

Taxi for SA turns heads

A SKY-blue London-style taxi was the centre of attention at a prestige economic fair in Switzerland recently.

The specially-liveried TXII – the latest incarnation of the world-famous, purpose-built taxi from LTI Vehicles – turned heads among a fleet of Audi cars used to ferry VIPs to the venue for the Swiss Economic Forum in Thun. The taxi was there to boost South Africa's profile, painted sky blue and with the slogan: "In South Africa, the sky matches this cab 350 days a year."

Among VIPs to travel in the SA-branded taxi was Adolf Ogi, the former President of Switzerland. The International Marketing Council of South Africa (IMC) said the former president insisted on being driven in the taxi "even though he had the choice to go for the biggest and most luxurious of the limousines".

Driver Paul Wardell said the reaction he got on his drive from London to Thun was incredible. "When I drove through towns and villages, people would stop in the streets in amazement," he said. "Everybody wanted to take pictures and pose with the taxi. People really loved it."

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Diagnostic imaging is here

Low-dose X-rays could turn the TB epidemic around and make mammograms more pleasant to undergo, writes **Ilse Ferreira**

The practice of modern medicine is a far cry from the staid old family physician with the white coat. In fact, doctors wearing white coats these days are the exception, not the rule.

Even hospital doctors are more relaxed these days — and portray this to their patients, with positive psychological effects. Technology has had a hand in this and today, as opposed to the past, most things are measurable, detectable, imageable.

In the past few years the University of Cape Town and Groote Schuur Hospital — with the Red Cross Children's Hospital — have been the backdrop for the development of the latest in hi-tech equipment used for, among other things, the detection of tuberculosis (TB) in children and other specialised applications.

This low-dose X-ray machine, which uses slot scanning digital X-ray technology to create high-resolution images, is used in the emergency room.

This machine, developed by a proudly South African SMME called Lodox Systems, was conceived, designed and manufactured locally with the input of researchers in the hospitals and funding from the Technology and Human Resources for Industry Programme.

The development is continuing under the leadership of Professor Kit Vaughan at the University of Cape Town. Statscan machines manufactured by Lodox Systems are being marketed already in the United States, Middle East, Europe and Africa.

Its pioneering record is all the more impressive, taking into account the fact that neither in the US nor in Europe does a digital image processor exist with these attributes.

Vaughan says the aim of the research is to develop algorithms, software solutions and working prototypes for low-dosage, slot-scanning digital X-ray devices for the medical industry — all done on South African soil and creating job opportunities for technical people of the highest calibre.

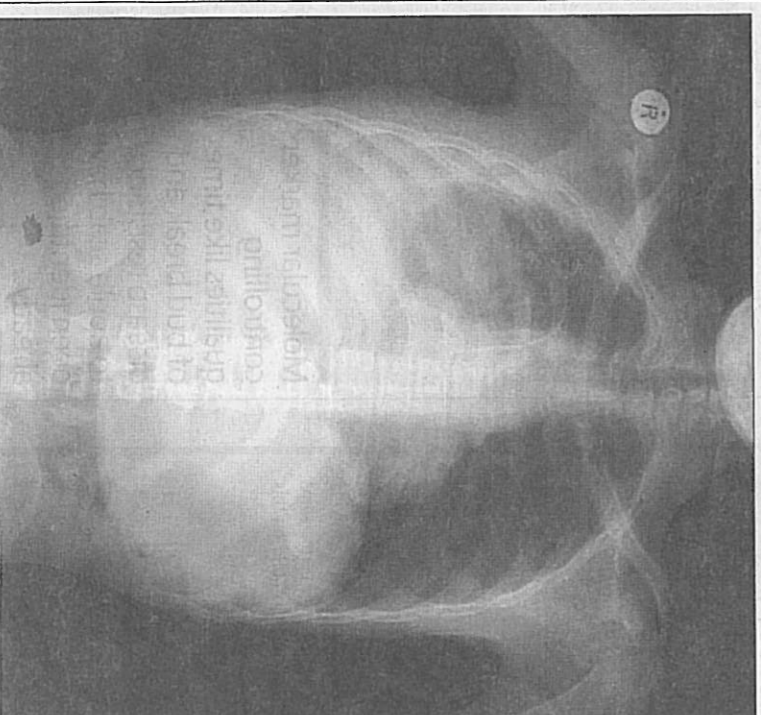
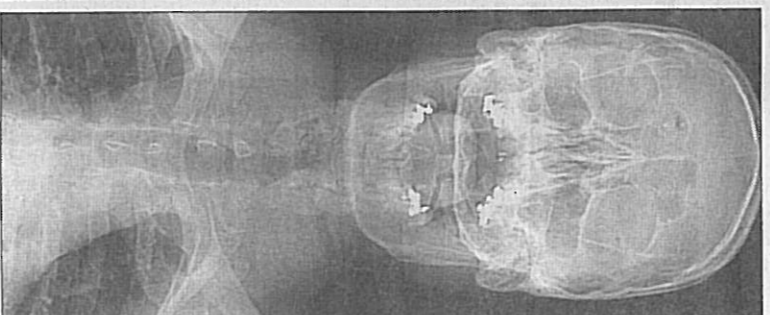
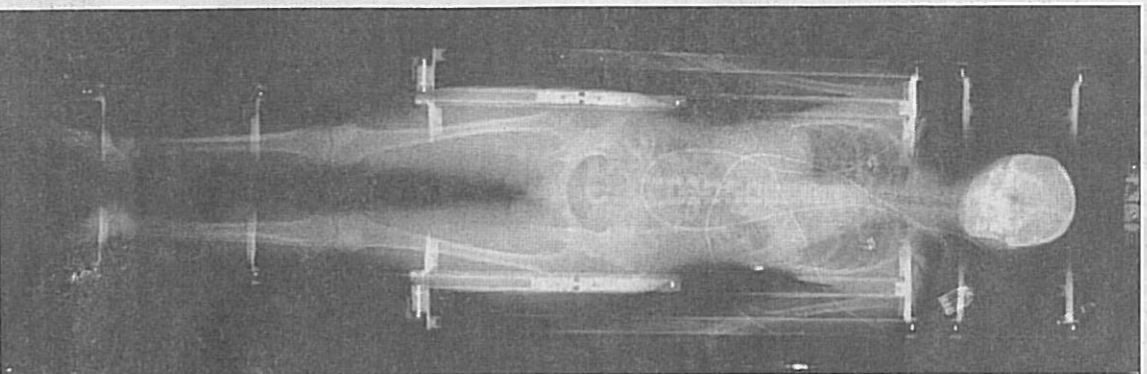
So far the research project has developed an innovative technique to correct for aspect ratio in slot scanning and a provisional patent has been filed for this application.

One of the most important sub-projects of the research is the development of a computer-assisted diagnosis system that is able to detect TB in children based on their X-rays.

Says Vaughan: "Currently data sets of X-rays taken by the Statscan system are being gathered at the Red Cross Children's Hospital. The aim is to automatically outline the airways on an X-Ray, for which the Lodox Statscan is particularly well suited since it can image fine detail on the image. Changes in the airway diameter or structure, which could be indicative of TB or HIV, will be immediately detected, speeding up diagnosis and, of course, treatment.

"In the geographic setting of the Red Cross Children's Hospital, this is particularly meaningful as most parents of infected children are from less prosperous areas. Early detection and treatment can mean a cure and we all know that TB is one of our biggest health problems."

Another area under development is that of the ever-unpopular



mammogram, which women have come to detest. Lodox, in collaboration with the research team and with additional funding from the National Institutes of Health in the US, is developing a mammography machine that will significantly lower radiation exposure and improve patient comfort through the reduction of painful compression.

This will be achieved by improving the image quality by optimising two key parameters: modulation transfer function and detective quantum efficiency. Overall, reduced time spent in the exam room as a result

**Local company
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developed the
machine that uses
slot scanning digital
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to create high-
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for medical use**

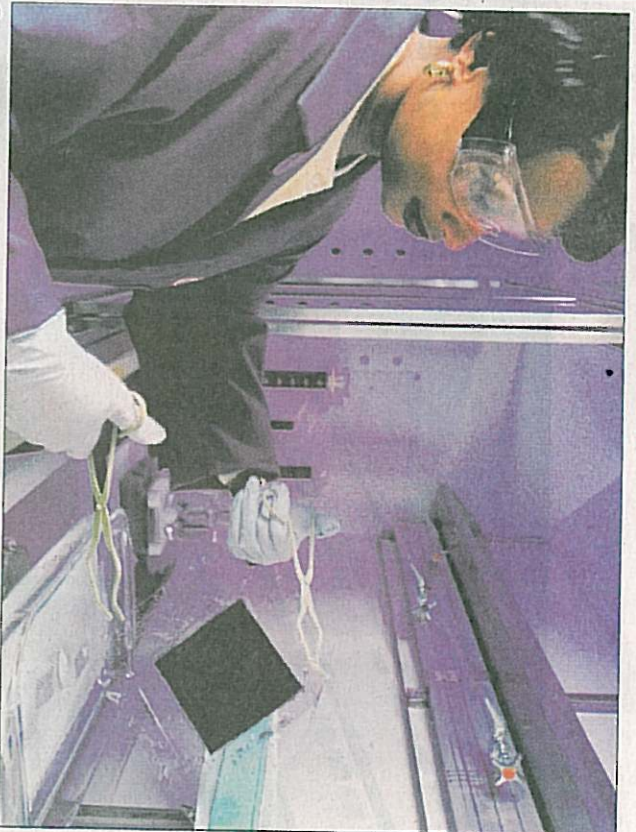
of these technological improvements means increased patient throughput. The lower radiation level addresses the concerns raised by medical members about repeated mammograms in older women.

Stereo X-ray image visualisation is being developed to improve the presentation of the images to the observer. This is especially useful for studies where three-dimensional positioning is required, as in radiation therapy, and is widely used in preparation for orthopaedic operations.

Digital image processing is the

diagnostic tool of today and tomorrow. Conventional X-rays can give both false negative and false positive pictures, but this new technology will close these gaps and continue to bring clearer, more precise images to the physician at lower radiation dosages than thought possible to date.

Better diagnostics lead to quicker, more effective treatment and increased cure rates, as will be the case with detecting TB automatically. This technology could change the face of the TB epidemic in centres where it is used.



Green energy: fuel cells are safe and almost 100% reliable

Fuel cells for the future

An eco-friendly, hydrogen-based power supply could be the answer in rural areas, writes **Ilse Ferreira**

The future is green — or that is the plan. All over the globe answers are being sought and many have been found already that will reduce carbon emissions, reduce the use of toxic substances and promote overall environmental safety while meeting the increasing needs of growing populations in the developing world.

Interestingly, many technologies that were invented a long time ago and not pursued with gusto at the time have appeared again and proved to be “futuristic” in nature.

Fuel cells are one such example.

The principle underlying fuel cells was first published in 1838, with the first working example making it into the news in 1843. In 1959 the British engineer Francis Bacon developed a successful stationary 5kW fuel cell. His design was later patented for use in the United States space programme to supply electricity and drinking water on board its space craft.

A fuel cell system running on hydrogen is usually lightweight and compact and has no major moving parts — already a boon when considering how parts of solar systems are regularly stolen, causing major setbacks in infrastructure delivery and financial losses to suppliers.

Furthermore, fuel cells do not involve combustion, making it much safer and almost 100% reliable. This means fuel cells in remote areas do not require round-the-clock, on-site maintenance. Measured reliability in existing installations has been shown to equate to about one minute of downtime in a six-year period — good news for anyone reliant on power.

The Vaal University of Technology (VUT) is developing a variety of fuel cells as affordable telephone facilities, used as an alternative source of energy in outlying areas. It is envisioned that these fuel cells could replace traditional batteries and solar panels at rural telecommunications sites.

One of the advantages of fuel cells over solar panels is that there is no seasonal drop in power generation, owing to periods of low solar radiation. As long as the fuel supply is properly managed, the supply of power will be stable. These same fuel cells could be devel-

oped for other uses in rural communities.

Says Professor Christo Pienaar, who heads the research project at VUT:

“There are a multitude of questions to be addressed, such as the economical supply of hydrogen, the control of the interface between cell and load and the robustness of the fuel cell to the climate extremes in South Africa.

“On a more practical level, a problem typical to South Africa is the ongoing theft of solar panels in rural telecommunications installations, which fuel cell installations would eliminate. The system we are working on is a hi-tech answer at a lower cost.

“Using fibre optics in the system would reduce the high copper theft rate and also do away with problems related to lightning strikes and power line interference.”

A laboratory model for a proposed fibre optic system is being built.

Pienaar says there are various types of fuel cells, including PEMs, or polymer electrolyte membrane cells, direct methanol fuel cells, alkaline fuel cells, those working with phosphoric acid, others that use molten carbonate and solid oxide fuel cells.

Hydrogen forms part of all these processes, either directly as the fuel used or as a byproduct of another fuel, such as methanol. As an adjunct, research is taking place into the generation and storage of hydrogen.

VUT’s research into zinc-air and methanol-based cells are at an advanced stage; prototypes are being put through their paces.

Pienaar says: “One of the main objectives now is to develop locally manufactured membranes and membrane electrode assemblies. The research to date is promising indeed and we believe a breakthrough in this area is imminent.”

With this increasing impetus towards the hydrogen economy so often propounded by United States President George W Bush, South African engineers are taking to heart the fact that it is cheaper, leaves no carbon footprint and is reliable. Local research is eminently able to find answers tailor-made to our conditions, develop our own applications and, at the same time, develop the skills necessary to maintain, manage and further expand these systems.



Met die blou van onse hemel

Blou, blou lug: Hierdie Londen-taxi is die eerste met 'n Suid-Afrikaanse handelsnaam wat die grense van Brittanje verlaat. Die taxi het by die Suid-Afrikaanse stalletjie by die Switserse Ekonomiese Forum gestaan. Die boodskap op die hemelblou-taxi is "In South Africa, the sky matches this cab 350 days of the year".
Foto: VERSKAF

