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ON THE COVER

A R22-million, 75 m long spooling jetty for client Sonils in Luanda harbour in Angola saw Franki South Africa pioneering a new method of fast-track deck construction. The completed jetty was officially handed over on 4 February 2006, a mere two days before the arrival of the spooling vessel Skanda Navica



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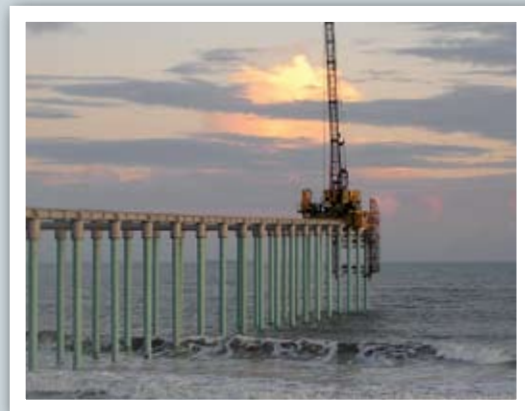
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ON THE COVER

New method of deck construction for Angolan

A R22-MILLION, 75 m long spooling jetty for client Sonils in Luanda harbour in Angola saw Franki South Africa pioneering a new method of deck construction due to the fast-track nature of the project.

The jetty, which had to be capable of

large berthing a spooling vessel, extends into a water depth of –10 m below chart datum. The completed jetty was officially handed over on 4 February 2006, a mere two days before the arrival of the spooling vessel *Skanda Navica*. The final contract

was only agreed to in August last year, with Franki South Africa establishing on-site in September. This resulted in a tight timeframe of only six months, with the company facing stiff penalties for any overruns.





► Left: The completed jetty was officially handed over on 4 February 2006, a mere two days before the arrival of the spooling vessel Skanda Navica

as its capability to innovate and think out of the box when needed. This latter characteristic was at the forefront of the Angolan jetty project, which has met with a favourable response from Angola's offshore oil and gas industry, comments Byrne.

'The very short construction period lead us to opt for a steel-tube pile with a steel collar and crossbeams as the primary support for the reinforced-concrete jetty structure. This was also due to the really shallow water and fairly limited length of the jetty itself. We also opted for a land-based construction technique working off constructed bays using an essentially hand-over-hand type of operation. The steel crossbeams also gave early access for the bay-by-bay construction,' explains Byrne.

'The concrete deck comprised longitudinal main beams with concrete planks, with the whole structure tied together on-site with a concrete topping.' The steel tubes were supplied by Sonils, with the collars and crossbeams fabricated in Cape Town and shipped to Angola. It was a logistical nightmare to co-ordinate the various suppliers, says Byrne. The precast reinforced-concrete main beams and planks were supplied by sub-contractor Steffanutti & Bressan Angola, while the on-site concrete for topping the deck structure was purchased from local readymix suppliers.

'This project certainly enhances our portfolio, as we now have substantial marine experience, particularly in the Indian Ocean islands area, where we have generally opted for precast concrete structures. In terms of the Angolan jetty project, the collar-and-crossbeam concept was certainly a first for us. Logistically it is a very cost-effective and quick and easy construction method, as you do not have to wait for the concrete to cure before construction can commence. This was an innovation driven by the fast-track nature of the project,' says Byrne.

Franki South Africa was tasked with the total design and execution of all marine work. The only components of the project it was not responsible for were the supply of the steel tubes and the precast-concrete deck elements. Byrne adds that the logistics of tackling such a project in Angola posed a considerable challenge, particularly in terms of material supply, access and traffic conditions, and other factors such as language and cultural barriers.

'Fortunately for us the marine conditions in the Luanda harbour were relatively benign, with no major wave and weather problems. The geotechnical ground conditions were also not particularly onerous, without major unforeseen geotechnical conditions being encountered that would have

delayed progress. We were very positively supported by the client, Sonils, when it came to assisting with the supply of the steel tubes, for example. Owing to the time constraint imposed by the imminent arrival of the spooling vessel, Sonils provided a jack-up barge to expedite the installation of the tube piles from both the finished deck structure and from the sea,' comments Byrne.

Franki South Africa has already had a presence in Angola for five years now, with Byrne citing 'a huge potential' for marine and foundation work as the war-ravaged country slowly continues to rebuild itself. Local Angolan labour was employed for the jetty project, apart from skilled workers such as crane operators, who came from South Africa. 'We have an intensive training programme in place to boost the Angolan skills pool and thus circumvent the need to import key members of our South African workforce. This will ultimately result in a good semi-skilled and skilled workforce being in place in Angola,' says Byrne.

Describing 2005 as a particularly successful year for the company, Byrne adds that he sees no reason for this trend not to continue. 'I foresee the boom continuing until at least 2010. While there has not really been that much of an upturn in government spending, parastatals such as the Airports Company South Africa continue with massive investments at Cape Town and Johannesburg international airports.

'With the Gautrain project now also signed and sealed, we will become extremely busy,' notes Byrne. Franki South Africa has been actively involved with the Bombela Consortium in terms of developing solutions to deal with dolomitic ground conditions, which Byrne cites as the biggest challenge facing the Gautrain project in terms of foundation work.

In terms of challenges facing the local industry, Byrne says that skills availability is a huge stumbling block, as is the globalisation of the sector. 'There has been an influx of offshore contractors into Africa from as far afield as India and China, with these burgeoning economies being able to sponsor infrastructural projects themselves. With South Africa lacking ready access to similar development funding, our biggest challenge in the future will be to maintain our competitiveness, especially in view of the exchange rate, with the current value of the rand against the dollar making us not as competitive as we have been in the past.'

Looking to the future, Byrne says that 'the short and medium term look to be very busy, with it being difficult to project accurately beyond five years. The challenge will be to provide the right skills and technology to meet all our requirements, but with some fast cooking and enough training, we will get by.' □

jetty

'We were contacted by Sonils to give a design and construct price, with an incredibly short completion time. The urgency was due to the fact that the boat was arriving in mid-January; the jetty had to be finished prior to its arrival before it could start spooling,' explains Franki technical director Gavin Byrne.

The project brief was to design and build a jetty for the short-term spooling of offshore oil and gas pipes, with the long-term application being to provide a maritime service for vessels working the offshore oil and gas industry. Byrne explains that Sonils had entered into a contract with Subsea 7 for the provision of a jetty, and hence it approached Franki South Africa because of its widely known ability to stick to budgetary and time constraints, as well



Text P Varndell
VKE International



F P Pequeno
Vela VKE



GEOTECHNICAL

Mamelodi sewer tunnel under construction

CONSTRUCTION HAS RECENTLY started on a 760 m long, 2,7 m ID horseshoe-shaped tunnel through the Magaliesberg in Mamelodi, situated in the east of the City of Tshwane. The tunnel will form part of a major upgrade to the sewer network in the Mamelodi area that also includes 3,4 km of 1,6 m diameter pipeline.

The project forms part of the City of Tshwane Long Term Sanitation Masterplan. Parts of the existing system are more than 40 years old and nearing the end of their expected life, while the capacity of the existing outfall-sewer system is decreasing because of the continued development of Mamelodi and the eastern part of the City of Tshwane.

GVM Incorporated was appointed as the lead consultant, with VKE International as the sub-consultant for the tunnel design together with Vela VKE, who undertook the detailed geotechnical investigations. These revealed fascinating results for the Magaliesberg quartzites.

Cerimele Phenduka JV was awarded the R74-million construction contract and Bomar Projects have been appointed as a sub-contractor to construct the R32-million tunnel section.

ENVIRONMENTAL IMPACT

The initial design called for a series of retaining walls, bridges and a short tunnel

which would have taken the pipeline through the near pristine Baviaanspoort, which is one of the very few river gorges in the Pretoria area that does not have a major thoroughfare dissecting it. The gorge is largely undeveloped with the exception of the existing sewer pipeline, which follows a zig-zag alignment through the river gorge. Following the findings of the EIA, it was decided to abandon the initial proposal, and a sewer tunnel conduit was the preferred proposal. The tunnel solution has a more favourable hydraulic alignment and also ensures that the picturesque and environmentally sensitive valley region will be conserved.

GEOTECHNICAL INVESTIGATIONS

The Pienaars River Outfall Sewer Augmentation Project has since developed into a multi-disciplinary project consisting of several kilometres of 1,6 m diameter pipeline, pipe bridges, junction boxes, pipe-jacked road and railway crossings, and the 760 m long tunnel. Geotechnical investigations for the route were undertaken from 2004 to early 2005. The investigations were primarily focused on determining the anticipated tunnelling conditions, where the largest safety and liability concerns lay, and where delicate engineering was necessary.

The extensive geotechnical investigations included core drilling (holes up to

120 m deep), detailed joint surveys (both on natural exposures and on cores), water pressure tests and rock mechanics testing carried out in Rocklab's state-of-the-art laboratory (see box on page 5). Triaxial tensile tests, unconfined compressive strength (UCS) tests and rock boreability assessments were undertaken to predict the behaviour of the rock mass.

The core drilling in itself posed tremendous challenges for the drilling contractor owing to the strict environmental and safety constraints imposed by the engineering team, together with the difficult access to the drilling positions on top of the Magaliesberg.

The investigations showed that the tunnel project would need to contend with some challenging geological features. Approximately 90% of the tunnel drive will be located in the Magaliesberg Quartzites of the Transvaal Supergroup and a short section of the Silverton Shale Formation will be encountered at the Southern Portal.

The quartzites are extremely hard with UCSs in excess of 400 MPa recorded. The rock was found to be very abrasive, but at the same time brittle. The water table is generally located at tunnel level, but does increase to 20 m above the tunnel in the central section.

The significant regional feature in the area is the presence of a down-faulted block

of quartzite through which the southern half of the tunnel cuts. A major fault zone, about 20 m wide, associated with the down-faulted block, occurs approximately at the mid-point of the tunnel, while a large number of major joints are present in the southern half of the tunnel.

TUNNEL SUPPORT DESIGN

Information from the investigations and analyses was used in determining the geomechanics rock mass rating and Q-values which were used for the tunnel support design. The initial tunnel support was designed using the Q-classification method. It is anticipated that pattern rockbolting alone will be required for most of the tunnel length, but provision has been made for reinforced shotcrete and steel arch support in the sections where poor ground conditions are expected. A 180 mm thick permanent concrete lining will be constructed to ensure structural stability and efficient hydraulic functioning of the tunnel over the full design life.

TUNNEL CONSTRUCTION

The tunnel is being constructed using drill-and-blast techniques. The tunnel sub-contractor, Bomar Projects, is using a

rail-bound Montebert H181 jumbo for the drilling operations. This hydraulic drill rig has two booms and can drill to a depth of 3,7 m. The mucking operations will be conducted using a rail-bound Atlas Copco LM71 loader in conjunction with a Hopper loading system.

Tunnel advance of 95 m has been achieved to date (as at end February 2006) and the ground conditions encountered have been as expected. The quartzite has proved to be extremely hard with UCSs in excess of 300 MPa but there has been limited over break. The majority of the support installed has been provided by individual spot rockbolts. A 5 m section of steel arch support was installed in an area where a major joint was encountered.

This project has thus far shown the true value that a detailed geotechnical investigation can add to a project. Much of what is currently being revealed about the condition and nature of the rock during construction was predicted during the detailed geotechnical investigations. This has minimised the numerous variables that such a tunnelling project would encounter and provided the contractor with a good indication of the conditions that can be expected. □



► About Rocklab

Rocklab, a division of Soillab (Pty) Ltd, has recently made a large capital investment in modernising its laboratory equipment in anticipation of increased civil and mining infrastructure spending over the next few years. The equipment purchased includes a Servo Control Stiff Rock Test Machine with a 2 000 kN capacity which is capable of conducting sophisticated rock testing according to ISRM methods and determining the post-failure strain curve on a triaxial test. It is the only such machine in a commercial laboratory in the country. A surface grinding machine, automatic core drilling machine and automatic diamond saw machine have also been purchased. These machines largely automate the specimen preparation process, ensuring a high quality finish and result.



VW Paint Shop project, Uitenhage

An investigation into the validation of the quality of piled foundations

THE CIVIL WORKS FOR the new Volkswagen Paint Shop (figure 1) in the Eastern Province industrial centre of Uitenhage are at present nearing completion. The design for this design-and-construct project was undertaken by ARQ in conjunction with Goba while Grinaker-LTA Civil Engineering (GLTA) undertook construction.

The foundations for the structure comprise a limited number of spread footings, used where the water table was low. Good-quality dense boulder layer was present within some 3 m of the surface. However,



Figure 1 Volkswagen Paint Shop



Figure 2 Casagrande and Soilmec auger rigs

over the vast majority of the site, these favourable conditions were absent and piled foundations were utilised.

In this article we examine the piling system utilised on the project in order to evaluate the degree to which the quality of the installed system could be defined.

IN-SITU PROFILE

Generally the profile at the site consists of:

- An upper transported layer some 2 m thick
- A transported boulder layer which on average was about 3,5 m thick
- A very soft/soft rock mudstone

The water table was located within the boulder layer.

INSTALLATION METHOD

Auger piles were installed by Ground Engineering (GEL), the geotechnical sister company within the Civil Engineering Business Unit of Grinaker-LTA Construction. Two state-of-the-art machines were used: a Soilmec R515 and a Casagrande B200 (figure 2). Both of these piling rigs were equipped with a facility for screwing the casings through the upper transported material and boulders and forming a near water-tight seal into the mudrock. Thereafter the machines auger a socket of 750 mm diameter within the casing, stopping either at refusal on soft rock, or once a specified maximum socket length of 3 m is achieved.

The base of piles was initially machine-cleaned, but after a careful evaluation of the safety, health and environmental risks attached to the operation, a second phase of hand cleaning was undertaken to ensure a positive contact between base of pile and the mudrock. In most cases this operation was achieved within 10–15 minutes.

QUALITY ASSURANCE

In the field of piling engineering, quality is often assumed to be ensured by specifying that a pile load test be performed. While this test enables the load/deflection behaviour of that particular pile to be determined, it is after all, only single-valued,

and does not generate any guaranteed knowledge of the rest of the piles.

It is postulated that a better idea of the sufficiency of the piled system would be gained if the following questions were answered effectively:

- What type of tests should be performed?
- How many of these tests should be performed?

In order to answer these questions, various factors need to be evaluated: the magnitude of the project, the location and geotechnical complexity of the project, the project programme, the approach and requirements of the client – and many others.

Owing to budget constraints on this design-construct project and the necessity to ensure that some of the above questions were satisfactorily addressed, a three-pronged approach to verify pile integrity was planned.

The individual structural integrity of as many piles as possible was to be verified by conducting a sonic tapping test on the trimmed shaft head of each pile. At a glance, this rapid, cheap test enables the integrity of the pile shaft to be visually appraised. In addition the length of the pile can usually be determined to an accuracy of about 100 mm. It was hoped that all piles could be tested using this method, but it was later realised that programme constraints and availability of suitable personnel would compromise this aim.

The detailed integrity on selected piles was to be confirmed by interrogating the results of cross-hole sonic logging (CHSL) tests. This test is better in identifying defects than the sonic tapping test.

A pile/rock contact test was to be performed, also on selected piles. This test is not normally performed but was thought to be particularly relevant in this case because the majority of the pile capacity is generated by end bearing on the mudstone.

ACTUAL RESULTS

Sonic tapping

Although it was originally envisaged that all piles were to be evaluated by sonic tapping, the fast-track works programme and



Figure 3 Smear contact from mudrock

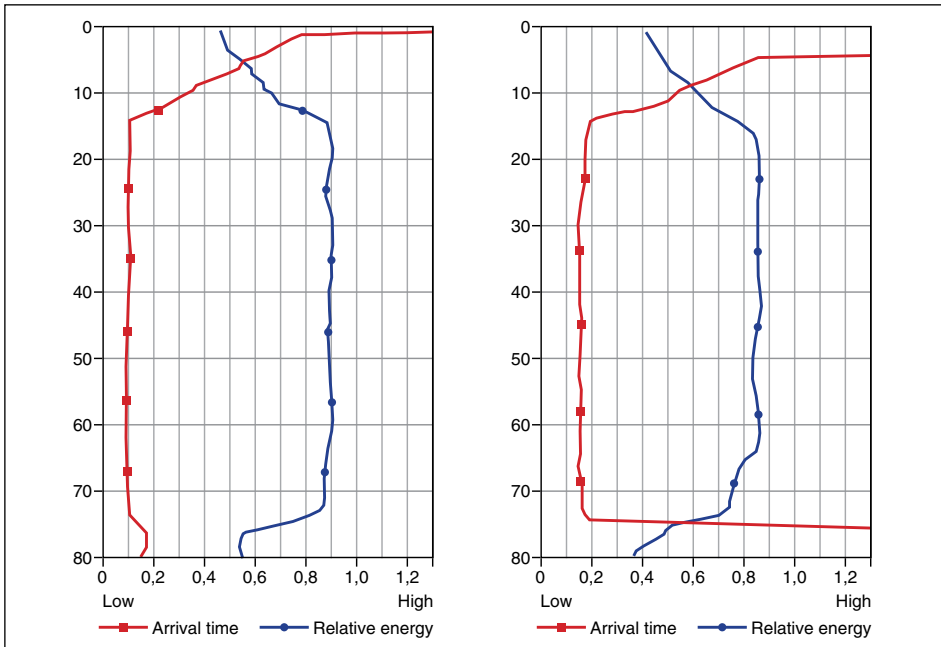


Figure 6 Graphical output from selected traces



Figure 7 Contact between pile concrete and base

the logistics in getting the required personnel from Durban prevented this. In the end 231 of the 355 piles installed on site were subject to sonic tapping tests.

If these 231 piles (65%) tested are considered in a statistical manner, then it can be shown using the t- or Student distribution that the results obtained in the sample

(231 tests) would only vary from the results that would have been obtained in the population (355 tests) by some 1% at the 99,9% confidence level. It is thus considered that a reasonable number of tests were conducted.

Of the 231 tests conducted, visual examination of the graphics results indicated an anomaly in only a single pile. The data indicated some anomalies were present in the upper reaches of the pile. This was possibly due to a rise of bleed water to the top of the pile after casting followed by insufficient removal of slightly compromised concrete. The load data for that particular pile was checked and was found that it only carried some 80% of the maximum design value. Thus the data indicated that the pile was not fatally flawed and did not carry the highest design serviceability load.

As the possibility of remedial measures was remote, it was reasoned that the pile could be left as installed.



Figure 4 No movement of water columns



Figure 5 Preparation of CHSL testing

Pile rock contact test

The rock contact test was applied to seven randomly selected piles. In the first test, a sharp-ended rebar was inserted into each of the PVC ducts and punched into the soft to medium hard rock mudstone socket. The bottom 5 cm of the bar was evaluated for the presence of mudstone smear (as detailed in figure 3), while the recorded pile depths were correlated with the length of the rebar spike. These were within a few centimetres.

In the second part of the test, a tap connection was used to fill the uPVC ducts by sealing the hose/duct connection with duct tape while the adjacent ducts were filled to the top with water. Only clear water returned through the connected ducts and no return, or even slight movement, was evident at water columns in adjacent ducts. Ducts were kept under tap pressure for approximately 2 minutes at a time. It was concluded that the pile/rock contact was water tight and thus adequate for load-bearing purposes.

Cross-hole sonic logging

Two sets of CHSL testing were carried out on site with a typical set-up, as detailed in figure 5. In each case four piles were tested with six traces across each of the four tubes installed.

In a single pile, anomalies in the form of an increase in the first arrival time (FAT) and a decrease in the relative energy of the sonic wave were evident from a depth of approximately 7,5 m below the top of the sonic tube (as detailed in the graphical output in figure 6).



Figure 8 Pile contact on C7/2



Figure 9 Pile contact on B6/4

In order to investigate what caused this concern, the pile was cored and the core examined. The relevant portion at the base of the pile is shown in figure 7.

This coring confirmed that there was definitely a problem at the depth indicated by the CHSL. In order to assess what could possibly have caused this anomaly, various facets were examined in detail. Construction records indicated that concreting took place after 17:00 and actually continued until about 20:00. No other obvious deviations from the norm were observed. Concrete quality records also indicated no problem, but to mitigate the effect of the poor concrete at the base of the pile an additional pile was installed to compensate for any loss of carrying capacity in the problematic pile.

Further investigations

A sonic tapping test was conducted on this particular pile, and when comparing the length obtained from this test to the length derived from the construction records it was found that the construction records indicated a length of 6,507 m while the sonic tapping test predicted a value of

6,35 m (ie the sonic tapping test predicted a length 157 mm shorter than the construction records showed).

Initially it was thought that this may be significant and a spreadsheet was prepared to evaluate in how many cases this particular condition occurred. Two conditions were flagged: an 'orange' warning condition in which the negative difference was < 150 mm and a 'red' danger condition for >150 mm difference.

Of the 231 piles examined some 22 raised the 'red' condition.

In order to evaluate whether this red condition represented cause for concern or not, five of the 'red' condition piles were cored. An additional pile which was deemed to be in the 'green' or 'no problem condition' was also cored for comparison purposes.

Five of the six piles generated satisfactory results. On one pile, however, the drill string skewed and the core exited the side of the pile. This result was thus discarded.

Figures 8 and 9 detail the condition between pile concrete and R3 mudstone deemed to be 'green'.

Thus although some 'red' conditions

were identified, the drilling established that there was no cause for concern. The reason for this is believed to be that the sonic tapping was not always conducted on piles which had been completely trimmed. In all cases the pile testing personnel were on site for only one day and as many piles as possible were tested on that day. It is believed that on some of the piles on which sonic tapping was undertaken, trimming was not complete. This may have resulted in the 'red' condition being identified.

CONCLUSIONS

Although it seems unlikely, only two piles could be established as exhibiting some deficiency. In the first the most likely cause was not breaking back the concrete at the top of the pile to a sound state, while in the other, it probably lies in a combination of time of casting and congestion caused in the pile by sonic tubes.

The other seven piles tested via the cross-hole sonic logging method all proved to be defect free.

All six piles tested for rock contact testing proved to be defect free at the pile base level.

Of the 355 piles cast, the number tested via sonic tapping (231) are vastly in excess of what is required for a statistically significant sample. As the vast majority of these piles proved to be defect free, it is believed that the vast majority of the others are probably also defect free. In this regard the statistical analysis would indicate that there is likely to be a 1% difference between sample and population. This is considered to be insignificant in the context of the project, especially as the quality control procedures conducted by the specialist geotechnical contractor are very rigorous.

The parallel nature of the pile layouts adopted on this project and the relatively favourable piling conditions both provide additional levels of redundancy in the pile design. This provides significant certainty as to the performance of both physically un-sampled piles and the total piling solution as designed and installed.

SOME FINAL THOUGHTS

In this design-and-construct solution, both parties (contractor and designer) are attempting via a collaborative effort to ensure the reliability of the system and the need to know what facets constitute the product which is eventually handed to the client.

The question is thus posed: 'Does this working together between consultant and contractor yield better reliability in the final pile quality or has our industry lost its discipline in testing, recording and acting upon the results obtained?' Are we getting closer to the truth via this collaboration or is this a dream? □



Dura still in an

AS WELL AS BEING BUSY with substantial South African projects in Gauteng, the Western Cape, KwaZulu-Natal and the Eastern Cape, Johannesburg-based Dura Piling is currently active in Mozambique, Zambia, Zimbabwe, Swaziland, Botswana, Madagascar and Mauritius. Dura has previously also been active in Namibia and Lesotho, and are currently interested in certain projects in Angola, Equatorial Guinea, the Democratic Republic of Congo, Malawi, Kenya and Tanzania.

'Here at Dura we are extremely pleased with the recent progress that we have made in expanding our business portfolio,

which now involves innovative design, methods, and plant utilisation for various processes including new piling, lateral support and ground improvement techniques/systems (including port/harbour and marine piling) as well as soil investigation works,' says Rob Marsden, MD and CEO of Dura Piling.

As the Sub-Saharan branch of Soletanche Bachy, Dura Piling (also trading as Dura Soletanche Bachy) has the benefit of the full support of the Soletanche Bachy group. Soletanche Bachy is the world's leading geotechnical and underground engineering spe-

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DURA ZAMBIA

IN OCTOBER 2004 Mopani Copper Mines awarded Dura a \$1 600 000 piling contract for the Mufulira Mine Smelter Upgrade Project, including 935 piles. A mass cruciform foundation was also done for the Isasmelt Furnace by the installation of diaphragm walls. Dura, with the help of Soletanche Bachy head office in France, installed the diaphragm walls and after excavating inside placed a plug for the cruciform deep foundation. The Mufulira project proved to be a huge success and the client was satisfied with the fast-tracking approach that was adopted.

Autkumpo subsequently awarded Dura

another piling contract at Nkana Cobalt plant for the same client, Mopani. Group Five, who were then working for Mopani at the Nkana Acid plant, invited Dura to the rescue as the local piling contractor was failing to deliver the project on time. Dura took over the piling for the Nkana Acid plant and because of the quality and delivery time achieved, Mopani Copper Mine awarded to Dura the subsequent Leach Plant piling contract. With the copper price at its peak, the mining industry in Zambia has embarked on expansion projects to increase the output.

Dura has registered a branch in Zambia with offices in the central Copperbelt town of Kitwe. With their presence in Zambia it has become much easier to assist the clients throughout the industry.

MOMA SANDS JETTY

The Moma Sands Jetty is part of the ancillary works, in the form of a sub-contract of the Moma Heavy Mineral Sands Project in northern Mozambique, which has been assessed and planned for the past 17 years by the Dublin-based mining and exploration company Kenmare Resources.

The site is situated in the northeastern part of Mozambique, some 240 km south of the town of Nampula and 440 km southwest of the Port of Nacala.

The project involves the construction and commission of the 'wet' and 'dry' plants as well as the conveyor system to transport the processed minerals for export along a jetty extending 450 m into the Indian Ocean where barges will be able to dock.

Dura, working in conjunction with Group Five, was appointed as the specialist sub-contractor for the marine piling and jetty construction portion of the contract.

Installation of 610 mm diameter marine piles for the jetty and 1 200 mm diameter piles for the mooring and berthing dolphins is in progress.

Group Five transported the piles to site from South Africa by barge and road in 12 m lengths.

The casings were then welded on site by Dura using full penetration tubular butt joints with a backing strip. All the welds were tested using ultrasonic testing equipment.

The piles were taken out of the welding area to the holding area using one of Dura's RB38 cranes.

The piles are currently being transported out along the jetty to the crane bogey using a transportation bogey. One of Dura's RB61 cranes with a 42 m boom section is then used (it is mounted on a bogey on rails cleverly designed by Liebenberg & Stander) to lift, place and vibro-drive the piles.

Using a PTC50 vibrator and power pack the piles are driven to the final depth using a 6 t drop hammer, in single lengths welded together up to 36 m. Piles are installed in a group of two (bent) and then a bridge deck (headstock) is placed by the Group Five-Dura team, and bolted and grouted. Every 48 hours the crane bogey moves forward to the next bent and the process is repeated until bent 46 is reached.

There are a total of 95 No 610 mm diameter



piles for a jetty and loading bay plus six No 1 200 mm diameter casings for the mooring dolphin piles. At the end of March Dura have nearly reached bent 40, with works expected to be completed in early May, ahead of programme.

The site is situated in a dangerous zone in a cyclone area and is extremely remote, necessitating a high degree of logistical planning.

expansion drive





BERTH 306, RICHARDS BAY COAL TERMINAL

Richards Bay Coal Terminal is the largest export coal terminal in the world, currently exporting more than 72 million tonnes per year, 364 days of the year (stopping only on Christmas Day).

The new expansion works aims to increase export capacity to 92 million tonnes per year. To achieve this, a new berth is under construction to accommodate the increase in traffic of some of the largest ocean-going vessels in the world.

The new berth consists of 11 No 22 m high concrete caissons that are to be backfilled with sand.

Deep soil improvement is to be carried out below the caissons to a depth of up to 45 m below sea level. Dura, in partnership with Soletanche Bachy sister company Vibroflotation, are making use of their patented marine double lock gravel pump to install the required stone columns through the deep silty clay and sand, all under a water depth of some 20 m.

The installation process

The patented marine double lock gravel pump has a snorkel hose, which is attached at an air exhaust lock to a receiver tank. The snorkel hose and locks are operated in such a way that during the gravel transport through hoses there is always atmospheric pressure in the receiver tank, independent of the actual water depth. In this way standard 7,5 bar compressors can accomplish the pneumatic gravel transport from the blow tank to the receiver tank. A high pressure compressor feeds directly into the pressure tank and thus supplies a sufficient pressure to surmount the water and soil pressures in the gravel tube at the tip of the vibroprobe.

The marine double lock gravel pump is currently working in a water depth of 20 m, but with this system it should be possible to reach a depth of 200 m.

The installation works started in January 2006, with the trial section indicating that vibro-compaction would not be possible, owing to the variability in stiffness and clay content of the soils.

A total of 1 120 columns are required on a triangular grid layout with depths ranging from

15 to 20 m below sea bed level.

The accuracy of the system, which is controlled through a Jean Lutz data logger and GPS, allows the quantity of stone placed at any one time to be controlled while monitoring the compaction via the amperage of the V23 vibrator. This ensures that stone is placed only in the areas where it is needed and that compaction takes place through the less silty sands, where less stone is required. Owing to this level of control, it has been possible to replace the required stone bed for the caissons with expanded heads at the top of the stone columns, thus saving time on the programme.

Dura have had a 'belt and brace' approach to the site and have ensured that there are enough spares on site to minimise the inevitable downtime in such a complex and plant-intensive operation.

The site is running two shifts, and stringent quality control is required with columns being checked daily via the Lutz instrumentation records. Production levels have reached in excess of 500 tonnes of stone placed per double shift. This should see the contract completed around the end of April.

► From page 10

cialist contracting group, with approximately 5 000 permanent employees and nearly 100 offices around the world.

Rob points out that Dura's objective is to continue to develop their business in conjunction with a strong, committed and professional client base 'who have recognised and appreciate the value that we can give to complicated geotechnical projects'.

'I would like to extend my personal vote of thanks to all my team, who have been simply fantastic, including my financial director, Yvonne Bausek, who has recently decided to take her well-deserved retirement,' says Rob. □



Rob Marsden



Yvonne Bausek

DURA PILING POWERING AHEAD IN CAPE TOWN

Dura has recently been awarded the piling contract for the Open-Cycle Gas Turbine in Atlantis, Cape Town.

The project is being carried out for Roshcon, the ultimate client being Eskom, and is intended to alleviate the critical electricity supply shortages in the Cape Town Metropolitan area.

This is an extremely fast-track high-priority,

high-profile project, with production, quality and programme being of paramount importance.

The current scope of the project is for approximately 400 driven cast in-situ piles to be installed to an anticipated average depth of 8,0 m. Most of these piles are anticipated to be 610 mm diameter piles, some with extremely high reinforcing to deal with the vibrating loads under the gas turbines.

The project is a team effort, with every single member of the participants from the client to the sub-contractors working together to deliver a good quality project in the shortest possible time so that

the lights won't go out in Cape Town again ...

Dura has a formal agreement with Fairbrother Geotechnical Engineers in the Western Cape, who have provided invaluable logistical support.

► Western Cape region

For any geotechnical work in the Western Cape region, including piling, site investigations and lateral support, contact Fairbrother on 021-15-5470. Dura can be contacted on 011-494-4058 for all geotechnical requirements

Results of some recent sonic integrity testing of piles

Table 1 Results of sonic integrity test

| 1 | 2 | 3 | 4 | 5 |
|-------------------|------------------------|------------------------------|-------------|------------------------------|
| Piling contractor | Number of piles tested | Number of anomalies detected | % Anomalies | Maximum for any one site (%) |
| 1 | 1 649 | 69 | 4,18 | 24,6 |
| 2 | 665 | 3 | 0,45 | 1,94 |
| 3 | 90 | 1 | 1,11 | 1,35 |
| 4 | 359 | 3 | 0,84 | 3,12 |
| 5 | 30 | 0 | 0 | 0 |
| 6 | 639 | 19 | 2,97 | 12,40 |
| 7 | 112 | 0 | 0 | 0 |
| 8 | 1 601 | 36 | 2,25 | 6,00 |
| 9 | 13 | 0 | 0 | 0 |
| Total | 5 158 | 131 | 2,52 | |



Typical pile defects which produce anomalies in sonic test results

DURING 2005 sonic integrity testing was carried out on just over 5 000 piles. A brief overview of the results appears below.

The theory and the practical application of sonic integrity testing have been comprehensively described by Parrock, Hartley, Naidoo and Green (2004). This article therefore deals only with results obtained on a number of sites, mainly in the Durban area.

The piles were installed by ten different piling contractors on 98 different sites. Most of these piles were CFA piles. The results are summarised in table 1.

The piles in table 1 were mostly in silty slightly clayey sands of the Berea Formation and fine to medium grained dune sand. They were usually tested within about two or three weeks of construction. In table 1 the numbers of piles and the corresponding proportion of anomalies are those summed over the full year. Although the average percentages ranged between 0% and 4,18%, the percentage on individual sites was

sometimes much higher. On one individual site, for example, the percentage of piles in which anomalies were detected was 24,6%, and 12,4% on a second site. However, in a separate series of tests, not included in the table, sonic integrity tests were carried out on 44 bored cast in-situ piles constructed about 15 years ago in estuarine sands in Durban. Anomalies were detected in 47% of the piles.

Typical reasons for anomalies were found to be:

- Honeycombing
- Abrupt changes in the strength of the grout in the pile shape
- Segregation of the aggregate
- Inclusions of soil or other foreign materials

■ Large cracks or voids in the pile shaft
 The remedial works that have usually been found necessary depend partly on site conditions, and depth to ground water level. Access is important in cases where the super structure is already under construction. If

the anomaly is less than about 2 m deep, the pile shaft can often be demolished and reconstructed. For deeper anomalies installation of additional piles in a group of piles may be necessary, or two new piles – one on either side of a defective single pile.

It is apparent from investigations on the sites that the most important factor in avoiding pile defects is the experience of the site operators. Appropriate procedures must be followed to attain the specified quality of the grout or concrete and proper installation procedures must be maintained – for example ensuring adequate grout flow and rate of extraction of the auger for CFA piles, and lancing the upper 1,5 m to 2 m of the CFA pile to displace grout with an excessive water content due to migrating of water from the lower portion of the shaft.

A comprehensive site investigation can often indicate the presence of obstructions or features such as subsoil drains, or pipes that would adversely affect the grouting or concreting. However, clients are often reluctant to spend money on site investigations and many piling contracts, especially the smaller ones, are often carried out without any site-specific subsoil data. Cube testing at 7 and 28 days is important and the results must be reviewed as soon as the tests are completed.

With good piling design, and experienced piling contractors, defects can be kept to a minimum or virtually eliminated. Nevertheless, from the data in table 1, and from experience on many sites, it is evident that soil integrity testing should be conducted on all cast-in-place piles, particularly CFA piles and uncased bored piles. Despite the best design and installation practice, certain piling defects (eg inclusion of foreign materials) may well be difficult for the piling contractor to control.

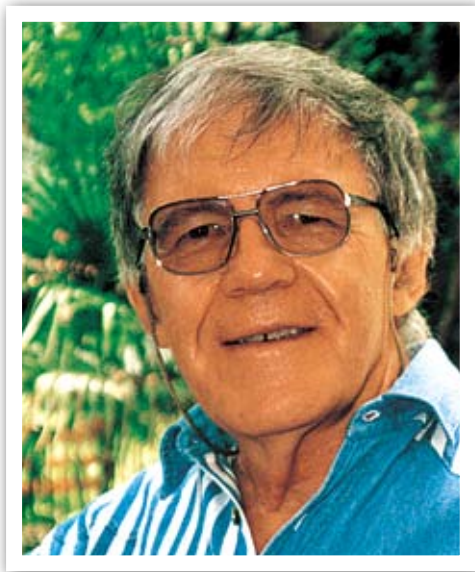
On large piling contracts, load tests, particularly those which reach ultimate load, provide valuable information for design which is not reflected by sonic tests.

Reference

Parrock A, Hartley, F, Naidoo D and Green, T 2004. Some current techniques for determining pile performance in the field. *Civil Engineering*, April, pp 9–13.



Do you want to *see your name in*



He has such intense curiosity and interest in his work that when Dr Frank Netterberg sees a pothole in a road he can hardly restrain himself from hauling out a geological pick, which he always has under the seat of his car, and doing an on-the-spot investigation. He also enjoys the recognition he has received as a researcher of note. But, says Frank, these qualities were key to what he has accomplished in his 40-plus years as a pavement materials and geotechnical specialist. In talking to Lorraine Fourie about his career in applied research and specialist consulting, he ponders, among other things, over the element of chance in his life as an earth scientist

'WHEN, AS A STUDENT, I told my geology professor at Wits that I was interested in research, he looked at me intently and asked whether I had the desire to see my name up in lights. You have to admit to that bit of vanity, he said. If you don't, you can never make it in research, because the money is poor. You're always struggling for funds, in your personal life as well as for your research. So you have to be passionately interested in what you're doing. You must have an inquisitiveness for finding out new things, and you have to be motivated by the need to see your name in print,' Frank sums up the forces that drove him to success.

'It's very important for a researcher to publish, so part of the incentive to work long hours is that people can use the results of your research,' he continues. Since 1959 he has authored or co-authored about 100 works that have been published in national and international journals, books and conference proceedings, and written many more research and consulting reports in his fields of expertise.

AUTHORITY ON CALCRETES

Frank is recognised as an international authority on the geology, location, proper-

ties and use of calcretes, the most common roadbuilding material in the drier two-thirds of southern Africa, and on the use and problems of saline materials in road construction. He is also an expert on pavements on active clays, and on cement and lime stabilisation. In the 1980s his team provided the first proof that carbonation of the stabiliser was the previously unexplained factor in the distress and failure of many cement and lime stabilised pavements throughout southern Africa. Since then research carried out under his supervision has led to an understanding and containment of the problem. Another first was his detailed investigation for Sasol into the effects of longwall mining for coal under bitumenised and unpaved roads in the coal-bearing areas of South Africa.

Dedication and commitment paid off because recognition for his work has been forthcoming over the years: the Holdredge Award of the Association of Engineering Geologists in the United States, for a report on calcarete in road construction (1975); the Jennings Award from SAICE for his work on calcretes, as well as two further awards from the Institution for his papers on the

location and use of calcretes for unsealed roads (1978); co-recipient of the South African National Transport Commission's award for a paper on wearing courses for unpaved roads (1988); co-recipient of the SAICE award for the best R & D paper (1989); SAICE's Medal for Meritorious Research on the engineering geology of pedocretes, especially calcretes (1994); the Draper Medal of the Geological Society of South Africa for 'his enormous contribution to the earth sciences' (1996); the Silver Medal of the Soil Science Society of South Africa (2001); and the South African Geotechnical Medal for 'his contribution to the art and science of geotechnical engineering in South Africa', as well as the Gold Medal of the SA Institution of Engineering and Environmental Geologists (2004).

As a youngster Frank wasn't so dedicated, or rather his commitment lay elsewhere. While studying for a BSc degree in geology at the University of Cape Town he was much more interested in snow skiing and climbing mountains. 'I fell in with the university mountaineering crowd and had a tremendous time. The studies only came second. I sort of passed; once I even

lights?

I was battling with the problem of the premature cracking of asphalt on an airport in Botswana when my dog, which then was a puppy, dragged out some document from under an immense pile of paperwork that is normally scattered all over my office. When I eventually managed to retrieve it from his mouth, there was a paper from Sweden that held the answer to the problem ...

got nought for a pure maths test. The prof called me in and said he failed to see how anyone could get nought for a test. When I pointed out that I had actually got many of the answers right, he agreed, but said that my reasoning was that of the Ancient Egyptians! However, I eventually managed to get my degree in 1960. It was only after I got into research at the CSIR that I blossomed and found my calling, shall we say.'

STUMBLING UPON ENGINEERING GEOLOGY

After graduating Frank did mineral exploration for African Selection Trust in the Kaokoveld in the former South West Africa (SWA) and Rhodesia (now Namibia and Zimbabwe, respectively). 'It was quickly drummed into you that you were not looking for minerals, you were looking for a new mine.'

Chance, good fortune, luck, whatever you may call it, reared its head for the first time in 1963. 'For my honours year I decided to go to Wits, which had a reputation for being more practical, rather than UCT. There I ran into an old acquaintance from my Kaokoveld days, who said he was going to study engineering geology and suggested I join him. I said, engineering geology – what's that? Whereupon we went to see a fellow called Tony Brink; after all, it sounded more interesting than looking for new mines. Looking back I can't believe my luck – being able to study engineering geology under Tony Brink and soil mechanics under Jere Jennings and Ken Knight, who were the leading minds in their respective fields. One of the first things Jennings said to us was that an engineering geologist had to be a one-armed geologist. He was not allowed to say that on the one hand it could be this, but on the other hand it could be that! And this I've always tried to be, although with Nature you never really know.'

His first intensive study of calcretes was undertaken for the SWA roads department in 1964. 'I was working for Kantey and Templer consulting engineers in Cape Town at the time, doing soil engineering

mapping and site investigations, and was loaned to the CSIR's National Institute for Transport and Road Research (NITRR) to investigate calcretes as a low-cost road-building material. I had a wide mandate and had to find out everything about calcretes – how to locate them, what was in them, how to test them and what specifications to apply to them.'

Frank's work in Namibia and subsequently in semi-arid regions in the rest of southern Africa – mostly Botswana, and widely in South Africa itself – led to the general acceptance of relaxed specifications for calcrete with considerable savings in costs, and to methods of utilising excessively saline base materials and water for compaction. Over the years he has visited, learned from, and advised on many of the roads and other pavements, such as airports, on the subcontinent that were constructed using calcretes, ferricretes and saline materials.

Frank joined the NITRR full time in 1965. 'Initially I thought I would go for a year only to do a master's, but the work

and the environment proved so fascinating that I stayed for four years. At the NITRR I had the good fortune – again, I didn't know it until later – to work with top research engineers, scientists and technicians in a research environment that was probably matched only by two or three other organisations in the world. Alas, most of this is no more. Doing research with commercial laboratories is not very satisfactory.' His research on the geology and engineering properties of calcretes eventually led to a PhD degree at Wits (1970).

To gain some overseas experience he joined Ove Arup consulting engineers in London, UK, where he mainly carried out site investigations for structures, often in coal mining areas. But back at Wits, Tony Brink had left and Frank was offered his post as lecturer in engineering geology. 'I thought it was the ideal job – a combination

► *Opposite page: Frank Netterberg, internationally recognised authority on calcretes*

Below: Frank taming Gamkaskloof (The Hell) by scooter in the late 1950s



of research, teaching and a bit of consulting to keep one's feet on the ground, so you weren't just doing ivory tower work. In the end it turned out that I couldn't do much serious research because the demands of lecturing took up most of my time.'

Two years later full-time research at the NITRR beckoned again. 'I'm really a hands-on applied researcher and specialist consultant. I enjoy this because one is at the forefront of knowledge. Usually when the problem reaches my desk, it's something highly specialised and very challenging that nobody else in the chain could solve up to then. Now there's a difference between a researcher and other people: the researcher is not motivated by money, except that he's got to have some means of income. He's motivated by a passionate interest in his field of study, discovering things that no one knew before – to search for the truth, if you like.

'At the CSIR we then still had an ample research budget. I always like to say that we were able to concentrate on doing the job properly. We had to produce results that were impeccable, and cost and time were secondary considerations.' The work on calcretes and saline materials expanded, progressing to long-term road performance experiments.

In 1977 Frank was appointed head of the NITRR's Soil Engineering Group, in charge of geotechnical and geological engineering research on natural gravels for paved and unpaved roads, waste materials, cement and lime stabilisation, salt damage, active clays, collapsing sands, moisture in roads, drainage, slopes and cuttings, soil and aggregate test methods, and mining subsidence. His expertise made him the ideal person to play a strong troubleshooting and specialist advisory role throughout southern Africa, which he still does. He also still monitors the long-term effects of many of these experiments with a view to writing up his findings and publishing the results. 'Obtaining funding to do this is my biggest problem at present. Research is expensive, especially if properly done, and it has to be properly done, because this is where our engineering practices and specifications like COLTO come from. Mistakes there can cost more later on than the research itself.'

INDEPENDENT OPERATOR

By the end of 1989 Frank felt that the time had come for him to leave the CSIR. 'The research environment had changed and I decided to go out on my own. I've been doing pretty much the same type of work ever since, but my heart is still in research.'

He returns to the phenomenon of chance in his life. 'It can take 20 years for one to develop a hypothesis, test the theory and find some answers, but there's

always something that's not definitive. Then something happens quite by chance, something so mundane it's laughable. I was battling with the problem of the premature cracking of asphalt on an airport in Botswana when my dog, which then was a puppy, dragged out some document from under an immense pile of paperwork that is normally scattered all over my office. When I eventually managed to retrieve it from his mouth, there was a paper from Sweden that held the answer to the problem,' he chuckles.

He cites another example: 'On a field trip in 1982 with some consulting engineers in KwaZulu-Natal, I was asleep in the back seat of the car, when the car stopped and I woke up. Still half asleep, I looked out the window and saw my colleagues observing some rippled surfacing, wondering about the cause of this distress in the road. I noticed that it looked exactly the same as a road I was investigating in Namibia. The problem – quickly established then and there with my geological pick – was caused by a weak interlayer between the surfacing and the lime-stabilised base. I believed this weak interlayer was because of carbonation-induced weakening during the long delay between completing the base and surfacing the long length of road. To cut a long story short – I had the necessary chemicals with me and right there I could prove to them what had happened to the lime. Now, had I sat and looked out the other side, and seen nothing, I would simply have slumbered on and a valuable opportunity would have been lost.'

At age 67 he admits that there's not much more that he wants to achieve except to finish writing up his research and see it published, criticised – 'whether it's good stuff or rubbish, because the older I get the more I know how little I know' – and applied. Also, of course, getting out into the mountains more often. He has fond memories of his earlier adventurous days when he did some serious ice climbing in East Africa and learned how to cope with mountain rescues. 'I think my most memorable ringing-in of the New Year was sitting on a 1,5 m x 1,0 m ledge, 5 000 m up Mount Kenya, after falling 50 m down a glacier. Fortunately, apart from mild frostbite, no one was hurt in the incident.'

His meticulous work ethic spills over into other favourite pursuits. Together with his son, he's restoring a 1959 MGA Twin Cam to its original pristine condition. 'I belong to the MG Car Club in Pretoria and although this model is not vintage it's a classic – there are very few in the country and this is the only one in Pretoria,' he says proudly. As for his everyday mode of transport, he drives a 40 year old Volvo, a real 'kanniedood'. 'My prof warned me that I would always be short of money, and besides, it's not a security risk.'

History and genealogy are other pre-



► Top: Frank's treasured 1959 MGA Twin Cam. Here he is, about 15 years ago, with his son Michael, who is at present helping his father restore the car to its original pristine condition
Middle: Hiking the Cycad Trail at Middelburg, Mpumalanga
Bottom: Frank interprets a calcrete profile in the Pienaars River area north of Pretoria

ferred pastimes. He had been through all the volumes of the South African engineers in World War II, and has been trying to trace the name Netterberg to its roots. 'We thought at first it was Swedish because my grandfather came from Sweden, but the original Netterbergs presumably migrated to Sweden from somewhere in northern Germany.' He touches on the maxim that history teaches us that mankind learns nothing from history. 'The same, I'm sorry to say, seems to be true of some of our roadbuilding today.' While this keeps him in good Cape wine – he passed the KWV advanced course in wine years ago and made his own for a while – it saddens him as a researcher.

The younger generation of geotechnical engineers regard Frank Netterberg as one of the doyens of the profession. His thorough and exact approach to everything he does is well known, which he affirms. 'Yes, I don't like "slapgat" work, it has to be done properly.' ■

GEO 16 ICSMGE held in Osaka



Akashi Kaikyo Bridge



Osaka by night

THE 16TH INTERNATIONAL Conference on Soil Mechanics & Geotechnical Engineering was held from 12 to 16 September 2005 at the Grand Cube Convention Centre in Osaka, Japan. The conference also provided an opportunity for the meeting of the ISSMGE Board, the 3rd iYGEC (International Young Geotechnical Engineers Conference) and Technical Committee (TC) workshops.

At the board meeting the South African society was represented by Nico Vermeulen and S W Jacobsz with Peter Day, retiring vice-president for the Africa region. Professor Pedro Sêco e Pinto (Portugal) was elected the new president of the society and

Professor Mounir Bouassida (Algeria) the new vice-president for Africa.

Megan Little and Lourence Tshabalala represented South Africa at the iYGEC after receiving awards and sponsorship for best presentation and best technical paper respectively at the local YGEC held at Swadini in June 2005. At the conclusion of the conference the ISSMGE presented their Young Member Awards for outstanding contributions to the development of geotechnical engineering (2001–2005) to S W Jacobsz (SA), Ellen Rathje (USA) and Susan Gourvenec (Australia).

In addition to the above, the conference was attended by Gavin Byrne (Franki), Trevor Green (ARQ) and Gavin Wardle (J&W). Five hundred and eighty four papers were accepted and presented as part of the technical, paper presentation and poster discussion sessions. A novel approach at this conference was that virtually all the papers were presented, allowing about 5 minutes per paper for a brief introduction. The authors were then allowed to display a poster summary of their papers and discuss these with interested delegates during subsequent discussion sessions.

Special lectures that were presented during the conference included the following:

- **Terzaghi Oration** 'Associating with advancing insight' by Professor F B J Barends (Technical University Delft & GeoDelft, The Netherlands)
- **Heritage Lecture** 'Development of geotechnical earthquake engineering in Japan' by Professor I Towhata (University of Tokyo, Japan)
- **Special Session** '2004 Niigata-ken Chuetsu Earthquake' by Professor F Tatsuoka (Japan)
- **Major Project Session**
 - 'An introduction of the geotechnical engineering issues for the Three Gorges Dam Project' by Drs Z Cheng, A Wu and C Bao (Yangtze River Scientific Research Institute, Peoples Republic of China)
 - 'Challenges in offshore geotechnics in Southeast Asia' by Professor C F Leung (National University of Singapore)
 - 'Second phase construction project of Kansai International Airport – Large-scale reclamation work on soft deposits' by Dr T Furudoi (Kansai International Airport Land Development Co, Japan)

An exiting new addition to the conference

programme was the practitioner/academic discussion forum coordinated by Professor Harry Poulos. The purpose of this forum was to try and bridge the gap that exists between academics (research for the sake of research) and practitioners (practice with ignorance towards new advances). The following issues were addressed:

■ Application of research to practice

Academics: Give an example of research work that you feel has potential for practical application but has not been used extensively by practitioners.

Practitioners: Give an example of a problem that you have encountered where research is lacking and would have been of benefit in developing a solution.

■ Complex vs simplified modelling of soils

Should research continue on complex constitutive laws for soil behaviour when we are unable to adequately assess parameters for simpler soil models, or should we focus on better evaluation of the simpler soil model parameters?

These sessions were probably the highlight of the conference and resulted in some lively debate by representatives on both sides – the academics (Professors M Bolton (UK), P Mayne (US) and F Tatsuoka (Japan)) vs the practitioners (Dr S Crawford (New Zealand), Mr P Day (South Africa) and Mr L Valenzuela (Chile)).

Osaka, Kyoto and Kobe provided the background for the social activities and technical tours. Accompanying persons (and some delegates) were able to participate in cultural experiences, riverboat tours and discovering the history of the area. The post-conference technical tours included the expansion project at Kansai International Airport, the Earthquake Memorial Nojima Fault Museum and Akashi Kaikyo Bridge (at almost 2 km the world's longest single-span suspension bridge), the remains of the 1995 Kobe earthquake, and construction of the underground railway for the Nakanoshima New Line.

All in all it the conference was organised with typical Japanese efficiency and was well enjoyed by everyone. (Travel tip: When travelling to Japan, note that official social events end promptly at 21:00 and if you don't leave, the lights are dimmed and then switched off. Fortunately many local pubs and restaurants stay open all night ...)

Nico Vermeulen



Equipping the piling nation

Piling contractors and their plant

THE STATUS OF GEOTECHNICAL EQUIPMENT in the South African piling contractors' market can be seen as a unique blend of evolution and isolation.

In the 1950s and 1960s, older contractors such as Frankipile and McLaren & Eger brought pioneering equipment primarily from the UK (Franki rigs, Dowsett rigs, RB cranes) and the US (Williams diggers). Other contractors such as GEL and Dura followed with similar style mechanical equipment.

In the 1970s and 1980s the local piling contractors expanded, and large fleets of predominantly mechanical equipment became the backbone of the industry.

This period also saw the effects of international isolation and trade embargoes.

The resilience of the local construction industry and its ability to survive and expand laid the foundation for the development and manufacture of local geotechnical large plant.

This period saw a number of new smaller contractors enter the

market with locally built equipment or components that fitted onto a mechanical crane that transformed it into a piling rig.

Since the South African manufacturing/engineering industry is highly advanced, it is of little surprise that the local manufactured equipment performed well in its own environment. Local contractors continued to make productive and effective piling equipment.

Since devising a geotechnical rig to suit local conditions is the preferred route, it was clear that this solution would be copied by other local competitors/contractors – hence the attraction for other possible contractors.

However, trends and geotechnical pile designs change and equipment changes naturally followed.

A significant transformation occurred in the late 1970s when Joe Rose formed Esor. His vision of continuous flight auger (CFA) piling as a niche for the South African market was correct, and a successful company was built around this pile.

The CFA pile needed a special type of unit, however, and again the decision was taken to manufacture locally, based on a known crane suspended principle.

The base carrier for most of these CFA units became a mechanical crawler crane.

Locally made crane booms, hanging leaders, auger rotation heads and powerpacks and flights became a way of business.

This 'local build' trend continued into the 1990s and has a place even today.

In the late 1980s and early 1990s the hydraulic era worldwide captured the geotechnical and piling industry. At present the hydraulic acceptance for construction type units is well entrenched and will go from strength to strength.

Hydraulic track mount auger rigs have taken over from mechanical truck mount rigs and hydraulic crawler cranes are currently sweeping through the world to replace old mechanical units.

The concept of hydraulic power is well suited to geotechnical and piling applications. A combination of torque, rpm, thrust and impact is always essential. All of these features can be carried out and controlled using hydraulics.

An almost total transformation has occurred and mechanical gearboxes and winches have been replaced with powerful and controllable hydraulic systems. Clever design has resulted in units now being custom built so that they are smaller and easier to handle than the older, heavier mechanical units.

Features such as hydraulic extendable tracks, telescopic booms, folding masts, multiple winches, very strong line pull winch, safety control systems and auxiliary applications have created a whole new way of working with and obtaining versatility from a base hydraulic unit.

Operator ease has been simplified and matched to computer safety systems and a new era of application and maintenance of hydraulic equipment in engine management systems has entered the market place.

Certain South African piling contractors have already taken the path of transition from mechanical to hydraulic. Since the geotechnical market is highly competitive, the capital outlay for new rigs is sometimes too onerous and jeopardises tender competitiveness,

therefore used equipment (five to eight years old) is often the preferred route.

Since the European equipment trend is to trade rigs in at the five-year mark, it is often possible to secure well-maintained rigs in Europe (having 2 000 to 3 000 hours' work) for good, market-related prices.

Running parallel to the above change, the old mechanical rigs still offer good service and will do so for some years to come.

The main problem faced by piling contractors is a people problem as opposed to a rig problem.

The mechanical rigs are prone to breakdowns owing to their type of manufacture and numerous wearing components. Because of age and units becoming obsolete, spare parts have become of concern to the contractor. In addition, specialist operators and mechanics are needed to keep these units going. The older mechanical piling units require skilled operators capable of handling them correctly. These operators need years of experience and training that can only be acquired in-house. The losses being felt by all contractors owing to the current Aids fatality rate is creating a very difficult period for them. The mechanics trained to maintain, repair and rebuild these old units have become equally scarce as they have taken many years to fully understand and be trained in older mechanical knowledge. To date, no younger mechanics are prepared to enter this field and manufacturer training cannot be offered.

Since the older mechanical supply companies such as RB, NCK, Dowsett and Hughes do not exist any more, the pool of persons trained in these older units is dwindling fast and they will never be replaced.

Although the local piling industry is still extremely active and growing, this natural transition is affecting all the players in some way or other.

The mechanical era of piling equipment in South Africa is nearing its end. Although many will still maintain that these units were the best, the hydraulic era in piling has arrived, and soon more hydraulic augers, drills and cranes will occupy our construction sites. ■

Call for nominations: Geotechnical Division Awards 2006

The Geotechnical Division wishes to invite nominations for the Jennings Award for 2006. The Jennings Award is presented annually to the author(s) of a paper on a geotechnical subject published at a local or international conference or in a journal. The award is made in honour of Professor J E Jennings, who is widely regarded as the pioneer of modern soil mechanics in South Africa.

The Geotechnical Division also invites nominations for the Barry van Wyk Award. This award is presented annually to a final-year student at a South African university or university of technology for his/her final year dissertation, which must be in the field of soil mechanics or geotechnical engineering.

► Info

Nominations, accompanied by a copy of the relevant paper / dissertation, should be mailed to

Dr T E B Vorster
Africon, PO Box 905, Pretoria 0001
E-mail eduardv@africon.co.za

The **deadline for submissions** is 30 August 2006.

The presentation of the awards will take place at the Geotechnical Division's annual general meeting in November 2006

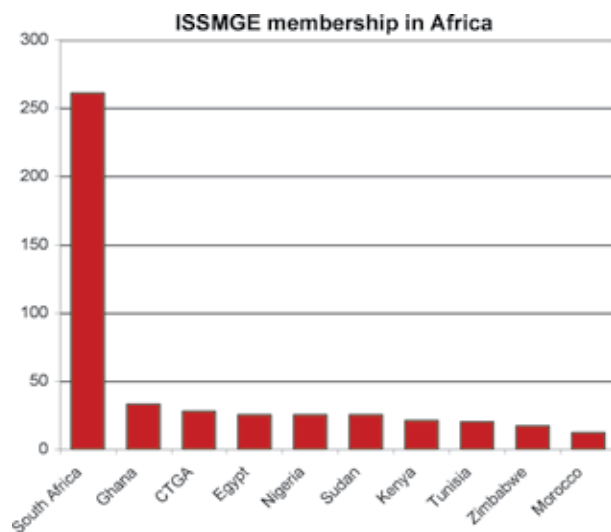
Geotechnical Division the largest ISSMGE member society in Africa

DESPITE A DROP in the membership of the Geotechnical Division in recent years, South Africa remains the largest member society of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE). In fact, South Africa's membership exceeds the combined membership of all the other African member societies.

South Africa's membership has dropped from 546 in 1997 to 390 in 2001 and currently stands at 261. This is probably due to the ISSMGE dues being added to the membership fees for the Geotechnical Division, making the 'GeoDiv' one of the more expensive divisions in SAICE.

The reason why South Africa is the dominant member society in Africa is that the 'GeoDiv' has a policy of enrolling all its members with the ISSMGE. In other words, being a member of the division automatically makes you a member of the ISSMGE with all the accompanying benefits including discounted conference fees, eligibility for membership of technical Committees and access to geotechnical literature. Many other countries in Africa enrol only their office bearers (normally leading academics) with the ISSMGE.

The 'GeoDiv' committee has established a reputation within the ISSMGE for being a young and vibrant committee with a good balance between academics, contractors and consultants.



► Info

For more information on the **role and activities** of the ISSMGE, contact Peter Day (day@jaws.co.za)



BLACK ECONOMIC EMPOWERMENT

A practical application of enterprise development and corporate social investment

MY FIRST ARTICLE (*Civil Engineering*, February 2006) covered a few of the myths that seem to fog up the whole BEE concept. It also postulated that the theory behind BEE might have been inspired by Abraham Maslow. This instalment is an assessment of corporate social investment and enterprise development – Maslow's first and second needs.

I believe that these two elements of the scorecard are the most significant, I also think that the Finance Minister would concur with me. The guiding principle behind these two concepts is sustainability for the poorest of the poor, most of whom reside in the rural areas. This sustain-

ability includes employment and wealth creation. The codes offer incentives for companies to invest in the Urban Renewal Programme and the Integrated Sustainable Rural Development Programme consists of 21 nodes across South Africa within which some ten million of its poorest citizens live. This story below illustrates the dilemma facing a large percentage of the South African population.

Joe Nkadimeng (not his real name) is a talented music student who managed to raise enough money to make it through his first year at university. Joe did not arrive at registration for the second year. After a little investigation, Joe was found to be working

in Johannesburg as a security guard. His lecturers were devastated and started a campaign to bring Joe back for the next year (it is too late to register him for 2006).

The solution to Joe's problem appears to be quite simple: all he needs to do is find a sponsor for the duration of his studies. The sponsorship would need to include accommodation. There should be no shortage of corporate sponsors who could be persuaded to make a contribution in exchange for a few points on their Corporate Social Investment scorecard. This is, however, a short-term solution to a much larger problem.

Joe's story is compounded by his

domestic situation. As it turns out he has taken the job to supplement his family's income. Mrs Nkadimeng is a Johannesburg street hawker who ekes out a living of R400 per month. For this R400, Mrs Nkadimeng is responsible for the accommodation, food and clothing for four people. Joe's monthly salary is vital to the family's monthly survival. It follows that any sponsorship that Joe receives will not be solving the broader challenges that he and his family face.

Mrs Nkadimeng is a typical example of South Africa's second economy. As a rule of thumb the second economy is identified by the following features:

- It is underdeveloped.
- It is isolated from the first and global economies.
- It contains a large percentage of people including the urban and rural poor.
- It contributes little to the country's wealth.

The government has been concerned as to the marrying of the first and second economies. A recent conference observed that the resolution of this problem does not lie in increasing welfare, as welfare can never overcome the scale of poverty and underdevelopment found in the rural areas and urban townships that contain the great

majority of the African population.

There have been numerous policies that have been designed to address the second economy – RDP, Gear and, most recently, Asgisa. The implementation of all these policies is to be found in the BEE codes. We'll now tie Joe Nkadimeng's situation into the BEE codes.

The most significant codes that are at play here are corporate social investment and enterprise development. It would seem that Joe's ultimate solution lies in solving his mother's problem. The facts suggest that Mrs Nkadimeng is living somewhere below the breadline, and whilst a regular welfare contribution will aid her situation, it will not elevate her from the downward poverty spiral she finds herself in. She really requires some enterprise development assistance, some type of leg-up that will differentiate her business and move her into a higher income bracket. This assistance must help her develop a sustainable enterprise so that she is able to operate under her own steam in the future, therefore donations of stock on a regular basis will have little positive long-term effect.

The spectrum for enterprise development contributions is particularly wide – the only real criterion is that the

contribution should ultimately result in the recipient becoming a sustainable enterprise. These contributions do not have to be purely financial, they could be a skills transfer or donation of machinery or equipment that will assist the recipient in getting off the ground. Mrs Nkadimeng's business would certainly benefit from any type of assistance from a corporate. If this assistance is ongoing, then the chances of her business surviving in the long term and moving from the second to the first economy increase substantially.

With Joe's mother now on the path to greater wealth, her dependence on Joe will diminish. It is at this point that the sponsorship of Joe's education will start to make sense.

The good news for donating companies is that they will be able to claim both enterprise development and corporate social investment points on their own BEE scorecards.

Joe's story is largely based on the truth. There is unfortunately no shortage of these types of cases in our economy, but with the right kind of focus from both the government and corporate South Africa, we will start taking the correct steps to growing our economy. ■



HUMAN RESOURCES

The community employer – a new employment contract

IT IS NOT BREAKING NEWS that business paradigms are shifting significantly. The difference, in historical terms, is that the shift is taking place on a global scale never seen before. Thomas L. Friedman, in his seminal book *The World is Flat*, describes how our world is being flattened by historical events and forces that in the last 15 years have resulted in the globalised, connected, speed-oriented world we live in.

Many factors contribute to these changes – the advancement of the Internet, outsourcing, production techniques, and many others. Although the global economy is a product of the cumulative efforts of local economies, many countries are finding themselves in precarious positions where some are forerunners and some are being left behind. Emerging economies are challenging the way we operate significantly. It is a defining time in history that no country is exempt from.

Many countries are finding themselves in do-or-die situations where global shifts need to be embraced to remain competitive in a context where local forces resist these changes. A typical example of such a shift lies in the employment contract between employee and employer. The global trend is the emergence of what Tom Peters calls the professional service firm (PSF) where individual entrepreneurship is the sign of the times. Working for BigCo for life is no longer the status quo. Talented individuals are creating a world of work dependent on themselves, their skills, their networks and their own attitude.

Whatever the view, a new employment contract is emerging where the traditional parameters of employment are being destroyed and revisited. The old contract was based on loyalty – BigCo would pay an employee a market-related salary and expect performance and long-standing loyalty in return. The employee of BigCo would expect a job for life in return for their salary.

The emergence of the PSF is contextual as many baby boomers found themselves being retrenched in rightsizing efforts as corporations faced economic challenges in the 1980s and 1990s. The realisation that jobs for life did not exist, and that survival in such a world is left up to our individual talent, has become apparent.

This is a specific challenge in South Africa for companies, for HR practitioners and entrepreneurs alike. Our historical lines between blue-collar and white-collar employees are being challenged in such turbulent times. It is the trend though that our traditionally blue-collar workers still operate on and expect the old loyalty employment contract, while super-talented white-collar employees are changing the way in which employment operates.

The distinction between employees who embrace the global shift and those who do not is evident in the events surrounding the June 2005 Metrorail strike. Although it was an all too typical situation in 2005 when mass union mobilisation occurred, the deadlock characterised how the blue-collar sector is resisting the global forces.

In a monumental strike that brought the country to a virtual standstill by limiting commuter mobility, the Labour Court ruled that the strike was legal in a precedent-setting ruling. The central issue in the strike, as with most in South African union disputes, was over wage increases.

The Union was demanding a 6,5% increase across the board while Metrorail was offering a 5,5% increase. And so a deadlock ensued. Neither party was prepared to move on the issue, let alone compromise. The Union claimed that anything less than a 6,5% increment was unjust and underserved, while Metrorail claimed that any increase beyond 5,5% would severely cripple its financial viability.

The rationale behind demanding annual increases that please the represented unionised employees lies in a socialist belief that the employer exists for the benefit of its employees. This position is starkly contrasted by the capitalist beliefs held by decision-makers and shareholders. In this orientation towards employment, annual increases are seen as a right.

To a capitalist mindset, these issues ring true in frustration. But under interrogation from a community mindset, these questions represent resounding issues. Many an employee believes that a company should be a steward of the employees and the community in which those employees find themselves. In this way the company ceases to be a company, but becomes the parent the employees never had – the parent who has seemingly sufficient

resources to significantly improve the lot of its employees. This should be a company's first priority. The question is asked, 'Does my company look after me?' 'Does my company put money where it is needed?'

So what is the solution for the conscientious, caring employer? This debate rages on, and will continue to rage on. Owners will argue how much they look after their employees, and the majority of employees will argue how little they are looked after.

By and large our country still operates within the belief that the company should look after the employee, to the standards expected by the employee. It is a situation typical of that found in the US where employees of corporations were proud to have a job for life. They left for work at the same time every day. They delivered the same levels of performance every day. They received their pay every month, and made retirement plans based on consistent and regular increases in remuneration. Does this situation accurately reflect the employment contract? No. A company merely pays for a person's time and talent. An employee receives remuneration for this effort.

And so our country is in a position where at one moment it is doing its best to contribute to the global shifts on operating, but at the same time is being left behind due to resistant forces that do not see the value of competing on a global stage. Reverting to the old loyalty-based contract is hindering the development of new opportunities that incentivise and favour the talent inherent in our blue-collar workforce.

As we move into an economy based on connecting with our customers, suppliers, shareholders and employees, we are learning that our businesses will succeed or fail on their ability to connect, and to connect well. One wonders what lessons the union leaders have to learn as they reinforce the old contract mentality in a competitive world that has no patience for such resistance? How do you lead a group of semi-skilled employees, to a place where they don't beckon over one percentage point increase in salary, but rather use that fervour to re-invent themselves and skills sets? And yet, what work needs to be done on a global scale in order that employers connect better with their employees? ■



SEACORE COMPLETES ONE OF ITS MOST CHALLENGING PROJECTS

SEACORE HAS SUCCESSFULLY completed one of its most challenging exploration projects in the company's 30-year history, drilling and recovering core samples of the massive sulphide deposits from the floor of the Manus Basin in the deep western Pacific Ocean, north of Papua New Guinea. Seacore, operating at a water depth of 1 700 m, drilled boreholes at over 30 locations and took core samples up to 20 m into seabed.

Seacore is one of Europe's largest specialist marine and offshore large diameter drilling construction and exploration drilling contractors.

The demanding and complex project is part of a mineral exploration programme for Placer Dome Oceania, in association with Nautilus Minerals Inc, to assess the commercial viability and environmental impact of mining gold, copper, zinc and silver deposits from the floor of the Pacific Ocean. The project is believed to be one of the world's first detailed commercial drilling and sampling programmes of these types of seabed mineral rich deposits. The deposits

are formed in mounds and hydrothermal vents or chimneys, produced by deep convection circulation of sea water generated by submarine volcanic activity.

Nautilus Minerals has been granted exploration licenses by Papua New Guinea, the first country to do so, to prospect for gold, copper and zinc sulphide deposits over 15 000 km² of the seabed in areas of hydrothermal activity. The initial Solwara Project focused on the Suzette Field, which covers an area of some 300 000 m² and is situated about 50 km northwest of Papua New Guinea's East New Britain Province's main port of Rabaul. Here Placer Dome Inc, one of the world's largest gold mining companies, through

► Above: Seacore working in a water depth of 1 700 m used its R100 Drill rig on the vessel D P Hunter to take core samples from the sea floor of the Manus Basin in the western Pacific Ocean, north of Papua New Guinea

Below: Seacore's drilling team running in drill rods on the D P Hunter to take core samples from the sea floor in 1 700 m of water.



its subsidiary Placer Dome Oceania Ltd, is funding an exploration programme of the seafloor for Nautilus Minerals. Placer Dome, recently acquired by Barrick Gold Corporation, based in Toronto, Canada, awarded an approximate US\$5.2 million exploration drilling and coring contract to Seacore.

For the Solwara project Seacore used its own heave compensated R100 drill rig mounted onto the chartered multiservice construction vessel *D P Hunter* to provide the drilling and sampling services. Seacore, based in Cornwall, England, complemented this equipment with a special drill string and suite of drilling tools for the taxing contract.

'This was one of Seacore's most challenging projects,' says Seacore exploration division commercial and contracts manager Mark Richards. 'We were operating in water over a mile deep and coupled with the sea floor topography, with its collapsed hydrothermal chimneys, surrounded by precipitous sedimentary mineral deposits, made it challenging to implant the drill bit. This tricky operation was helped by previous high definition 3D topographical mapping of the sea bed and, in some instances, the use of an ROV [remotely operated vehicle] with a camera, supplied by the client. Despite the enormous challenge, the project was very successful and we anticipate other similar exploration projects, which we hope Seacore will be involved with.'

The Solwara project followed on directly from Seacore's previous and similar deep sea minerals exploration drilling project with the *D P Hunter* and its R100 drill off the North Island of New Zealand. This followed on from a scientific seabed coring project off the coast of Tahiti for the National Environmental Research Council in association with the British Geological Society, investigating sea level rise to learn more about climate change.

The cores recovered by Seacore from the Suzette Field were initially assessed on the *D P Hunter* prior to a more extensive detailed study onshore to gauge the commercial viability of mining the sea floor sulphide deposits. Marine biologists were also on board the *D P Hunter* to document the biological observations and recovered materials as part of an environmental study of the Suzette Field.

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CONCRETE PIPING GENERATES MORE JOBS, SURVEY REVEALS

IN AN INDEPENDENT and scientifically based survey which examined total labour content on three stormwater and sewer piping materials, concrete, high density polyethylene (HDPE) and glass fibre



Concrete piping was chosen for this stormwater relocation project in Durban. The picture shows a section of a 2,5 diameter concrete pipe being bedded into position. Each pipe section weighed 13 t and included half a ton of steel

reinforced plastic (GRP), concrete piping was found to generate significantly more employment.

The survey was commissioned by the Concrete Manufacturers Association (CMA) and conducted by LHA Management Consultants in the diameter classes of 300 mm, 600 mm and 1 200 mm.

Concrete piping was found to be up to six times more labour intensive when the labour content on 100 m of pipe was calculated across the total value chain of raw material supply and pipe manufacture.

Concrete's higher labour input arises from the extensive scope and labour intensive nature of raw material mining and pipe manufacturing, as opposed to GRP pipes for which key raw materials are imported. Concrete piping generates jobs in the mining of coal and iron ore, steel manufacture and in the aggregate and cement manufacturing industries as opposed to coal mining, ethylene and HDPE polymers manufacture in the case of HDPE. GRP is manufactured from imported glass fibre and resin and only generates local employment in the manufacturing process.

The difference in labour content was especially pronounced in the larger diameters, mainly in manufacture and delivery. For instance the 'mandays' required to manufacture 100 m of 1 200 mm of concrete piping was up to two and a half times higher than for HDPE piping and five and half times higher than in the case of GRP piping.

Concrete was also found to be slightly more labour intensive on installation 'mandays' than the lightweight materials.

'Based on this research the argument that light-weight piping is more labour intensive in installation cannot be substantiated,' says CMA PIPES Division vice-president Danie Greeff.

'The majority of concrete pipe manufacturers have retained processes which are labour intensive as opposed to the more mechanised

approach found in developed countries. We are committed to providing jobs, a fact which this survey demonstrates quite clearly,' observes Greeff.

Another aspect covered by the survey was total pipe laying cost. All three piping systems were found to be comparable in instances where local materials can be sourced for bedding and fill. However, when bedding and fill material need to be sourced off-site, concrete piping offers a total laying cost which is substantially the lowest, in some instances by as much as 50%.

Greeff points out that unlike concrete piping, which is rigid and self-supporting, both GRP and HDPE piping systems are far more dependent on fill and bedding material for structural stability.

He concluded by saying that there is a great deal of knowledge on concrete and its related performance over 60 years, as opposed to newer piping materials on which field knowledge can still be sparse.

John Cairns
Concrete Manufacturers Association
T 011-805-6742

BALLITO SEWAGE INFRASTRUCTURE TO BE UPGRADED

STEMELE BOSCH AFRICA (SBA), part of the B & A Group, has been appointed by Siza Water Company to undertake consulting engineering services for the upgrade of sewage infrastructure facilities in the rapidly developing Ballito area, north of Durban.

Initial projects include a pumpstation at

Simbithi, a pumpstation, rising main and trunk sewer near Compensation, and the Frasers Wastewater Treatment Works.

A major pumpstation 180 l/s at 108 m of head, 400 mm rising main and 450 mm trunk sewer situated at Simbithi has been constructed to cope with flows from the Simbithi development and the surrounding areas. Odour control chambers have also been installed in the pumpstation and pumping line to efficiently eliminate gases emitted from sewage.

A 65 l/s pumpstation, rising main and trunk sewer have been installed near Compensation to serve the new commercial area at the entrance to Ballito, as well as the existing and proposed service park development of the areas east of the N2, surrounding the Umhlabi Country Club.

The Frasers Wastewater Treatment Works is also being upgraded to a 12 Ml/day plant to cope with the projected inflows from the numerous surrounding residential and commercial developments.



'Services from SBA in the Ballito area include the design and tender, working drawings and construction and installation stages of the civils, mechanical, electrical and instrumentation of these projects,' says SBA's Morrell Rosseau. 'SBA focuses specifically on infrastructure projects and provides multi-disciplinary consulting engineering and project management services throughout southern Africa and the African continent.'

The value of these projects is approximately R30 million.

Morrell Rosseau
Stemele Bosch Africa
T 031-207-2093

SOUTH AFRICAN DESIGN COMPANY SCORES NUCLEAR CONTRACT

PEBBLE BED MODULAR REACTOR (Pty) Ltd (PBMR) and Thermtron Projects (Pty) Ltd, a South African design house, have entered into a R10,5 million professional service contract for the design of the coated particle production facility, one of the facilities of the pilot fuel plant to be constructed at Pelindaba.

POLYURETHANE WEAR LINERS MORE COST EFFICIENT FOR MINES



From left: Jan Deacon, Uretech sales executive and product specialist; George Hoffmann, Uretech director; and Mike Mpanza, SamQuarz engineering manager. In the background is the mine's secondary crusher screen plant, containing the feeder used to test polyurethane liners and others that have since been converted to the product

TESTS AT A DELMAS MINE have shown polyurethane wear liners to be at least five times more cost efficient as a wear solution in a vibrating feeder than traditional steel liners.

The polyurethane liners were developed by Uretech, a South African technology company specialising in wear solutions for mining and other industries, and have been tested in various mines for the past year.

'Most mines have traditionally used steel wear liners to protect components such as feeders and chutes in automated mining systems against general wear,' says Uretech's George Hoffmann.

'Polyurethane liners are about three times more expensive than steel liners and should therefore last three times longer. But if one takes into account the indirect expenses involved in changing the liners, such as maintenance downtime, labour and tooling costs, the initial investment should be recouped in just twice as long.'

Uretech was invited to test polyurethane lining on a vibrating feeder at Petmin-owned SamQuarz opencast silica mine near Delmas in Mpumalanga at the beginning of 2005. A 20 mm polyurethane liner cast on a 4 mm mild steel backing plate was installed on a vibrating feeder on 14 February. A year later the liner remains in place and the mine says it looks good for at least another six months.

Previously SamQuarz replaced its steel liners in the same application every four weeks.

Best solution

Mike Mpanza, engineering manager at SamQuarz, says there is no doubt polyurethane liners are the best solution for the mine's abrasion problems. 'We have done conversions from steel liners to polyurethane liners on a number of chutes and feeders and are in the process of identifying more units for similar conversion.'

'Although polyurethane liners were primarily aimed at addressing wear problems, noise reduction has been identified as an additional benefit,' says Mpanza. 'This promotes compliance with the Mine Health and Safety Act. SamQuarz is also conducting experiments that could confirm power savings on the feeders resulting from the conversion.'

Hoffmann says Uretech inspects all the polyurethane liners at SamQuarz every three months. 'The information gathered allows for continuous improvement and better material selection where necessary.'

'We aim to establish polyurethane liners as the preferred solution to protect automated systems on mines against abrasion, impact, corrosion and general wear and tear. Based on the results we have achieved so far, we are confident that this objective is more than realistic.'

George Hoffmann

Uretech

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A view of the end of vibrating feeder VF01 in the secondary crusher screen plant showing polyurethane bottom and side liners, the side lining partially obscured by rubber curtains to prevent spilling. The picture was taken in mid-January 2006, 11 months after installation



George Hoffmann, Jan Deacon and Mike Mpanza inspecting a polyurethane liner recently installed by Uretech on vibrating feeder VF02 in the secondary crusher screen plant

coater facility for the laboratory scale plant.

- It is a local company, thereby retaining this core PBMR technology in South Africa.
- Thermtron is currently a level 7 company on the DTI score card and has a BBEE plan to meet the DTI score card of level 3 by 31 December 2009 as per the BBEE Act and DTI Score Card guidelines.
- The Thermtron group of companies is accredited under the ISO 9001:2000 quality system.

www.pbmr.com

INJECTING NEW LIFE INTO AFRICA'S ROAD NETWORK

THE AFRICAN RENAISSANCE is set to receive a huge boost in September, when representatives of the world's leading infrastructural decision-makers gather at an international roads conference. The IRF/SARF regional conference for Africa will be jointly hosted by the International Road Federation (IRF) based in Geneva, Switzerland, and the South African Road Federation (SARF).

The development of an efficient inter-continental road network will be the primary focus of the conference.

Conference chairman and head of the KwaZulu-Natal Department of Transport, Chris Hlabisa, says much of Africa's development hinges on the positive outcome of this conference.

'Africa's socio-economic development is being thwarted by the under-funding of the continent's road network, and without substantial and sustained investment in this arena, the African Renaissance will be stillborn.'

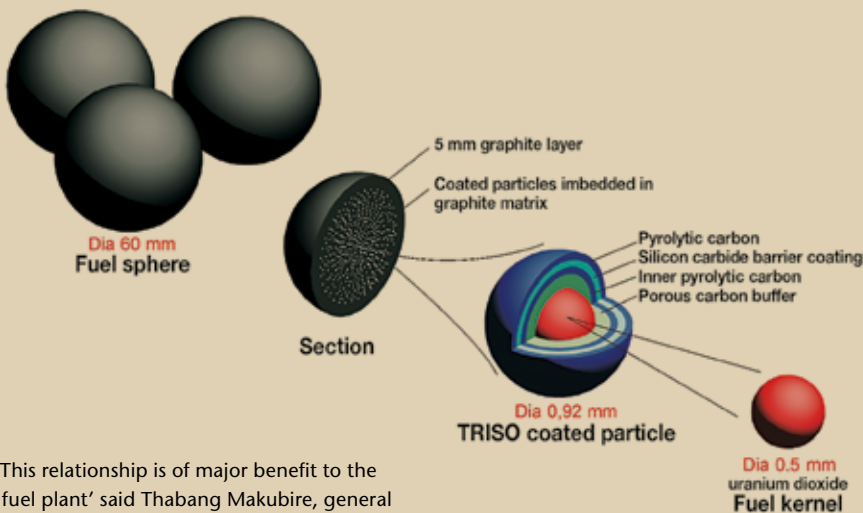
'Efficient road networks form the backbone of any economy and only when one is in place will Africa's true potential begin to be unlocked,' comments Hlabisa.

Africa's political and executive decision-makers, as well as researchers and business leaders of international repute, will gather at the International Convention Centre in Durban between Monday 11 and Wednesday 13 September. They will examine the current state of Africa's road network and explore the way forward in terms of sound delivery, management and operations.

Three World Bank representatives will be presenting papers. Other bodies/institutions involved in the conference include:

- Southern African Department of Transport
- African Development Bank (AfDB)
- Southern African Development Community (SADC)
- New Economic Partnership for Africa's Development (NEPAD)
- Department of Transport of the Province of KwaZulu-Natal
- Development Bank of Southern Africa (DBSA)
- eThekweni Transport Authority
- Automobile Association (AA)
- CSIR

Fuel element design for PBMR



'This relationship is of major benefit to the pilot fuel plant' said Thabang Makubire, general manager of the Fuel Division. 'Of these benefits is the fact that there will be no significant learning curve required as Thermtron already has an involvement with PBMR Fuel in the 5 kilogram uranium coater.' Makubire added that this relationship also supported the intention of PBMR and the South African government to support local capability and to develop local capacity. 'Ultimately the benefits are a seamless relationship and the sustainability of jobs in this high-skill sector.'

This is a crucial and second step in the PBMR fuel manufacturing technology to prove sustain-

ability on an industrial scale.

Unlike its predecessors, the PBMR technology is inherently safe.

The coated particle production facility is the core of the fuel production process in the electricity generation from nuclear power.

Some of the reasons why Thermtron was selected as the preferred supplier from a group of international companies are:

- The company is currently completing the installation of a 5 kg uranium coater at the advance

- Road Freight Association (RFA)
- South African National Roads Agency Ltd (SANRAL)
- Cement and Concrete Institute (C&CI)

Skhumbuzo Macozoma of the Department of Transport will deliver a keynote address entitled 'Achieving sustainability in road network management'.

The conference has stimulated intense interest among African and world leaders, their governments and road-related institutions.

The conference is open to anyone involved either directly or indirectly in road and other modes of transport.

Cilla Taylor Conferences
012-667-3681
confplan@iafrica.com

INSTANTANEOUS NON-EXPLOSIVE BREAKING/BLASTING SYSTEM

AS THE CONSTRUCTION OF the Gautrain becomes imminent, considerable thought must be given to the methods to be adopted in tunnelling and excavating in the busy urban areas through which this construction work must proceed. Obviously safety of personnel and the built environment is of paramount importance, as is the safety of the buildings and the properties under which and through which this construction work must pass with a minimum of disturbance and damage.

The Cardox instantaneous non-explosive breaking/blasting system fits the bill, says George Gray.

This totally non-explosive system is extremely flexible and is used internationally for heavy rock excavation, tunnelling, and concrete and mass masonry demolition in areas where explosive, pyrotechnic systems, and pneumatic breaking systems have been banned due to shockwaves, vibrations and noise. In addition the system is used internationally in cement manufacturing plants, food and grain silo installations, oil refineries, and bulk handling installations, including bulk carriers, to dislodge and break up all types of blockages in the various processes attributed to those industries.

Why Cardox?

According to Gray, some of the immediate advantages of using the Cardox system are:

- The system is fully approved by the UK Health and Safety Executive and the Singapore Health Sciences Authority.
- It is classified as non-explosive, so no magazines are required for storage.
- No special permits are required for storage, transportation or use.
- There are no shockwaves or damaging vibrations.

- It is cost effective and produces virtually no dust.
- It has an indefinite shelf life.

With the introduction several year ago of a simple tube restraining device, Cardox can now be safely used in horizontal drilled holes and is therefore fully applicable to tunnelling, pipe-jacking and other similar applications in areas that are sensitive to vibrations and shockwaves.

In addition to working effectively and efficiently in 'dry' civil works Cardox works in all conditions ranging from dry surface conditions to underwater conditions with no difficulties whatsoever. This allows Cardox to be used in all conditions by chosen staff members trained by Cardox engineers without the necessity of them holding a blasting certificate or licence.

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OIL AFRICA SPEAKER SAYS FABRICATION AND ENGINEERING MUST GET UP TO SPEED

THOSE IN CHARGE OF FABRICATION and engineering capacities in South Africa need to prepare themselves now to be ready for the giant leap in activity that will take place over the next five years in sub-sea oil and gas projects off the country's coast, says a top executive at PetroSA.

Moosa Karodia, capital projects manager of the national oil and gas parastatal, which is the dominant corporation in resource exploration in the country, says the current focus is on the R4 billion Bredasdorp basin project and that there are six to seven billion dollar projects in the pipeline over the next five years.

'There has been a change of pace – PetroSA has evolved a growth strategy in line with the urgency of the need for us to obtain those resources. It is a huge challenge, which we must all be ready to meet,' he says.

Karodia was one of the speakers at the Oil Africa Conference held at the Cape Town International Conference centre from 22 to 24 March. The conference and accompanying exhibition were aimed at establishing South Africa as a major player in unlocking African value through supplying and servicing oil and gas exploration and development projects on the continent.

Karodia said that South African fabrication and engineering resources had to ensure that they would be up to speed at the peak of their services requirement. 'It's time to start creating capacity now, so that they are ready,' he cautioned.

He said PetroSA was exploring its new growth prospects in proposed joint ventures that would

provide additional financial and professional resources. 'PetroSA is already a solid resource of expertise and experience in both upstream and midstream projects, but it must be kept in mind by all parties – once we have made the discovery, we have unique technical and contractual challenges that have to be met head-on.'

JEFFREYS BAY GETS DOWN TO BUSINESS

IT'S ALL SYSTEMS GO for the Jeffreys Bay R1,2 billion retail, commercial and residential development after the Kouga Municipality signed a services agreement with developers Buchner Propvest that will meet the current service delivery needs of the town.

Jeffreys Bay mayor Robbie Dennis, who spearheaded the agreement on the 600 ha Fountains property, says: 'Many months of planning have culminated in this major step towards improving our service delivery and to upgrade our infrastructure and essential services networks.'

'The phenomenal growth in the population of Jeffreys Bay has placed our infrastructure under severe strain, necessitating major upgrading that cannot be financed from rates and taxes.'

Dennis continues: 'We have achieved a win win solution to the improvement of our service delivery, through a cooperation agreement with developers Buchner Propvest. We are providing services to meet their needs, and they are providing upgrading and construction services to meet ours.'

Leon Gouws, director of services of the Kouga Municipality, explain the problems faced by most local authorities: 'Services upgrading usually cannot be done in small steps. By way of example, to meet our medium term needs, the transformer we need to upgrade our electrical network will cost R3,5 million. Our sewerage treatment plan upgrade costs R5 million. These upgrades will meet our short to medium term needs. Typically, the problem is that Jeffreys Bay does not have the funds to undertake this work.'

'Buchner Propvest are therefore providing the funding and the construction capacity to upgrade our power, water, roads and sewerage systems. We in turn are guaranteeing them services to meet their medium-term needs.'

Dries du Preez, MD of Buchner Propvest, gives credit to the councillors and officials of the municipality for their forward-looking attitude and their acceptance of the benefits of a joint venture with the private sector. He says: 'Many local authorities fail on service delivery because of a lack of forward planning and limited expertise to deliver. The Jeffreys Bay attitude of cooperation with a developer for mutual benefit, is in stark contrast with this typical scenario, and is an example that should be followed by other local

authorities. We are providing funding of R41 million, much of which is not for our immediate benefit. The infrastructure upgrade which we are funding and constructing now, will, however, be to our long-term benefit and therefore justifies the investment.'

QUALITY – THE MASTER KEY TO SOUND PROJECT MANAGEMENT

QUALITY IS A PRE-REQUISITE for sound project management, a principle that is borne out by Bigen Africa Management Services (MSP), which was recently certified in compliance with international standard ISO 9001:2000.

An ISO certification that is implemented and maintained with an emphasis on quality, and at all times adheres to the principles of sound project management, will go a long way to ensuring operational agility and financial viability in a globally competitive marketplace.

'A well-designed, developed and thoroughly implemented quality management system will go a long way to achieving sustainable growth,' comments C J Venter, director of MSP. 'It will also create ongoing opportunities for improvement and client satisfaction, and keep adding value to the bottom line.'

ISO 9001:2000 standards focus on a number of principles, including a focus on the customer, sound leadership practices, involvement of people at all levels, a process approach, a systematic approach to management, continual improvement, a factual approach to decision making, and mutually beneficial supplier relationships.

MSP, which is essentially involved in infrastructure management, developed and implemented the ISO compliance process with very little disruption, in accordance with the Project Management Professional (PMP) certification framework.

All work carried out by MSP is in the form of projects, and the company therefore has a strong project-based structure. ISO had to be integrated into the whole project management approach to ensure it forms part of everyday management.

Bigen Africa views quality management in a serious light. They took their time ensuring all internal processes were in perfect order before attempting certification, and as a result passed the certification audit with accolades.

'Adhering to quality principles is critical when implementing an ISO standard,' stresses Venter. 'The process of conforming to the ISO standard is not simply a mechanical process, but needs to be approached as a total, all-pervasive business solution of which quality is an integral part.'

Quality is in fact an inherent element of the MSP culture and ethos. 'In implementing

the compliance process, we instil a culture that emphasises adherence to quality,' states Leonard Curtis, ISO System group leader for MSP.

The actual ISO certification process took approximately three months and a project methodology was fundamental to the success of the certification. 'This methodology involved formally documenting the project implementation process through the entire project lifecycle, and highlighting key risk areas that should form part of the ISO process,' explains Curtis.

'We combined leadership, teamwork and resource management to ensure that each and every step of the certification process was completed on time, was within budget and met our quality objective,' Curtis concludes.

CMA SUBMITS DRAFT STANDARDS FOR TWO CONCRETE PRODUCTS

THE CONCRETE MANUFACTURERS ASSOCIATION (CMA) has initiated the introduction of SABS standards for two precast concrete products, simulated stone paving and concrete retaining blocks (CRBs).

Two draft standards have been prepared by the CMA's paving and crb divisions and submitted to the SABS for verification and approval. Both standards will apply to material and dimensional composition and the performance thereof.

Simulated stone paving

There is currently no standard for the material content of simulated stone paving blocks. They are manufactured using the wet cast process and range from 100 mm to 300 mm in length.

In addition to specific simulated stone param-



eters which have been incorporated into the draft standard, elements from the conventional block paving standard SANS 1058 and the standard for large concrete paving slabs, SANS 541, have also been included.

CMA director John Cairns says the market for simulated stone paving has grown substantially and the industry requires a benchmark through which quality and performance can be gauged.

'Once the SABS approves this standard we

► Above: This garden retaining wall provides a good example of where the right CRB material has been chosen for the right application – proving both functional and aesthetically pleasing
Below: This driveway had been laid with simulated stone paving and is an excellent example of appropriate paving technology



CHRYSO ADMIXTURES FOR CENTURY CITY PROJECT



CHRYSO SA SUPPLIED A VARIETY of admixtures for the concrete mix supplied by ready-mix companies for the construction of Cape Town's multi-million rand Century City development.

Anthony Venier, Chryso's Western Cape branch manager, says Chryso provided a wide range of plasticisers, air-entrainers and other admixtures to various ready-mix companies involved in the residential and commercial development north of Cape Town.

Pictured here is the Villa Italia residential complex for which Chryso supplied a plasticiser to enhance the workability of the concrete produced by contractors Murray & Roberts' on-site batch plant. Chryso plasticiser was also supplied to M&R for the Oasis multi-storey residential complex scheduled for completion by the end of the year.

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intend developing a laying standard as well,' says Cairns.

To acknowledge the growth in the market for simulated stone paving, two new categories, commercial and domestic, have been created for this year's CMA 2006 Awards for Excellence competition. Entries must be submitted by May 26.

Concrete retaining blocks

There are three possible causes for CRB wall failure: inadequate design, poor construction, and poor quality blocks. This standard deals with the latter, there being currently no standard relating to the material content performance of CRBs.

Cairns says poor quality blocks can crack, crumble or be crushed and the standard will be based primarily on strength but also on dimensional tolerances.

'Uniform size, particularly height, is critical and it is important that the right block is selected for the right application,' says Cairns.

The CMA is also working on a performance standard which relates to block performance in a wall.

'This standard will include specifications for what tests should be performed, but as is the case in Australia, it won't prescribe what the outcome should be. That is for the engineer to determine. Because blocks vary in shape and size, it will only lay down testing procedure.

'Concrete retaining blocks are produced for different applications. For instance, some are only suitable for small garden walls no more than 1,2 m high and a larger block is required for a wall 6 m high or higher. Recently a 9 m high retaining wall was built using blocks which are only suitable for small garden walls. Not surprisingly, it collapsed.

'All CRB walls over 1,2 m high should be designed by an engineer qualified to determine whether a block is suitable for a particular application or not,' concludes Cairns.

► [Concrete Manufacturers Association](#)

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NATIONAL CONSTRUCTION WEEK TO BE HELD ALONGSIDE INTERBUILD AFRICA

THERE WAS MUCH EXCITEMENT when it was announced that National Construction Week 2006

will be co-locating alongside The Star Interbuild Africa in July, said Rosalind Nash, exhibition manager, Specialised Exhibitions.

At the recent launch of a nationwide awareness campaign promoting National Construction Week, Public Works Minister Stella Sigcau especially encouraged women and youth to join an industry that offers exciting career opportunities.

The country's construction industry is on the brink of a boom, and, for the sector to execute the massive work expected of it within the next five years, great strides will have to be taken to attract new entrants into the profession whilst also encouraging skilled professionals back into the local industry.

Building statistics released by Statistics SA in January show that the value of building plans passed by larger municipalities during the first 11 months of last year increased 53% year-on-year to R62,46 billion.

A further report highlighting industry growth was the South African civil engineering sector increasing its turnover by 8% – according to a preliminary estimate by South African Federation of Civil Engineering Contractors (SAFCEC) economist Pierre Blaauw, with turnover growth forecast at 9,42% for the balance of 2006.

In line with this industry growth comes an increase in sales for the ever popular Interbuild Africa and co-locating shows.



CONSTRUCTION IN FULL SWING AT BEDFORD SQUARE

MURRAY & ROBERTS CONSTRUCTION is forging ahead with construction at Bedford Square, a large lifestyle development in the suburb of Bedfordview in Johannesburg.

The entire project consists of three different contracts, organised in three phases with Murray & Roberts Construction the main contractor on Phase 3 – the largest and most complex of the phases.

Phase 1, already complete, saw the construction of 40 duplex luxury townhouse units, and an additional 108 apartments are under construction for Phase 2.

According to Barry Holness, construction director at Murray & Roberts Construction,

Phase 3 is worth approximately R520 million, and includes the construction of retail and commercial facilities, as well as additional residential components.

The development comprises a car park containing about 1 800 parking bays over four levels, a hotel and conference facilities, six Cinema Nouveau theatres, a Maronite Catholic Church, 15 000 m² of retail space, 18 000 m² of office space and 197 luxury apartments. Quality finishes will be used throughout.

Holness explains that the residential development comprises four blocks surrounding a multifunctional courtyard, while the retail area incorporates a central piazza with a retractable

roof, adding to the cosmopolitan feel that the design is intended to create.

'The façades of the buildings will be very intricate, and include precast elements with mouldings, chimney features and window details,' he says. Rough, smooth and scratch plaster will be used in different places to finish the façades, giving them a variety of visual textures. The church forms an unusual element in the development, and will be stone-clad, with a timber interior.

Murray & Roberts Construction took site occupation at Bedford Square in mid-September 2005, work kicked off in earnest in mid-October, and completion is currently scheduled for the end of October 2007.

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Says Nash: 'There has been considerable growth in exhibition floor space sales year-to-date and we are far ahead of where we were five months before the 2004 show; and sales are continuing to go well.'

Given the current economic climate in South Africa, the wood industry has also seen an upturn in the recent year and exciting things were planned for Woodpro Africa, says Nash.

International interest is also high with various pavilions showcasing suppliers of equipment,

construction and building products and services, wood machinery and adhesives. The international flavour enhances and complements the wide local contingent.

Plumbdrain Africa will feature a forum where various industry topics will be presented throughout the exhibition as a value-add for visitors. The topics will be practical in nature and range from pipe selection to tools and tooling.

The Star Interbuild Africa – together with

Plumbdrain Africa, Aircon-Vent Africa, Building Services Africa and Woodpro Africa – is the largest building and construction exhibition in Africa covering industrial, commercial and residential sectors.

The Star Interbuild Africa 2006 takes place from 26 to 29 July at the Expo Centre, NASREC, Gauteng.

Construction Week will involve hosting a number of smaller activities during the course of the year and will culminate into a week-long celebration of the construction sector in July. The

private sector is encouraged to participate with competitions and events and can go to www.ncw06.org.za for further information.

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PROACTIVE PARTNERSHIPS IN A CHANGING PROFESSION

IN FEBRUARY 2006, Knowledge Base held talks with the Young Professionals Forum of South Africa (YPF) with the intention of signing a partnership agreement with the body. The proposed partnership was initiated by Vincent Bester, CEO of Knowledge Base, in the hope of supporting the organisation's initiative of retaining the skills of young engineers.

'South African engineers have long been considered to be among the best in the world, pioneering innovative techniques whilst keeping pace with international trends and developments. Maintaining this high standard in South Africa's rapidly changing environment depends on the wider construction industry's ability to connect with the emerging generation of engineering professionals and a partnership with YPF will hopefully help in this regard,' says Vincent. He continues that there is a gap between young engineers and the established civil engineering industry and that strong links need to be forged at secondary and tertiary institution levels in order to provide an adequate level of direction and support.

Knowledge Base recognised the need to protect the civil engineering market and have been providing expertise and resources to schools via the Department of Education for the last two years. As part of Knowledge Base's social responsibility initiative, they have sponsored educational institutions with the provision of AllyCAD and Civil Designer software. The software has been successfully implemented in the educational curriculums of both secondary schools and tech-

nikons at tertiary level. In addition, the company has forged close ties with Khanye, a Western Cape government initiative for the provision of computer labs in schools.

'We believe that a partnership will provide the ideal platform where young aspiring engineers can be exposed to the initiatives of YPF at secondary and tertiary level and thereby promote the engineering industry in South Africa,' explains YPF chairman Jana van der Merwe.

The YPF was launched by SAACE in October 2004 in order to attract young professional and technical people to the consulting engineering sector and to retain them in the profession. According to Jana, the partnership with Knowledge Base will provide the ideal platform where information sharing between young and old can be maintained and will provide a means where necessary information channels will take root and thus help bridge the gap.

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LAFARGE IN PARTNERSHIP WITH SW GAUTENG COLLEGE

LAFARGE SOUTH AFRICA'S Cement Business Unit has agreed to a supply partnership with South West Gauteng College.

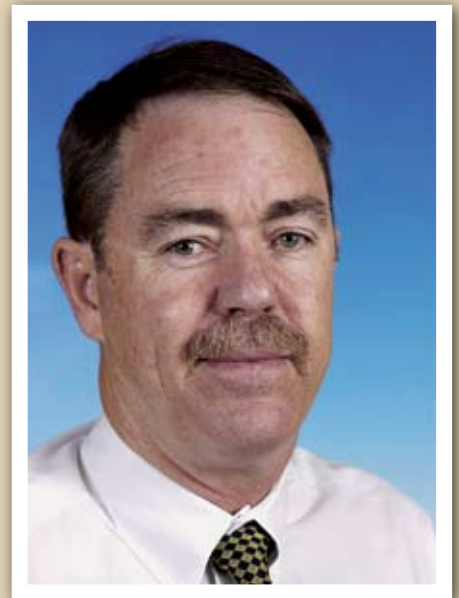
The aim of the partnership is to develop an ongoing relationship with the College's Civil Engineering School to enhance the education of students involved in building, while creating awareness of Lafarge and its products.

The agreement covers the supply of cement, protective clothing and equipment for hands-on building activities to a value in excess of R30 000 per annum. Of even more value is the doorway to industrial experience that Lafarge will open for the students. Integrated with the engineering school's syllabus is a programme which

includes visits to the Lafarge cement factory at Lichtenburg, visits to the company's quality department at Industria (which has one of the finest accredited civil engineering laboratories in the country), and lectures and demonstrations relating to the building industry.

One of the Lafarge group's fundamental beliefs is that the company can only grow and prosper by actively pursuing sustainable development. This involves making a responsible social commitment to the well-being of the communities in which it operates. An effective partnership today will help to lift the skills' pool among our youth in order to sustain the country's future need for talented human resources.

www.lafarge.com



C&CI's PERRIE IS NEW PRESIDENT OF SARF

BRYAN PERRIE, ROADS PROJECT LEADER at the Cement & Concrete Institute (C&CI), has been

elected president of the South African Road Federation (SARF).

Perrie, who is also technical manager of the C&CI, has had many years' association with SARF on both committee and council level.

AOL REELS IN PHISHERS

AMERICA ONLINE ANNOUNCED that it has filed three civil lawsuits against three gangs that obtained private identity information of unsuspecting customers through online subterfuge.

That makes AOL, one of the pioneers of commercial Internet access, the first major US portal to take legal action against phishing gangs. AOL filed the lawsuits against the groups it believes are located in Germany, Romania, and the US.

AOL executives say they have thousands of e-mails used by the groups to lead web surfers to websites that look like the sites of trusted firms such as AOL, only to fraudulently acquire private information such as credit card numbers and passwords from customers.

The fraudulent activity, called phishing, has drawn the attention of law enforcement and lawmakers all over the world.

The case will be filed under the federal Computer Fraud & Abuse Act, a 1984 law that has been amended to include spam and junk mail abuse. AOL also filed the suits under the Lanham Act, which contains federal statutes governing trademark law in the US. The law was updated last year.

Red Herring: The Business of Technology

R2,9-BILLION REFINANCING FOR MAPUTO DEVELOPMENT CORRIDOR

THE SOUTH AFRICAN National Roads Agency Ltd (SANRAL) and its Mozambican partners, Administração Nacional de Estradas (ANE), received news that financial close has been reached in respect of the refinancing of the Maputo Development Corridor (MDC) toll road to the value of R2,9 billion.

Launched in 1995, the year after both South Africa and Mozambique held their first democratic elections following the end of apartheid and a peace treaty between Frelimo and Renamo, the MDC plan was one of Africa's most ambitious regional development projects. Prior to these historic events the political environment did not promote any trade, cultural or other links between the two countries.

The MDC was aimed at reversing this decline,

and both governments promised to facilitate the construction and repair of the transport infrastructure along the route between Johannesburg and the Mozambican capital, with the goal of reviving international trade and attracting foreign investment in industry, agriculture and tourism.

A concession contract was signed with a private sector consortium, Trans African Concessions (TRAC), during May 1997 and financial close was reached on 6 February 1998. TRAC commenced work on the 525 km, R1,5 billion (1998 rand) toll road between Witbank and Maputo soon thereafter, representing South Africa's first significant project finance deal.

The MDC was one of several spatial development initiatives (SDIs) promoted by the South African government at the time. The philosophy behind the development corridor is straightforward: governments try to improve basic infrastructure, create a favourable climate for investors and then encourage the private sector to increase trade and investment and create jobs.

An advantage was that the MDC had been an important trade route since gold was discovered at Johannesburg, and Maputo remains the logical port for South Africa's Mpumalanga province, as well as for much of Gauteng.

The financing of the R1,5 billion MDC broke new ground in South Africa, largely because it was the first true public private partnership (PPP) of any magnitude. The section of the N4 road linking Pretoria to Maputo is now being managed and operated by TRAC under a 30-year concession contract with the South African and Mozambican governments.

In addition, the project was the first build-operate-transfer (BOT) project in South Africa and Mozambique. It was unusual in that it ranges across borders and required substantial attention to legal detail to hammer out the respective legal positions of the South African and Mozambican governments.

An excellent track record, greatly improved risk profile, established traffic patterns and market conditions rendered an ideal opportunity for refinancing of this project. It also availed the two governments and all major shareholders and lenders (ie the South African Infrastructure Fund, the Commonwealth Development Corporation, Standard Bank and Investec) an opportunity to revisit the obligations imposed by the first arrangement.

The MDC could be considered the forerunner of black economic empowerment (BEE) in the roads sector, as it went hand in hand with the empowerment of communities along the way by means of targeted procurement, training and skills transfer.

The refinancing of the MDC represents a considerable achievement for South Africa and Mozambique, as it is the first refinancing of a PPP project and the largest transport deal ever in South Africa.

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IN-HOUSE PROJECT FINANCING IS THE ANSWER!

'PROJECT FINANCING can be challenging, particularly when you want to finance projects of between R5 million and R100 million,' says Etienne Meyer, financial director of engineering company Thuthuka Group Limited. 'As a turnkey business, most of our projects fall somewhere in the middle of those two figures and the lack of readily accessible finance has proven to be a constraint in some instances.'

Thuthuka Group Limited is the result of the merger of related companies that are active in diverse engineering disciplines.

Thuthuka has taken the step of setting up its own project financing division that will facilitate the sourcing of finance for projects. As Meyer points out, 'Project finance needs a specialist set-up to accomplish both the structure and the legal entities required. Merchant banks do project finance as a matter of course but they mostly finance large projects. Commercial banks don't have this type of finance within their mandate and also generally don't have an investment banking mentality. Therein lies the gap that is filled by our project finance business.'

Up until now, companies like Thuthuka have had to put their own balance sheets on the line in order to finance projects, which is not the preferred method of doing business and is also a very limiting approach, according to Meyer.

He says: 'This is why our company has undertaken to establish project finance facilities in partnership with major financial institutions, using securitisation methodologies to lower the cost of the finance and to diversify the risk, thereby enabling Thuthuka to readily fund the debt portion of projects. The equity portion of projects is funded by Thuthuka and other investors relevant to the project.'

'Eventually other companies could benefit from this service, although initially it will be rendered exclusively for Thuthuka projects. I would envisage that with our extensive engineering expertise, we could help the financial institutions that we partner to make good decisions on other projects. Thuthuka might even take a portion of the equity in such cases,' says Meyer.

'One advantage of having our own project funding is that it will allow Thuthuka, a company that traditionally is intellectual property-heavy and asset-light, to accumulate real assets that will strengthen the balance sheet. It also gives Thuthuka the ability to participate in projects on an outsourcing basis and opening the way forward to growth. In addition, this will alleviate capital allocation problems for big companies as they won't have to carry either the operational or capital risks for projects not forming part of their core revenue generating businesses. Put simply, they won't have to spend money on something that won't earn them money! Build, operate, own and maintain (BOOM) projects can become a big

driver of growth for Thuthuka,' adds Meyer.

Commenting on the future of project funding, Meyer concludes by saying that cross-border financing of smaller projects into Africa is the way forward and that he is confident that Thuthuka Group Limited will be successful in meeting this 'challenging yet possible' goal.

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CHINESE DELEGATION CALLS ON GMBA

A DELEGATION FROM mainland China recently called on the Gauteng Master Builders Association (GMBA) in Midrand to exchange information about construction work and tender conditions in China and South Africa.

After the discussions – which focused on governmental construction – the leader of the delegation, Ms Xiangling Yang, Deputy Director of the People's Standing Congress of the Wuhan municipality, presented Eunice Forbes, immediate past president of the GMBA, with a commemorative plate depicting one of Wuhan's major tourist attractions, Yellow Crane Tower.



Xiangling Yang (right), leader of the Chinese municipal delegation which had discussions with the GMBA, explains the history of the commemorative plate she presented to the GMBA to GMBA immediate past resident Eunice Forbes

BAHRAIN DISASTER

FIFTY EIGHT PEOPLE were killed in Bahrain when a ferry capsized while on a pleasure cruise.

Employees of Murray and Roberts and its partner, Nass, a professional design team and sub-contractors, had hired the boat to celebrate the topping-out of the concrete structure of the \$150-million World Trade Centre being built in Bahrain.

The South Africans killed were 47 year old Chris Braysher, who was a commercial manager for the company, 59 year old Jimmy Allen, design

co-ordinator, Lawrence Sulman, 39, project engineer, and Allan Jeppe, 51, engineering surveyor.

Twenty five year old Cathy Judd, the partner of one of a Murray & Roberts project worker, was also killed.

They were among 120 people, excluding crew, on board and were having dinner when disaster struck.

TOSAS SUPPLIES BITUMEN RUBBER TO MOZAMBIQUE

TOSAS RECENTLY SECURED a contract to supply in excess of 2 million litres of bitumen rubber for a section of the EN1 near Beira in Mozambique. The contract is a breakthrough for Tosas as it is the first time that the company will apply its Arm-R-Shield technology in Mozambique.

The project entails the upgrade of 154 km of road between Muxunge and Inchope, approximately 150 km west of Beira. It includes in-situ base reconstruction followed by a double seal with bitumen rubber used as a tack coat. 'The in-situ

material necessitated that the base be stabilised with 5% cement, making bitumen rubber an ideal binder to effectively handle cracks and the high road surface temperatures experienced in this part of the country,' states Johan Vorster of Tosas.

Working with consultants BKS Global and contractor China Henan International Corporation (CHICO), Tosas began spraying late in March once most of the seasonal rains had subsided.

Distances and language barriers are key challenges in Mozambique. For this project Tosas has established a mobile plant near the site and will re-establish its camp to stay within reasonable working distance as the contract progresses. Tosas' technical know-how and on-site experience should ensure that the project runs smoothly. 'The contract offers a great opportunity for Tosas to introduce bitumen rubber as a superior binder to road authorities in Mozambique,' says Jacques van Niekerk, marketing manager of Tosas.

Expected to take at least six months to complete, the project will provide safer and improved travelling conditions for all road users on what is a strategically important road for commercial and industrial development in that country.

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Poor maintenance has led to hazardous travelling conditions on large sections of the EN1. The rehabilitated surface will enhance safety along this section of the route

A new division in SAICE

In October 2005 Council approved the establishment of a Project Management Division within SAICE. The following paragraphs identify the need for a Project Management Division and outline the functions of this division and the contribution it is expected to make for the benefit of SAICE and its members

CIVIL ENGINEERING IS the application of science and technology in the control, use and application of forces and materials of nature, for the progressive benefit of all the peoples on planet earth. Construction is an essential human activity that rivals few in its consumption of resources and its environmental, ecological and economic consequences, which impact on any of the primary actors in a project.

How can SAICE best meet these challenges whilst obtaining maximum benefit to its members? Is there a need to establish a Project Management Division that benefits SAICE and SAICE's members?

BACKGROUND

Members must actively contribute to the well-being of society and, when involved in any civil engineering project or application of technology, where appropriate, recognise the need to identify, inform and consult affected parties. It is through this integration that creating 'value-to-society' is supported.

Currently SAICE has seven divisions:

- Information Technology
- Environmental
- Geotechnical
- Structural
- Transportation
- Railway and Harbour
- Water

Divisions were established to advance and expand the science and practice of civil engineering in the provision and maintenance of facilities, and to promote the civil engineering profession in the above fields. This is predominantly achieved by the holding of meetings, site visits and social gatherings in the various disciplines mentioned above. In addition the divisions are the source of technical documents, including guidelines, codes of practice, inputs regarding standards, continuing professional development (CPD), and so forth.

Owing to our changing landscape, and principles of civil engineering, it is quite evident that in our division framework a

technical discipline is lacking. There is a definite requirement for a division to attend to the procurement, management and monitoring of projects within the civil engineering industry as it relates to the built environment.

The existing SAICE Procurement and Delivery Management Panel (PDMP) was established to: 'Advise on all matters relating to procurement and delivery management and provide guidance for members on procurement and management practices established by Government and the CIDB.'

Some of the functions addressed to date by the PDMP include the following:

- Owing to the many new procurement issues in a rapidly changing regulatory and delivery environment the panel informed the SAICE Executive Board of the approach and policy to be adopted.
- The committee assisted SAICE members by providing informative articles, and developing training presentations, thereby assisting with CPD and capacitating members in this field.
- Provided guidance to government, by taking a proactive stance in suggesting improvements to policy and providing feedback to its members.
- Providing guidance to members on how to use the new procurement documents that are being and have been developed.
- Before the Construction Division was disbanded in 2003, they reviewed, in particular, relevant conditions of contract. The PDMP subsequently redrafted the 1990 General Conditions of Contract Edition 6, and the GCC 2004 was then published. However, procurement is a far wider field than addressing general conditions of contract.
- The collective wisdom of the panel was applied to research similar work in other countries and this was used to inform the CIDB of current practices internationally, and ensure that local practice becomes internationally accepted.

SAICE is the leading professional institution, making groundbreaking strides towards

reform in the procurement field. It actively promotes public sector delivery and procurement practice, with guidance and expertise provided by the PDMP.

Subsequent to a PDMP meeting held on 17 August 2005, a revised Terms of Reference (TOR) for the PDMP was established:

- The function of the PDMP is to advise the SAICE Council on CIDB matters and government issues.
- The PDMP should advise on and give input regarding the SANS specifications, methods of measurement and payment, and the maintenance of the GCC 2004.
- The PDMP should facilitate training and communication to members about the changing procurement environment.
- The PDMP should maintain the Panel of Adjudicators, Mediators and Arbitrators.
- The PDMP should attend to all the other issues related to procurement and construction which SAICE needs to address.

The establishment of the Council for the Built Environment (CBE) and the South African Council for Project and Construction Management Professions (SACPCMP) has prompted SAICE to facilitate and contribute in the following areas (in addition to the TOR for the PDMP):

- Identification of work
- Validation of CPD
- Procurement and management of projects
- Finding a 'home' for construction managers and construction project managers who are SAICE members

SAICE wants to serve its members to the best of its ability and at the same time promote and strengthen its ties with various stakeholders in civil engineering. In an ever-evolving environment, SAICE needs to identify where the needs of members exist and how to make its structures and operation more efficient to meet these needs. A potential opportunity exists in the establishment of a Project Management Division.

SAICE PROJECT MANAGEMENT DIVISION Long-term aims and objectives

The terms of reference for the proposed division include the following possible long-term aims and objectives:

- Promoting the civil engineering sector by recognising the contribution of project management skills in the development of the built environment
- Bridging the gap between 'creators of value and society'
- Informing members of the latest developments regarding project and construction

management, especially in light of the latest development of the various councils, including the SACPCMP, as well as ECSA

- Dealing with and communicating project management matters
- Interpreting and conveying project management philosophy related to engineering principles and practices
- Growing and developing synergy between engineering and the project management professions
- Developing strategies to engage in best practice in project management
- Identifying where SAICE can make a contribution to project management
- Identifying information that can be published in the SAICE magazine on project management approaches, practices and methods
- Establishing structures and frameworks for engagement and capacitation of SAICE members in project management along the lines of the training provided for delivery and procurement as prescribed by associated bodies such as PMISA
- Identifying the needs for information and capacitation, and creating the source material for courses to be presented at branches of SAICE on project management approaches, practices and methods

- Supporting a cohesive approach to procurement and delivery management through the implementation of project management approaches, practices and methods
- Delivering information and motivation for these developments to members and possibly other stakeholders
- Keeping abreast of developments internationally in the project management arena

Short-term aims and objectives

These will include:

- Providing input to the SACPCMP and ECSA on identification of work
- Strengthening delivery and project management skills, in conjunction with the Project Management Institute and SACPCMP
- Promoting and contributing to the CPD requirements of ECSA and the SACPCMP through training
- Facilitating awareness of procurement and delivery issues, and informing member of developments
- Actively guiding and influencing project management
- Broadening membership by focusing on practitioners and engineering professionals associated with project management who are not SAICE members as yet

WAY FORWARD

In the interim a steering committee has been established to develop an action plan that will plan, develop and establish the way forward for the Project Management Division until such time that a PM Division committee has been elected. It is envisaged that nominations to stand for the PM Division committee will be called for in July 2006. The interim steering committee will report directly to the SAICE Executive Board and to Council. All related SAICE initiatives such as procurement and the Delivery Management Panel will in future probably be located under this division's control, either as sub-committees or as sub-divisions or panels. The chairperson of the division will represent the division on SAICE Council. All past Construction Division members and PDMP members would automatically become members of this division.

Membership of this division will be free for at least the first year if the member belongs to more than one SAICE division.

► Contact

All members **interested in serving on the steering committee** are requested to contact the steering committee chairman, Malcolm Pautz, at Malcolm.pautz@treasury.gov.za

Adopt a Student

Bursaries needed for brilliant university entrants in the Hundred for Hundred Project

IN RESPONSE TO SAICE's centenary and Allyson's research, in 2003 Dudu Mkhize, a teacher with a master's degree in maths, initiated a project to find 100 high-calibre entrants for civil engineering studies at South African universities. This was an optimistic target for one year, but nevertheless, after tireless campaigning in North West, Limpopo, KwaZulu-Natal and Gauteng, Dudu identified 32 candidates. Twelve eventually chose other engineering fields but 20 entered civil engineering and collectively gained many distinctions at the end of 2004. Successes since that time are outlined in the table below:

| Level of students | Number of students | Distinctions in the previous exams |
|----------------------|--------------------|------------------------------------|
| Third-year students | 11 | 15 |
| Second-year students | 12 | 12 |
| First-year students | 20 | 10 |
| TOTAL | 43 | 37 |

The success of the programme was such that it was decided to continue. The support of Jones and Wagener enabled Dudu to dedicate more time to the project. So 2006 has seen more students from disadvantaged backgrounds entering civil engineering. Most of them would have been lost to the South African economy because of their financially

impoverished backgrounds coupled with lack of career guidance. (Dudu now visits over 50 schools and has added the Free State to her itinerary.) The calibre of the 2006 entrants is impressive. One matriculant from a rural school gained 99% for higher grade maths!

Unfortunately the project is experiencing a financial crisis that is threatening its quality and reputation owing to bursary funding sources apparently having dried up or having become bogged down in decision-making processes!

APPEAL – 2006 UNIVERSITY ENTRANTS

Please consider taking over one or more of these students totally or participating in 'Adopt a Student'.

The needs of the students who require financial support are set out in the table below.

If you are looking for students, we would like you to commit to them for the duration of their studies. However, we are aware of the risks associated with first-year students so suggest an 'Adopt a Student' approach, in which we ask for commitment for first-year costs only, excluding the selection and management fees. Should the student pass, we would ask you to contribute R 5 000 towards the selection and management of the project. Thereafter you may wish to continue to support the student or withdraw. Experience has shown that once students have passed their first year, it is easy to get bursaries for the remaining years, so we do not anticipate further crises for that particular group.

| University | Number of students | Tuition fees (R) | Residence and meals (R) | Books and stationery (R) | Selection and management (R) | Total (R) |
|---------------------------------|--------------------|------------------|-------------------------|--------------------------|------------------------------|---------------|
| University of Pretoria | 3 | 19 370 | 18 700 | 5 000 | 5 000 | 48 070 |
| University of Johannesburg | 10 | 16 000 | 14 000 | 5 000 | 5 000 | 40 000 |
| University of the Witwatersrand | 7 | 22 210 | 18 000 | 5 000 | 5 000 | 50 210 |

Companies can adopt students as part of their corporate social investment activities.

APPEAL – 2005 UNIVERSITY OF JOHANNESBURG NATIONAL DIPLOMA STUDENTS

Another crisis has befallen last year's national diploma students. Despite commitment, the funds did not materialise. We now have six students who have passed S2, mostly with excellent results, but are faced with large debts and are unable to carry on. A contribution towards their debts and an opportunity for experiential training are also being sought.

CONCLUSION

Twenty students who have the potential to succeed in their studies in civil engineering are in danger of being rejected by the universities if their financial obligations are not met, and a further six with excellent S2 results may not be able to continue with their studies. This in the context of scarce skills in engineering!

Please URGENTLY consider contributing towards this project!

► Contacts

Dudu Mkhize
T 082-462-0292
newera@jaws.co.za
Or Allyson Lawless
T 011-476-4100
allyson@ally.co.za

New ENERGYS unleashed in local government!

IT HAS BEEN RECOGNISED that service delivery in local government has been very slow, and one of the many constraints identified in *Numbers and Needs* has been the shortage of technical personnel. Furthermore, young graduates have been unable to secure employment owing to lack of experience. Having framed a capacitation model using retired SAICE members (who responded to appeals in the magazine in 2005) teamed with students, the SAICE Section 21 company, SAICE Professional Development and Projects, has negotiated with a number of funders – notably the national

Department of Provincial and Local Government, Gauteng and North West Provinces and the LGSETA – to set funds aside for infrastructure personnel to assist with service delivery and to supervise and train young students and graduates. The seniors (usually retired engineers) will assist municipalities in identifying projects and unblocking bottlenecks and will drive the development process. The seniors will be paired with graduates and students to carry out the production function under their supervision, and in this way the young people will gain experience and become an asset to local government.

After many months of negotiations agreement was given to SAICE, working in collaboration with SABTACO, to commence most of the initiatives. Since then Allyson and dedicated staff have been working feverishly to carry out needs analyses in 31

municipalities to match our seniors with the needs and to place graduates and students to address a range of problems. The ENERGYS programme was launched officially at the DPLG Conference at Emperor's Palace on 27 March 2006. Twenty six of the 39 seniors employed so far were in attendance. Three of the seniors are 70 and over, but are so full of energy that the acronym for the initiative is most apt! The full name, Engineers Now to Ensure Roll-out by Growing Young Skills, illustrates the commitment to train young people. To date some 70 students and 15 graduates have been recruited and the number is growing.

Allyson Lawless
T 27-11-476-4100
www.ally.co.za

| Date | Event and CPD validation number | Presenters | Contact details | Where |
|--------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------|
| 2–3 May | Structural Steel Design Code Conversion from SABS 0162 to SANS 10162 SAICEstr06/00009/08 | | SAISC spencer@saisc.co.za | Gauteng |
| 4–5 May | Handling Projects in a Consulting Engineer's Practice SAICEproj06/00003/08 | Wolf Weidemann | Colin Driver T 043-743-9528 colin@hssc.co.za | East London |
| 7–9 May | 3rd South African Construction Health and Safety Conference | Prof J J Smallwood | john.smallwood@nmmu.ac.za T 041-504-2790 | Cape Town |
| 8, 9, 11, 15, 16, 18 May | SCT 35 Analysis and Design of Concrete Structures SAICEcon06/00002/08 | Cement and Concrete Institute | Zoe zoe@cnci.org.za | Gauteng |
| 8–18 May | SCT 35 Concrete Structures Analysis and Design SAICEcon06/00002/08 | Various specialists from Cement & Concrete Institute | Rennisha rennisha@cnci.org.za | Midrand |
| 11–12 May 5–6 June | Business Finances for Built Environment Professionals SAICEfin06/00004/08 | Wolf Weidemann | Sharon Muger T 011-805-5947 cpd.sharon@saice.org.za | Cape Town Gauteng |
| 15–16 May 1–2 June | Handling Projects in a Consulting Engineer's Practice SAICEproj06/00003/08 | Wolf Weidemann | Sharon Muger T 011-805-5947 cpd.sharon@saice.org.za | Cape Town Gauteng |
| 16–17 May | Road Traffic Signals Manual | J Falkner | Angie Wallace sarfuse1@acenet.co.za | Gauteng |
| 16–19 May | SCT 31 Concrete Technology for Engineers SAICEcon06/00006/08 | Cement and Concrete Institute | Zoe zoe@cnci.org.za | Durban |
| 25–26 May 29–30 May | Highway Capacity Manual (HCM) Course | Prof Ken Courage (previously from University of Florida) | Sharon Muger cpd.sharon@saice.org.za and SAICE Transportation Division | Cape Town Gauteng – SAICE House |
| 29 May – 2 June | SCT 30 Concrete Technology Course SAICEcon06/00007/08 | Cement and Concrete Institute | Zoe zoe@cnci.org.za | Gauteng |
| 14–15 June | Technical Report Writing Course SAICEbus06/00014/08 | Trygve Wang | Sharon Muger cpd.sharon@saice.org.za | Durban |
| 18–21 June | CIOB Africa – Built Environment Conference | Prof J J Smallwood | john.smallwood@nmmu.co.za | Gauteng |
| 20–22 June | Roads and the Environment | S Ballot | Angie Wallace sarfuse1@acenet.co.za | Gauteng |
| 26–30 June | Finite Elements SAICEstr06/00018/08 | Roland Prukl | Dawn Hermanus dhermanus@saice.org.za | Cape Town |
| 28 June | SCT 22 Concrete Road Design and Construction SAICEcon06/00013/08 | | Zoe zoe@cnci.org.za | Gauteng |
| 21–25 May 2007 | CIB World Congress: Construction for Development | Deadline for Abstracts: 30 June 2006 http://www.cib2007.com | Carla de Jager T 011-805-5947 cdejager@saice.org.za | Cape Town |