocks is different and that they could be akin to the continental rocks seen on Earth, which are generally granitic.

German scientists say that granites are made at the edges of the great geological plates that cover the planet. At the boundaries of these plates, ancient rock pulled deep under the ground and reworked with water, resurfaces through volcanic activity. If there is granite on Venus then, scientists say, this is an indication that water must have existed on the planet and that plate movement occurred at some time in the past.

The evidence from Venus was obtained using the Visible and Infrared Thermal Imaging Spectrometer (VIRTIS), which can penetrate the thick clouds that cover the surface and can measure the amounts of heat energy coming off the rocks. Different geological compositions radiate at different wavelengths. The new maps of the southern hemisphere of Venus show rocks on the Phoebe and Alpha Regio plateaus and these rocks are lighter in colour and look older than the majority of other rocks on the planet. On Earth the lighter rocks are usually granites.

The observations seem to fit with the theory that the highland plateaus are actually ancient continents, once surrounded by oceans and produced by past volcanic activity. Venus has undergone major global warming over millions of years where trapped solar radiation has heated the surface of the planet to an average of 467°C.

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SCHOLAR DESIGNS ENERGY EFFICIENT HOTEL

Jana Jordaan, a grade 11 learner at Parys High School, gets an adrenaline rush from being in a room full of young people with gadgets and contraptions made out into science projects.

Being an inventor herself, her last innovation won her a cool R30 000 in mulah and the honour of being chosen the 2008 winner of the ***eta*** Awards: Young Designers Category.

Energy efficiency is part of Eskom's drive to ensure sustainable electricity supply into the future and is the core focus for the ***eta*** Awards. The ***eta*** Awards is an annual event sponsored by Eskom and supported by the Department of Minerals and Energy and it has been running for the past 19 years.

In her winning project, Jana sought to prove that bigger buildings, in her case a hotel, can be self-sufficient, generating 100% of their own electricity - using mainly biogas plants; solar panels and solar collectors.

"Initially, I was planning to build a house. But I decided to be different and chose to do a project on a hotel," Jana said.

"I had to go deeper and research further than I would have if I had built a house. The project took me about six weeks to complete. A few friends had joined me at the beginning, but they dropped off, saying it was too demanding.

"It was a lot of work but I stayed with it. Not that I didn't enjoy it. I have been fascinated with biogas technology for a while. My interest started with a project I did in Grade 8. Another factor that made me see the project through to the end was my stubbornness. When I start something, I have to see its conclusion," she added.

Jana is entering the competition again this year and this time she is expanding the scale in a project to determine if a shopping centre can generate 100% of its own power.

Her win has inspired a lot of young people in her community to explore energy efficiency projects.

"I have had 48 enquiries from learners who want to do projects similar to mine. A man also approached me with a proposal to supply him with the air-conditioner I designed for the hotel project. But that is for later.

"I plan to study towards a degree in architecture or civil engineering. On completion of my studies, I want to open a franchise to build energy efficient houses or convert existing houses to be energy efficient," she expounded.

The eldest of three siblings, Jana gets a lot of support from her parents, both teachers. She might love science but she is not square. Part of her winnings for the ***eta*** Awards went towards paying for the cost to enter the dance section of the South African Championships of the Performing Arts. She also loves music and plays the piano.

There are eight categories which one can enter: Industry; Commercial; Residential; Women in Industry; Woman in Community; Power Fitness, Innovation and a prize for Young Designers. Each category winner receives R30 000. The two runners-up get R5 000 each.

Eskom encourages those who have exciting and innovative ideas or projects to enter them for the 2009 ***eta*** Awards.

For more information on the ***eta*** Awards and how you or your company can enter, please visit www.eta-awards.co.za or email Anna-Marie Roux on amroux@mweb.co.za.

Dr. Steve Lennon, MD of Eskom's Corporate Services Division, Ms. Jana Jordaan, winner of the Young Designers category and Ms. Thandeka Zungu, Deputy Director General for Corporate Services, Department of Minerals and Energy.

Minute-by-minute weather updates for pilots

America's NASA is funding a weather monitoring service that will provide pilots around the world with up-to-the-minute updates of weather patterns using data from the National Centre for Atmospheric Research (NCAR), which specialises in studying turbulence at different altitudes, particularly over open oceans.

It is hoped that this kind of information will help to prevent disasters such as occurred when the Air France aircraft crashed over the Atlantic Ocean in mysterious circumstances killing all 228 people on board. According to John Williams of the NCAR, the more detailed forecasts from the new service will assist pilots to navigate around potential danger areas to avoid storms and the accompanying turbulence. He says that pilots do not have up-to-the-minute data when flying over remote parts of the ocean, which is where some of the worst turbulence occurs.

Scientists at NCAR have created global maps of air turbulence based on global computer weather models that use artificial intelligence systems to analyse the data and predict sudden storms or severe turbulence. Williams says the goal is to provide pilots with accurate information about storms and suggest what alternative routes might be used to avoid them.

This applies predominantly to areas over the ocean where there are no land-based radar detectors or other tools to provide information to pilots. The NCAR information service could prove invaluable to pilots, alerting them to potentially violent downdrafts, turbulence or even lightning storms that could be hazardous to the aircraft and its passengers.

Soon your garments may be taking pictures for you

Researchers in the United States have developed a fancy, new kind of fabric capable of taking snaps of everything that's going on and even detecting the wavelength and direction of light falling onto it. The researchers are able to place sensors in each fibre, co-ordinate the electrical signals and send a signal when light falls on the fabric.

Dr Yoel Fink of the Massachusetts Institute of Technology and his team have found a way to stretch 25 mm strands of polymer into much thinner fibres while still maintaining the relative positions of the sensors.

The work may lead to the creation of long and flexible temperature and light sensors that can be used to make smart fabrics for soldiers working in hostile environments. Fink says that the strands can be woven into a 0,1 m2 section of fabric and, by noting the positions of the light-sensitive elements, allow the team to know which sensors are sending a signal.

The team was able to reconstruct an image projected onto a small square of fabric and Fink believes that this is the first step towards finding ways of getting different nano-scale devices to work together to produce value information.

He has given no indication of the future development of these fabrics or the time that it will take to make enough fabric to clothe a single soldier, let alone an entire battalion that is expected to work under enemy fire in hostile environmental conditions. But then that's not always a concern for laboratory scientists who spend thousands of hours coming up with newfangled gadgets that eventually prove invaluable.

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Ethiopian villagers smile as they harvest the sun

An international aid project to provide solar power to villagers in northern Ethiopia has changed the lives of people there now that every house in the village has electricity powered by solar systems. About 80 percent of Ethiopians live in rural communities and just one percent of the total population has access to electricity.

The problem for many African countries across the continent is a large rural population and leaders in the different countries concede that the vast distances between rural settlements makes it extremely expensive to connect more people to a national electricity distribution grid.

For years, solar power has been touted as a solution to Africa's energy needs.

In Ethiopia's Rema village, 240 km north of the capital Addis Ababa, huts are dotted with solar panels, one to provide power for four lamps and the other to provide energy for radios or tape recorders or other small appliances.

There are 2 100 solar home systems in the village used to provide power for a number of different purposes and there is even a solar technician training school to train students on managing energy in the village. Some villagers remain deeply suspicious of the solar power, claiming that it's the "devil's work" that provides the electricity rather than believing that the sun's rays are the primary source of electricity. But more and more villagers are benefiting from the project and, as the direct benefits are felt by the community, so the suspicions decline.

Prior to the solar power project, Ethiopian villagers used to rely on gas for lighting and as a fuel for cooking and because of the intense heat in the region, villagers were often forced to bury gas bottles in the sand to keep them cool.

As visiting journalists and other aid workers have found, it's now even possible to get a cold beer in Rema.

R250-million for energy efficiency programmes from government

Government is to spend R250-million on a variety of projects aimed at making government buildings more energy efficient according to Energy Minister, Dipuo Peters. Moreover, 19 municipalities are to receive government funding to support their own energy efficiency initiatives.

The municipal focus is on street lights and traffic lights and Peters told delegates at The Star's Energy Efficiency Exhibition in Midrand that the retrofitting of energy efficiency technology to public buildings will be undertaken by the Department of Public Works.

Measures include switching from incandescent lighting to compact fluorescent lamps, installing solar water heating panels and reconfiguring the buildings to be more energy efficient.

Referring to greater energy efficiency in South Africa, Peters says that the government is working on new regulations for energy efficiency standards for industrial equipment, such as electric motors, and points out that a lack of expertise in industry has been one of the key barriers to increased energy efficiency in South Africa.

Currently, expenditure on energy amounts to about 15 percent of South Africa's gross domestic product. She says that the Departments of Energy and Trade and Industry are working with the United Nations Industrial Development Organisation to establish a training programme for the industrial sector and she also called on private sector companies to find more meaningful ways to contribute to energy efficiency in this country.

She has urged companies to approach municipalities and government departments directly with products and innovations that can be implemented to save energy and contribute toward greater energy efficiency in South Africa.

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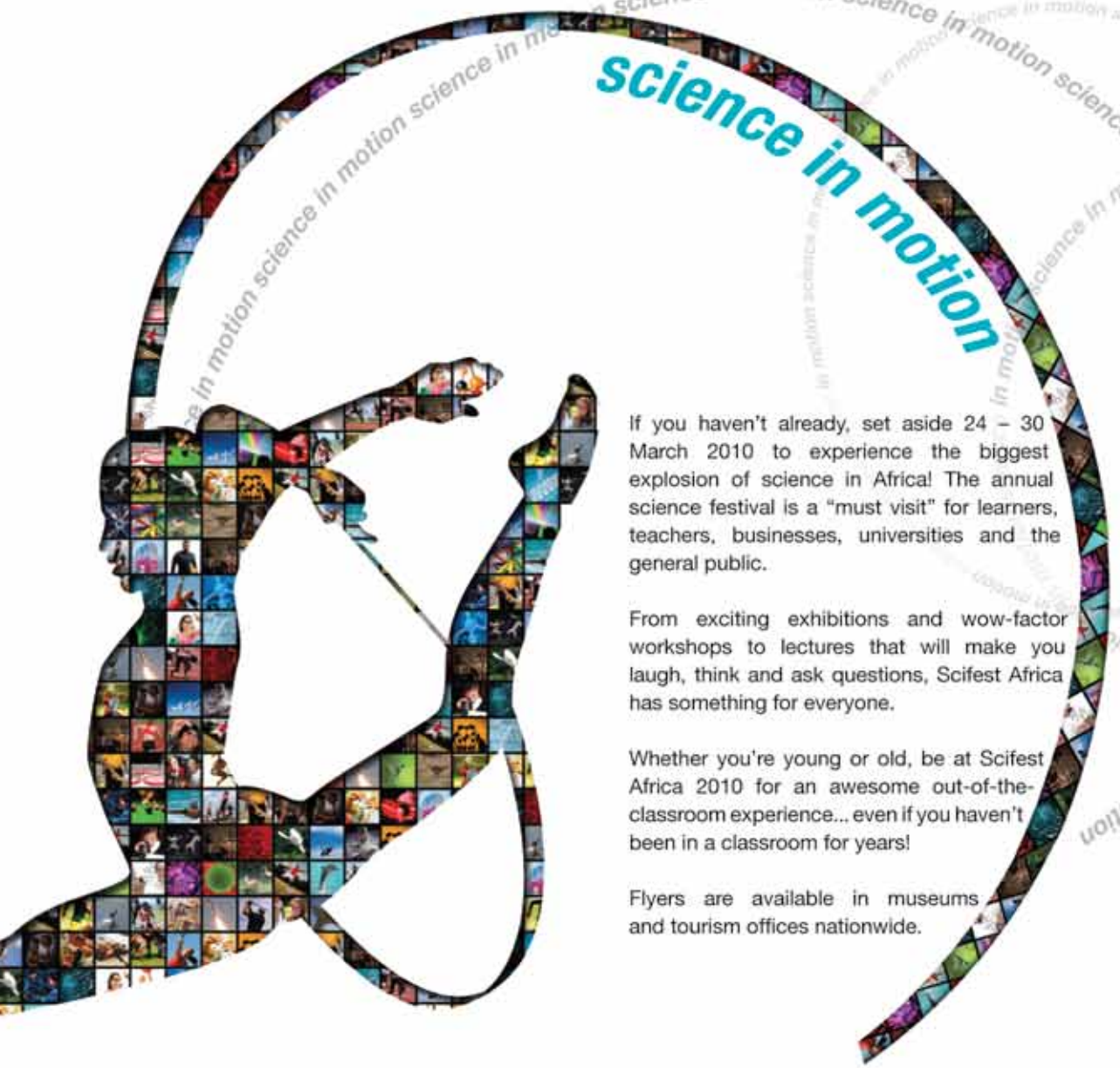

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Whether you're young or old, be at Scifest Africa 2010 for an awesome out-of-the-classroom experience... even if you haven't been in a classroom for years!

Flyers are available in museums and tourism offices nationwide.

Europe's biodiesel plants standing idle

Production of biodiesel from countries within the European Union increased by 35.7 percent last year and capacity is expected to increase further during 2009, according to the European Biodiesel Board, but the volume remained relatively low at just 7,8-million tons when compared with conventional fuel volumes.

In 2005, biodiesel production rose by 65 percent and in the following year it was up by 54 percent. But, in 2007 it rose by just 17 percent and the EU has blamed what it claims is unfair international competition for affecting profitability of biodiesel plants in Europe.

Two countries, Germany and Austria, have both halted biodiesel production as a result.

In addition to a decline in demand for biodiesel caused mainly by strong competition from the United States, producers have been forced to cut margins and, when combined with the lower crude oil prices, means that half of the biodiesel production facilities in Europe are standing idle.

The EU has set a target of 10 percent of fuel consumed in the region coming from renewable energy resources by 2020 and the largest biodiesel producer, Diester Industrie of France says that it will halt its investments in further capacity until clarity on the EU's future energy targets are released later this year.

The European Commission has agreed to extend, for a further five years, its anti-dumping tariffs imposed on cheaper US biodiesel imports as part of a drive to protect European producers and increase investments in this sector of the energy market.

Nissan wants to include wireless charging in its ZEVs

Nissan has developed a wireless charging system that can be used to recharge electric cars. The system is based on inductive charging, the same electromagnetic field technology used to charge an electric toothbrush. The system is being developed for use in the company's Zero Emission Vehicle (ZEV).

According to David Bott, director of innovation programmes at the Technology Strategy Board, inductive charging is a proven technology and he predicts that electric cars will probably rely on a plug-in charge overnight, but will use inductive charging during the day for on-the-go recharging of batteries.

Nissan says that it hopes to scale up this technology enabling it eventually to use electric plates laid into the surface of electric vehicle lanes on the road, so that motorists can charge their vehicles as they drive. However, Nissan admits that it has no idea how much such a project would cost, who would pay for it or how quickly the batteries could be recharged.

Nissan's own consumer research has shown that 61 percent of potential electric car customers would use these vehicles if the inconvenience of recharging the batteries could be overcome.

According to Nissan Europe's general manager of product strategy and planning, Larry Haddad, inductive charging is one technology being considered but he points out that Nissan is also developing fast-charging facilities for use in shopping centre car parks and at motorway service stations. He says the company is aiming to achieve an 80 percent recharge within 25 minutes.

Nissan's ZEV is a five-seater family car with a top speed of 150 km/h and a battery range of about 160 km. The cars are being built so that new batteries, currently under development at various sites around the world, can be retrofitted to vehicles. The car is conventional in its styling and is due to go on sale in the United States and Japan next yea, with cars being distributed in Britain and Europe by 2012.

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will be held in Cape Town, South Africa, from 23-27 May 2010, prior to the Soccer World Cup also being held in South Africa. The conference is aimed at addressing key themes on "Communications: Accelerating Growth and Development." The program will feature major Symposia, Tutorials, Panel Discussions, and Workshops. Full details of submission procedures are available on the IEEE ICC 2010 website, www.ieee-icc.org/2010/.

The organizers of IEEE ICC 2010 as well as our attendees expect accepted papers to be presented at the conference. IEEE reserves the right to exclude a paper from distribution after the conference (e.g., removal from IEEE Xplore) if the paper is not presented at the conference.

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Communication Theory Symposium
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Signal Processing for Communications Symposium (SPS)
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Donglai Xu, d.xu@tees.ac.uk
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Sennur Ulukus, ulukus@umd.edu
Wei Chen, wchen@tsinghua.edu.cn

Wireless & Mobile Networking Symposium
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Randall Berry, rberry@ece.northwestern.edu
Hai Jiang, hai.jiang@ece.ualberta.ca
Farid Nait-Abdesselam, farid.nait-abdesselam@lifl.fr

Optical Networks and Systems Symposium
Mounir Hamdi, hamdi@cse.ust.hk
Andrea Bianco, andrea.bianco@polito.it
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Next-Generation Networking and Internet Symposium
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Achille Pattavina, pattavina@elet.polimi.it
Hussein Mouftah, mouftah@site.uottawa.ca

Communication QoS, Reliability and Modeling Symposium
Nelson Fonseca, nfonseca@ic.unicamp.br
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Toshinori Tsuboi, tsuboi@cs.teu.ac.jp

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Abderrahim Benslimane,
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TUTORIALS

> Tutorial Proposal Due: 10 Sep 2009

Proposals are invited for half- or full-day tutorials in communications and networking topics. Proposals should be submitted to liye@ece.gatech.edu and mischa.dohler@cttc.es for review.

PANEL DISCUSSIONS

> Panel Proposal Due: 28 Aug 2009

Submissions are sought for panel discussions the latest technical and business issues in telecommunications topics. Proposals should be submitted to gibson@ece.ucsb.edu and dwngwenya@icasa.org.za for review.

WORKSHOPS

> Workshops Proposal Due: 30 June 2009

Submissions are sought for workshops on the latest technical and business issues in communications and networking topics. Proposals should be submitted to a.jamalipour@ieee.org and molisch@usc.edu for review.

Tariff uncertainty leads to project suspension

Eskom's failure to accept or reject a tariff proposal from CIC Energy for power generated by the planned Mmamabula power station in Botswana has contributed to the project being put on hold by the Canadian principals. The proposal was submitted to Eskom in July this year.

The Mmamabula power station, on the eastern border of Botswana was due to come on stream by 2013 and supply electricity to Botswana and South Africa.

Eskom's reluctance to commit to the proposed tariff was based on its own uncertainty as to whether such a contract would be financially sustainable over a long period. This is the second large project from an independent power provider to have stalled over tariffs and Eskom's apparent unwillingness to commit to longer term purchases of power.

Earlier this year, listed company Ipsa announced that its combined heat and power plant at Newcastle was standing idle while it waited for a firm power purchase agreement from Eskom. It started selling steam in September last year and electricity about a month later.

Eskom is believed to have received more than 30 bids from independent power producers but has not committed itself to buying power from any of them and has suspended talks over tariffs until these have been finalised.

Eskom concedes that it needs power from the independent producers and delays in reaching agreement with these organisations could result in power supply disruptions in the future.

Discussions with the South African government, the National Energy Regulator and the independent power producers regarding a sustainable funding model for the purchase of electricity are continuing and are expected to be finalised soon.

Eskom says it will only commit to the purchase of electricity from independent producers once the funding model has been agreed and if it is sustainable for the utility in the long term.

This hybrid might be set to take off

A jet-propelled hybrid electric car is being developed by an Israeli company using an electric engine containing a super-capacity battery and a micro-jet turbine engine to provide power to the rear wheels. It has been tested on a test track in Tel Aviv by ETV Motors.

The company, which has already raised more than $12-million for the project, believes that the jet turbine-powered electric vehicles will be used increasingly in the future. ETV uses the micro-turbine engine as an on-board charger that provides power to a high density battery with a range of between 60 and 80 km.

ETV says that its batteries will power a car for twice as long as existing batteries do and, with the on-board charging unit, it will not be dependent on a complicated electric charging infrastructure to provide a plug-in method of charging.

The high capacity batteries are based on Lithium Manganese Nickel Oxide and will have 4,7 V cells compared with the Lithium Ion batteries that have 3,2 V. According to ETV chief technology officer, Arieh Meritav, the batteries provide a longer range, are smaller and are expected to last the lifetime of a vehicle.

The turbine can be run on a variety of different fuel sources including petrol, diesel and biofuels but these fuels will be used purely to charge the batteries as they discharge. The turbine will spin at 80 000 rpm for maximum efficiency.

Once the company has developed prototypes of its engines, potential partners will be asked to assess the performance and cost benefits of the new system and compare it with other contending technologies.

ETV says that its hybrid system will be cheaper than other hybrids available on the market today.

A Toyota Prius, similar to the one in the picture, has been adapted by ETV Motors to run on new batteries and to use a turbine jet motor.

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FROM THE CENTENARY PRESIDENT ... du Toit Grobler

THE SAIEE AND ECSA

The 2005–2009 term of office of the Council of ECSA is coming to an end and the 2009–2013 term will commence on 28 August 2009. The final meeting of the outgoing council and the inaugural meeting of the incoming council will take place on 25 August 2009. Membership of ECSA Council is limited to two consecutive four-year terms and the two SAIEE Council nominees serving on the outgoing ECSA Council, Prof Bea Lacquet and du Toit Grobler, will both step down for this reason. After at least a one term break from ECSA Council, an individual may be re-appointed.

SAIEE Council nominees appointed to the incoming council are Rod Harker, SAIEE Past President and past member of the ECSA Council, Ian McKechnie, SAIEE Past President, Dr Nhlanhla Mbuli, SAIEE Council member, and Neël Smuts, Immediate Past Chairperson of the Southern Cape Centre of the SAIEE. Trevor Maphumulo, SAIEE Council member, will continue to serve a second term of office and TC Madikane, SAIEE Council Member, will serve a first term. Other members of the SAIEE, who will continue to serve a second term include, (Ms) J Janjic and (Ms) M Kibido. New electrical engineering appointees include (Ms) Revona Botha, Mthokozisi Zondi, Yashin Brijmohan, Loto Nolo and Jack Cunnington.

Although ECSA Council members serve in their own right once appointed by the Minister of Public Works, it is encouraging that no less than 13 of the 50 Council members of the incoming ECSA Council are electrical engineering professionals. Council Members are appointed in the three categories of engineering professionals (30), state representatives (10) and public representatives (10).

I would like to extend a special word of appreciation and congratulations to those ECSA Council Members who have reached the end of their term of office, to those who are continuing with another term, to those who are returning to Council and, last but not least, to those who are serving for a first time. While being a Council Member is an important and responsible position, it can also be most satisfying and enriching.

Active involvement of the SAIEE in the engineering profession goes back to at least 1935. The SAIEE is recognised by ECSA as a Voluntary Association and in addition to serving on ECSA Council; its members actively serve on numerous committees of ECSA Council, carrying out professional reviews of applicants for registration as professional engineers and acting as professional mentors of candidate engineering practitioners. The SAIEE plays an active roll in the validation of CPD activities.

SAIEE CENTENARY BERNARD PRICE MEMORIAL LECTURE 2009

September 2009 is largely going to be taken up by the Bernard Price Memorial Lecture tour around the SAIEE centres and interest groups. The main event will take place on 30 September 2009 in Johannesburg. Please look at the announcements in WATTnow, on the SAIEE Website and on WattsOn for the details of the event in your area.

Kind regards
du Toit Grobler
Pr Ing, Pr Dipl Ing FSAIEE
SAIEE Centenary President 2009

SAIEE centenary banquet 2009 and annual awards

The SAIEE Centenary Banquet will take place at the Wanderers Club on Thursday the 19th of November. During the banquet the SAIEE Annual Awards will be presented.

The SAIEE ***President's Award*** is the SAIEE's premier annual award. It has a premium value of R15 000; recognises current major contributions in any sector of electrical, electronic, telecommunications and computer engineering; and is open to all persons living in South Africa (members and non-members of the SAIEE). The award is not intended to recognise long or distinguished service, but current major engineering contributions.

The SAIEE ***Engineer of the Year Award*** is awarded to a member of the SAIEE who, through his or her involvement in Institute affairs, has energetically and voluntarily worked towards promoting electrical science and its applications for the benefit of SAIEE members and the Southern African community. The award, with a premium value of R10 000, has in the past been sponsored by Alstom SA.

The SAIEE ***Young Achievers Award***, valued at R7 500, is awarded to the most outstanding young achiever of the year in the field of Electrical/Electronic engineering. This award is open to all persons living in South Africa (members and non-members). To be eligible, the nominees must be 35 years or younger during the stated calendar year of the award. In the past, this award has been sponsored by Powertech Transformers in memory of Keith Plowden.

Nominate your candidate

If you are aware of worthy recipients for any one of the above prizes or if you would like to sponsor a table at the banquet, please contact Gerda Geyer on 011-487-3003/4 for full details.

Presidential address for local electrical engineers in George

The President of the SAIEE visited George during the week of the 29th of April this year to present the annual presidential address to members and guests of the Southern Cape Centre of the Institute.

This year marks the centenary of the Institute, and celebratory events will be held at various centres around the country during the course of the year. The address entitled 'SAIEE: A Century of Achievements Behind Us; A Century of Challenges Ahead of Us', opened with insights into the growth of the SAIEE, from a small group of engineers in 1909 to well over 5 000 members today.

An encouraging factor has been the large number of young black engineers that have joined in recent years, and their integration into all branches of engineering.

One of the focus areas of the Institute has been that of continuous professional development (CPD) of members, and it arranges tutorials, lectures and seminars, which are accredited for the required CPD credits to maintain professional registration. Rural members may also participate in CPD through a structured evaluation process in conjunction with WATTnow, the official monthly magazine of the SAIEE, which carries accredited articles.

The Southern Cape Centre of the SAIEE has about 60 members, and meets regularly at various venues for lectures, tutorials and industry tours. It also provides networking opportunities for members, and promotes reciprocal liaison with other professional and industry bodies in the region.

The Centre held a centenary celebratory function in Sedgefield on 5 June, which also recognised 2009 as the International Year of Astronomy, with an appropriate lecture. This celebration coincided with main Centenary Celebration Party of SAIEE, which was held at the head office of the SAIEE at Innes House in Johannesburg.

Neël Smuts, Immediate Past Chairperson of the Southern Cape Centre. Neël has been appointed to serve on the 2009 to 2013 Council of ECSA, which will be inaugurated on the 25th of August 2009. He was the 2008 recipient of the SAIEE President's Award.

Left to right: Peter Henry, Fellow of the SAIEE with the President.

Left to right: Willem du Toit (Member of the Centre Committee), du Toit Grobler (SAIEE Centenary President), Les Stuart (Chairperson), Neël Smuts (Imm. Past Chairperson).

New centre established in the centenary year of the SAIEE

On Tuesday 12 May 2009, the Eastern Cape Centre of the SAIEE held its inaugural meeting at the Nelson Mandela Metropolitan University in Port Elizabeth. Following a rewarding 61% positive response (17 out of 28) to an earlier request to the Senior Members and Fellows living in the Port Elizabeth, Uitenhage and Despatch areas that they support the opening of an Eastern Cape Centre of the SAIEE, Council approved our appeal and called for committee nominations. Nine were submitted, being the number required by Council.

At the start of the meeting of 12 May, led by the President of the SAIEE, du Toit Grobler, eight of the nine committee members then elected Graeme Hopewell as Chairman; Sarel Schoombie as Vice Chairman; and Rob Stone as Honorary Treasurer of the new Centre (the ninth member of Committee, Eric Ceba had earlier tabled his apologies as he was out of town). The other six member of the Centre Committee are: Carl Hempel, Bernhardt Lamour, Chris Rist, John Yuill, and Dawid Bester.

The Eastern Cape Centre of the SAIEE stretches from the Bloukrans River in the west to Port Alfred in the east and inland as far as Grahamstown. Although members in the Eastern Cape outside this area will always be welcome at meetings and Centre events, the long distances to travel to Port Elizabeth would normally make this impractical. The Centre borders on the Southern Cape Centre on the west and the East London interest group on the east.

After the new Chairman and Vice Chairman had introduced the guest speaker, the President presented his extremely informative address entitled 'SAIEE: A Century of Achievements Behind us, A Century of Challenges Ahead of Us'. The President was accompanied by his wife Elize and mother-in-law, Mrs Toekie van Heerden.

After the meeting and a vote of thanks, the 27 members and their guests enjoyed drinks and snacks sponsored by the Institute.

The President on his way to the Inaugural Meeting of the Eastern Cape Centre and to deliver his Presidential Address at NMMU.

Attendees at the Inaugural Meeting: Graeme Hopewell being congratulated on his appointment.

Graham Hopewell, Inaugural Chairperson of the Eastern Cape Centre.

Mrs Toekie van Heerden and Mrs Elize Grobler.

SAIEE Centenary year Bernard Price Memorial Lecture 2009

University of the Witwatersrand, Wednesday 2009-09-30, 18:30 for 19:00

Title of the Lecture: New Technologies of Intelligent Systems for a Global World

William A. Gruver, PhD, FIEEE, FEIC
Simon Fraser University, Burnaby, BC Canada
Intelligent Robotics Corporation
IEEE SMC Distinguished Lecturer
w.gruver@ieee.org

Computer and communication technologies are rapidly shrinking the world. While companies are more global and service infrastructures are increasingly distributed, there is a need for higher levels of performance, integration and interoperability. Fortunately, there is a significant convergence of cost-effective products based on high performance computer chips and hardware systems, high speed wireless networking products and standards, and platform independent software. Personal robots with the ability to communicate by engaging multiple senses assist people in their daily tasks. Machine learning and pattern recognition algorithms automatically learn to recognise complex patterns from data and recommend decisions. Radio Frequency Identification (RFID) systems provide improved services for supply chain and healthcare management. Brain-machine interfaces are beginning to transform thought into action and sensation into perception. Finally, systems previously depending on client-server networks are being integrated using new serverless architectures of distributed intelligent systems that provide improved robustness, scalability, and flexibility.

This lecture presents an overview of technologies of intelligent systems with emphasis on recent applications of systems science and engineering, human-machine systems, and cybernetics. Applications will be drawn from a variety of fields including robotics, manufacturing automation, healthcare, intelligent transportation, distributed energy management, and integrated digital services.

Biography of the Lecturer

William A. Gruver is President of Intelligent Robotics Corporation and Professor Emeritus of Engineering Science at Simon Fraser University. He received the PhD, MSEE, and BSEE degrees from the University of Pennsylvania and the DIC in Automatic Control Systems from Imperial College of Science and Technology.

His industrial experience includes management and technical leadership positions at GE Factory Automation Products Division in Charlottesville; GE Industrial Automation Centre in Frankfurt, Germany; IRT Corporation in San Diego, Centre for Robotics and Manufacturing Systems at the University of Kentucky, and LTI Robotic Systems, a California based start-up that he co-founded. He has also held engineering and faculty positions at the NASA Marshall Space Flight Centre, DFVLR German Space Research Centre, Technical University Darmstadt, U.S. Naval Academy, University of Kentucky, and North Carolina State University. He has published 215 technical papers and three books on robotics, automation, control, and optimisation. His current research emphasises the development of distributed intelligence technologies and their application to manufacturing automation, robotic systems, digital services, and energy systems management.

Dr. Gruver is a Fellow of the IEEE and the Engineering Institute of Canada. He is currently the Sr. Past President of the IEEE Systems, Man, and Cybernetics Society for which he was President, Vice President of Long Range Planning and Finance, Vice President Publications, Vice President Conferences, and a member of the Board of Governors. He has served as a Division Director and a member of the IEEE Board of Directors. Currently, he is also a member of the IEEE MGA Board. He is an Associate Editor of the IEEE Transactions on Systems, Man, and Cybernetics and he co-chairs the Society's Technical Committee on Distributed Intelligent Systems. He served as Associate Editor for the IEEE Transactions on Robotics and Automation, an Associate Editor of the IEEE Transactions on Control Systems Technology, and was a founding officer and an AdCom member of the IEEE Robotics and Automation .

Presentations at Centres and Interest Groups of the SAIEE

Monday	2009-09-14	Bloemfontein Interest Group
Tuesday	2009-09-15	Vaal Triangle Centre
Friday	2009-09-18	Western Cape Centre
Monday	2009-09-21	Southern Cape Centre
Tuesday	2009-09-22	Eastern Cape Centre
Wednesday	2009-09-23	East London Interest Group
Monday	2009-09-28	KwaZulu-Natal Centre
Tuesday	2009-09-29	Mpumalanga Centre
Wednesday	2009-09-30	University of the Witwatersrand (Main Event)

Invitation

Convention Centre Cape Town, South Africa, 24-28 August 2009
Organised by: University of KwaZulu-Natal, University of Stellenbosch, University of Cape Town, University of the Witwatersrand, Johannesburg
Endorsed by the South African Institute of Electrical Engineers

Dear Colleagues and Friends,

The prevailing economic climate and the daunting environmental pressures we face challenges engineers and decision-makers in the electrical power industry to be innovative and to lead the industry in to a new paradigm. It is important that current research is understood, developed and integrated into refurbishment and new work.

In South Africa we have a unique opportunity to come abreast with current research in the field of high voltage engineering – the technology influencing the design and operation of transmission and distribution systems, and of all insulation diagnostics. The International Symposium on High Voltage Engineering (ISH2009) is taking place in South Africa, at the Cape Town International Convention Centre, from 24-28 August 2009.

This is the premier, biennial, international event for the dissemination of current research in high voltage engineering. And it is in South Africa in 2009! Just over 300 papers, with authors coming from 30 countries around the world, will be presented in the space of five days.

The papers have all been peer-reviewed and represent a show-case of current research and development. In addition to the published papers, there is a significant technical exhibition with some twenty industrial organisations displaying current technology.

This exhibition offers the possibility of coming abreast with new and innovative products available in the marketplace.

I invite you to take this opportunity to interact with your peers in the vital field of high voltage engineering.

Jan Reynders
Chairman of the Organising Committee of ISH 2009.

International Steering Committee

Chairman: Babuder, M. (Slovenia)
Fröhlich, K. (Switzerland)
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Kawamura, T. (Japan)
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Nagabhushana, G. R. (India)
Reynders, J. P. (South Africa)
Rizk, F. A. M. (Canada)
Smit, J. J. (Holland)
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Zicheng, G. (China)
Zingales, G. (Italy)

Exhibition Opportunities

There will be an exhibition held in conjunction with the conference. Organisations who wish to exhibit their products and services, should contact the ISH 2009 secretariat.

CPD Points

Attendance at the ISH 2009 conference is validated for five CPD points. The ECSA CPD validation number for the conference is: SAIEE-0354

Topic Areas

Topics of interest include, but are not restricted to the following areas of high voltage engineering:

- Electromagnetic Fields: EMC, Computation, Measurement, Environmental Effects, Corona
- Transients, Lightning, Switching & Repetitive Transients Emerging HV Technologies, Advanced Materials and Interface Phenomena
- Outdoor Insulation, Ceramic and Composite Insulators and Pollution Performance
- Intelligent Systems in HV Engineering; Data Mining and Knowledge Rules, Power System Applications
- Asset Management of HV Equipment: Strategies and Tools, Preventative Maintenance
- Diagnostics and Online Monitoring for CBM; Automated Conditions; Assessment of Remote Monitoring
- High Voltage Insulation Systems for AC and DC; Gas Insulation Systems, Liquid and Solid Dielectrics
- High Voltage Measurements, Testing Techniques and Quality Assurance, Ageing, Space Charge and Dielectric Measurements
- Live Line Technology & Practices
- Insulation Coordination & Practices (HVAC & HVDC)
- Modelling of HV Phenomena: Long Sparks & Floating Objects, Systems Aspects, Studies

FEE CATEGORIES

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Early (Before 30/06/2009)	R6 900	R6 100	R2 700
Late (After 1/07/2009)	R7 200	R6 350	R2 700
Technical Tours	R300	R300	R300

Secretariat

Email: secretariat@ish2009.org

Sponsorship & Advertising Opportunities

There are various sponsorship options available to organisations who would like to support ISH 2009 and promote their products and activities.

The ISH proceedings, exhibition and banquet venues will have space available for promotional material. All enquiries should be addressed to the ISH 2009 secretariat.

FOR INFORMATION AND REGISTRATION GO TO: www.ish2009.org

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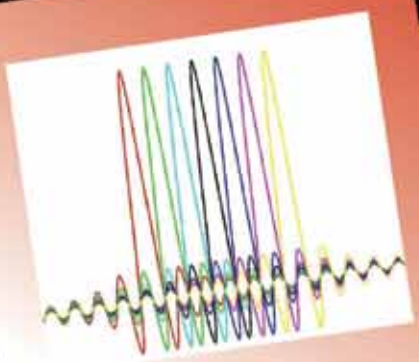

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