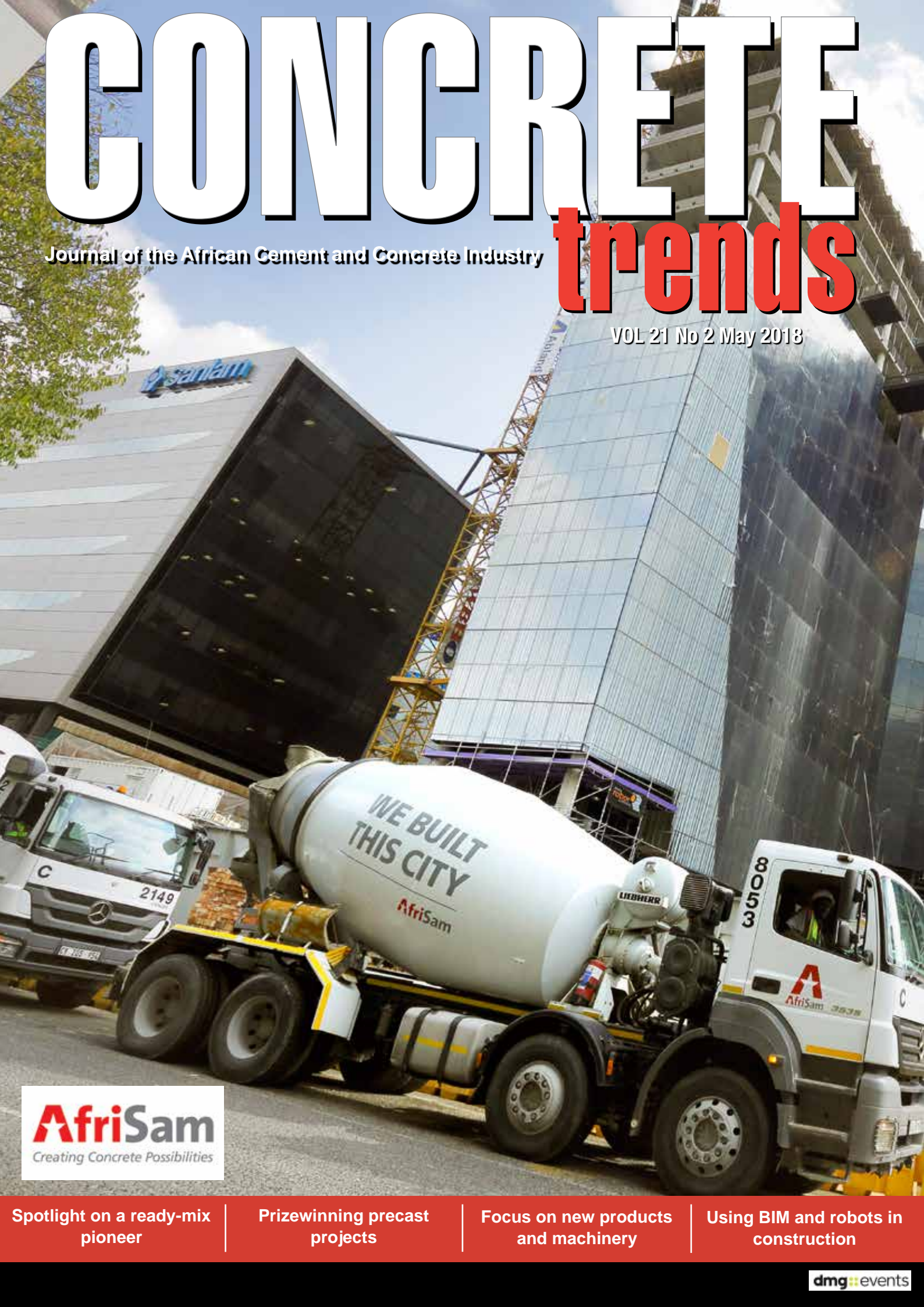


CONCRETE

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trends

VOL 21 No 2 May 2018



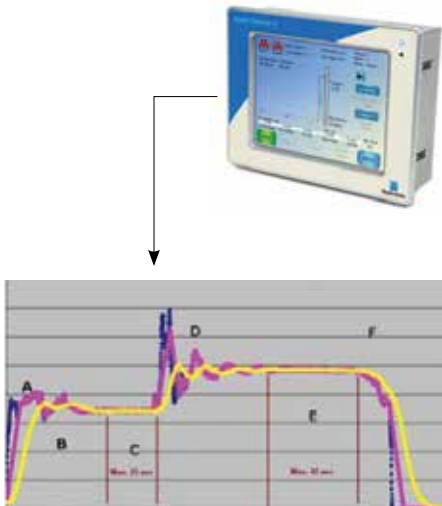
Spotlight on a ready-mix pioneer

Prizewinning precast projects

Focus on new products and machinery

Using BIM and robots in construction

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- D. WATER DISCHARGE
- E. MONITORED FLAT LINE FOR WET MIX
- F. TIMED DISCHARGE

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CONCRETE trends

Volume 21 No 2 May 2018

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CEO:
Devi Paulsen-Abbott e-mail DeviPaulsen@dmgevents.com
PUBLISHER:
Vuyisa Mfobo e-mail VuyisaMfobo@dmgevents.com

EDITOR:
Gill Owens e-mail GillOwens@dmgevents.com

ADVERTISING:
Vuyisa Mfobo +27 21 700 5510 / +27(0)62 145 7767
VuyisaMfobo@dmgevents.com

DESIGN, LAYOUT & PRODUCTION:
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14 | COVER STORY



AfriSam designed concrete mixes for the PwC Tower that were both pumpable and suitable for slipforming, including specialised retarded mixes that could be continuously pumped up into the moving slide 24/7. See page 14.



32 Cape Town Airport cladding wins CMA award.



58 Construction of Azuri Peninsula, Nigeria.

Africa: the case for investment

There can be little doubt that, observing South Africa's economy over the past few years, the times have been torrid indeed. It seemed that only a miracle could help the country emerge from the doldrums – but emerging from the doldrums it is.

The installation of Cyril Ramaphosa has awakened a new sense of optimism. A recent article by Tom Head published in South Africa the Good News, quotes Goldman Sachs declaring that: "South Africa will be the big emerging market story of 2018." He continues: "Goldman Sachs are the world's third-biggest investment bank. So they know a thing or two when it comes to picking out a country with massive 'emerging market' potential. And right now, they're championing South Africa."

Why is South Africa the 'big emerging market story'? Cyril Ramaphosa has always been seen as 'business-friendly' and in his first months as ANC President, he seems to be opening South Africa up to investors.

In addition, the Government's Special Economic Zones (SEZs) are offering incentives to attract investment. They are growth engines towards government's objectives of industrialisation, regional development and employment creation.

Finally, South Africa has good infrastructure, excellent banking, independent courts, competitive politics, a robust media, and an increasingly active civil society. And an enforceable constitution.

So, what of the rest of Africa? Africa is a continent of explosive population growth – such that by 2050, a quarter of the

population will live on the continent.

Rapid urbanisation and population growth has led to an enormous housing backlog across Africa. It is unsurprising, therefore, that there are mega housing projects being implemented. These are largely financed by Public-Private Partnerships (PPP), offering opportunities for investment.

The 2017 edition of Deloitte's Africa Construction Trends report includes 303 projects valued at US\$50m or above that had broken ground by 1 June 2017. In total, these projects are worth US\$307bn.

Southern Africa has the largest number of projects with 93, while West Africa remains the region with the largest share of projects by value, worth US\$98.3bn.

Outdated attitudes and perceptions about Africa frequently overshadow the continent's attractiveness for investment. However, the disconnect between perception and reality has created significant opportunities for investors willing to roll up their sleeves and put boots on the ground.

So, like old age, investing in Africa is not for sissies, but the rewards are there for the taking for the bold and for those with the stomach for the long view.

Gill Owens, Editor



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New Fulton Awards sponsor pushes the boundaries of concrete possibilities

Cement and construction materials leader AfriSam is the new anchor sponsor for the Concrete Society of Southern Africa's (CSSA) prestigious Fulton Awards. This is in line with the company's mission of creating concrete possibilities by pushing the sustainability and technical performance boundaries of concrete products.

"This event recognises excellence in concrete – a product that is synonymous with AfriSam," says Richard Tomes, executive: sales and marketing at AfriSam.

"We believe in giving a platform to individuals and companies that are pushing the boundaries in the use of concrete, leading to innovative use of concrete architecturally as well as functionally."

AfriSam has also been a sponsor of the AfriSam-SAIA Awards for Sustainable Architecture and Innovation for a decade.

"At AfriSam, our focus has always been about the possibilities that concrete structures create for society, which is why we work very closely with industry bodies and tertiary education institutions to achieve this," says Tomes. "This form of collaboration seeks to do more than just promote awareness. We actively get involved with various industry bodies like the Concrete Society, South African Institute of Architects (SAIA) and the universities to fund research and various initiatives aimed at advancing excellence in concrete. Our work has always been about partnerships,



AfriSam's focus has always been about the possibilities that concrete structures create for society.

as none of us can create these concrete possibilities on our own."

The Fulton Awards recognise and honour excellence and innovation in the design and use of concrete. They recognise the various teams involved in each project, including the owner, the developer, consultants and contractors.

"Partnering with the CSSA for the Fulton Awards enables AfriSam to recognise the excellent work our customers do with the high-quality concrete they purchase from

our readymix operations around country, or that they produce using aggregates and cement from AfriSam quarries and cement operations," says Tomes. ■

More information from Maxine Nel,
Tel: +27(0)11 670 5893
email: maxine.nel@za.afrisam.com
www.afrisam.com or
<https://concretesociety.co.za/fulton-awards>

Flooring doyen awarded MBA North Honorary Life Membership

Neil Duncan, who is a respected leader in the South African flooring and building industry, has been awarded Honorary Life Membership by Master Builders Association (MBA) North.

Duncan is currently the director and formerly chief financial officer of KBAC Flooring, is among the pioneers of training in the flooring sector, having successfully implemented an internal training programme at KBAC Flooring – an initiative which has already resulted in 30 KBAC flooring installers acquiring SAQA/CETA-accredited qualifications. Duncan has also been instrumental in the establishment of the Flooring Industry Training Association (FITA) which registers, accredits and pro-

vides training of flooring installers nationally, and serves as one of FITA's directors. Apart from his involvement in the flooring industry, Duncan has also played voluntary and key roles in the building industry overall over the past 44 years. A qualified Chartered Accountant, he has, for example, served as Trustee and Principal Officer of the Gauteng Building Industry Pension and Provident Fund, Honorary Treasurer of MBA North, Executive Committee Member of MBA North, and President of MBA North in 2006 and 2007. ■

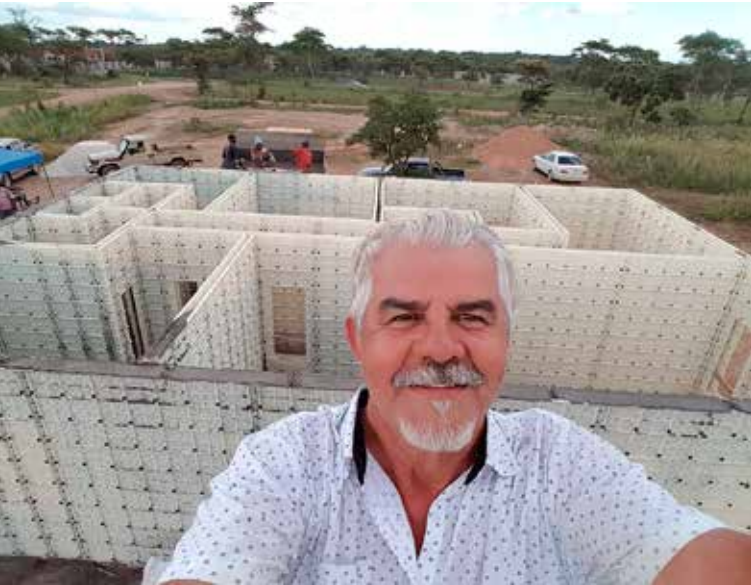
More information from
Tel: +27(0)11 805 6611
www.mbanorth.co.za



Neil Duncan (right), director of KBAC Flooring, receives the Honorary Life Membership bestowed on him by MBA North from the Association's president, Jason Wilmut.

Finally, success for moladi in South Africa

Despite his success in 21 countries across Africa and the world, Hennie Botes, founder of the moladi construction system, spent many years in fruitless attempts to gain Government approval for the system in South Africa. His efforts have finally been crowned with success.



Hennie Botes, founder of the moladi building system.



In a newly-constructed classroom with Jaco Calitz, contractor on the project.



A double-storey classroom built for the Western Cape Department of Education.

"We at moladi were honoured to have been invited by the Western Cape Department of Education to showcase our superior technology in Philippi and Robertson where we built badly-needed classrooms for the local communities," says Botes with satisfaction.

"Both the single and double-storey structures were constructed in record time and, of course, all finishes and technical specifications conform to the strict building codes of the Education Department.

"It is the intention of the Department to implement moladi to eliminate and replace the use of prefab classrooms with permanent structures. We are delighted that we can finally use our construction technology to address the huge backlog of classrooms and schools speedily. A big thank you and gratitude to Averg Grinaker-LTA for their support and enthusiasm to implement moladi."

One of moladi's greatest breaks was the construction of a 1,600-m² courthouse, funded by the World Bank in Tanzania, which the World Economic Forum (WEF) has named as one of six buildings to revolutionise the construction industry.

According to the WEF, the Kibaha District Courthouse was built for half the money it would have cost when using conventional methods at about \$250/m². The building was completed in six months, whereas it would have taken three years with traditional methods.

The moladi system was created in the 1980s when Botes, realising the struggles of the poor in getting good quality housing, decided to do something about it. His solution was the development of a whole new building system, which he named moladi.

The system replaces the cumbersome bricklaying process with an approach similar to plastic injection moulding.

A 'mould' is produced by training local unskilled labourers to assemble reusable plastic injection moulded panels, commonly known as formwork. The formwork is erected on an engineer-designed raft foundation.

Doors, windows, electrical and also water reticulation are mounted in the appropriate positions onto the formwork. Thereafter, the formwork is filled with a quick-setting aerated mortar, consisting of sand, cement and an admixture.

The house is left to set overnight and the formwork is removed the following day and re-erected on the next foundation. The superstructure is finished by fixing conventional roofing, plumbing fixtures, ceiling panels, hanging doors, glazing and, finally, painting.

Botes has built thousands of houses all around the world – from Mexico to Sri Lanka – with the system.

Botes goes on to say: "We have won numerous awards over the years, and were also selected by the Smithsonian Institute in 2011 to showcase Moladi at the United Nations' 'Design for the other 90%' exhibition in New York.

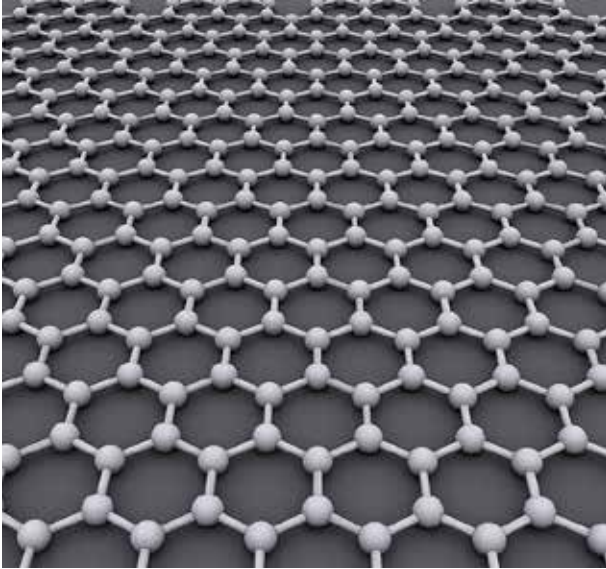
"However, what really makes me tick is to see how our licensees succeed in their businesses. It was a great joy to see how the devoted team we trained to work on the Tanzania project also trained others in their community, primarily women. As such moladi brought hope and helped others to break out of the poverty cycle.

"And now we can finally do it for South Africans. It was a proud moment to officially hand over a signed-off double-storey classroom in the Western Cape," says Botes. ■

**More information from Tel: +27(0)41 379 2600
Mobile: +27(0)84 657 4028 / www.moladi.co.za**

Graphene-laced concrete twice as strong as normal mix

By Joe Quirke



The hexagonal atomic-scale grid structure of graphene (Wikimedia Commons/AlexanderAIUS).

A team of scientists from Exeter University in the UK has discovered a way to add graphene to concrete to render it “twice as strong and four times more water resistant” than regular concrete.

Graphene is an allotrope of carbon formed by a hexagonal lattice. It has a long list of remarkable properties, one of which is strength. It is the strongest material that has ever been tested – six times lighter than steel, but 200 times stronger.

Researchers from Exeter say their concrete can be “used directly by the construction industry on building sites” and that the samples they have created would meet both British and European standards for construction.

The study shows that the concrete would also be cheap to make and compatible with large-scale production.

Professor Monica Craciun, co-author of the paper, said: “Our cities face growing pressure from pollution, sustainable urbanisation and resilience to catastrophic natural events. This new composite material is an absolute game-changer in terms of reinforcing traditional concrete to meet these needs.

“Not only is it stronger and more durable, but it is also more resistant to water, making it uniquely suitable for construction in areas that require maintenance but are difficult to access.

“More importantly, by including graphene we can reduce the amount of materials required to make concrete by around 50%, leading to a significant reduction in carbon emissions.”

The scientists believe that the technique could lead to the incorporation of other nanomaterials into concrete mixes.

The study, titled: *Ultra High Performance Nanoengineered Graphene-Concrete Composites for Multifunctional Applications*, was published in the journal *Advanced Functional Materials*. ■

Source: <https://goo.gl/uDVcqK>

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A woman is steering Nigeria's premier engineering academy

Engr. Mrs. Joanna Olu Maduka, the first female President of the Nigerian Academy of Engineering (NAEng), was interviewed by Engr. Dr. Kolawole A. Olonade. She shared her views on issues related to engineering, gender participation and challenges in Africa.

Tell me about your education.

I attended secondary school at Queen's School, Ede, followed by A levels in the then Nigerian College of Arts, Science and Technology at Ibadan. The campus was where the University of Ife (now Obafemi Awolowo University, Ile-Ife) started. After A levels, I moved to the University of Ife where, in 1962, I was a foundation member. After one year at the Western Nigeria Broadcasting Corporation I returned to the University to lecture. I then completed my Masters degree (MSc) in engineering at Trinity College Dublin. The University of Ife did not then offer engineering, so my first degree was in Applied Physics which earned me some exemptions towards the Institution of Electrical Engineers' (IEE) examinations in UK. The qualification was Graduate IEE.

What motivated you to study engineering?

I have always been better in science and mathematics than in biological sciences or arts. One of my lecturers, the late Professor Victor Williams, had his first degree in engineering. He introduced Applied Physics to the Physics Department and also encouraged me into engineering.

There is a general belief that engineering is a male profession, what is your take on this?

Most girls do not like mathematics and science and in those days, even parents would direct their children to study nursing, secretarial practice or arts and not sciences or mathematics. Therefore everybody believed that engineering was definitely a male profession and mistakenly believed that engineering required carrying heavy loads and struggling with equipment. So, it has taken a long time to convince parents that women can study engineering. Even today, women engineers account for less than 10% of the engineers in Nigeria. I founded the Association of Professional Women Engineers of Nigeria, APWEN, in 1982 and it is now a division of the Nigerian Society of Engineers.

How many women were in your class during your undergraduate days?

I was the only one!

How did you cope amidst boys then? Did you feel intimidated?

I was the only woman but I never felt intimidated. I felt I was dealing with people of my age whether they were boys or girls. We were able to get on together. My physics class comprised only five students, but there were 12 of us when I did my Master's degree. However, I was still the only woman!



There were, in fact, very few women in Trinity College, Dublin's whole engineering faculty because there were just very few female engineers in the western world at that time.

How has your experience in engineering practice been since you left university?

It has been wonderful. Generally, I found it very satisfying although it took a long time for government and society in general to understand that women could be engineers. Again, things are changing very rapidly. When I went into professional practice, especially private practice, people were very reluctant to give jobs to women.

What other engineering professional bodies do you belong to?

I am a Fellow of the Nigerian Society of Engineers, a registered engineer with the Council for the Regulation of Engineering in Nigeria (COREN) and Fellow of the Institution of Engineering Technology (UK).

When was Nigerian Academy of Engineering (NAEng) established? What does it stand for and how does it differ from other engineering bodies in Nigeria?

The Nigerian Academy of Engineering (NAEng) was founded in 1997 by a few fellows of the Nigerian Society of Engineers. It was fashioned after other academies in the world, like those in the UK, USA and in Europe.

The Academy consists of experienced elderly engineers, who can give time, and sometimes money, to the smooth running of the institution and who have reached the pinnacle of their professional lives.

As an Academy, the membership is 2/3rds Academia and 1/3rd professional engineers. Fellows are generally retired, so they have time for the Academy's activities. That is the difference between NAEng and NSE. The mission of the Academy is to provide input and leadership in national technological issues and policies at the highest possible level, through contributions to Science, Engineering and Technology ideas in Nigeria and by extension, globally.

Is there any conflict of interests between NAEng and other professional engineering bodies in Nigeria?

No conflict. This is because to be a member of the Nigerian Academy of Engineering, you have to be registered by COREN and be a fellow of NSE. Therefore, unless you have those two qualifications, you cannot join. You also have to have reached the peak in the profession. Hence, as far as we are concerned there is no conflict because there are very few of us, we are still less than 150 and the selection of Fellows is very strict.

What has NAEng achieved since its establishment?

NAEng's role is mainly to influence policy and contribute to the profession. For instance, we contributed to the Communication Commission and the bill to privatise the national electricity authority when they were being formulated. In quite a lot of

continued on page 8



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things, we made our input. Presently, we are trying to establish a database of research products to link engineering research to industry and bridge the gap between them. We are also involved in curriculum development in our universities and capacity building of the staff.

What is the present membership of NAEng? How many are men and women?

We are about 136 – with only 4 women! I attended a Royal Academy of Engineering conference in London conference two years ago where gender diversity was discussed, so we are making special effort to increase the number of women. Nevertheless, the majority of female engineers in the profession are relatively young and NAEng seldom takes anyone who is younger than 60.

People say you are the first woman to head an engineering professional body in Nigeria, is it true? How do you feel breaking the jinx?

I am not the first woman to lead an engineering professional body in Nigeria but the Academy, yes. A colleague, Mrs. Mayen Adetiba, was the President of Association of Consulting Engineers in Nigeria (ACEN), although NAEng is the peak of the engineering profession. Perhaps that's why people think I am the first woman to head an engineering professional body in Nigeria. Again, many of us in engineering consultancy belong to ACEN.

It is over a year since you were elected President. What has been your experience and what achievements have you made?

It has been very interesting although very busy. Very interesting in that what we do mainly is to open up the Academy to the outside world which is part of what I have decided to do. I mean even to Nigeria to let people know that there is this body which is ready to work with the government, the private sector and different bodies in our society. I think, largely, I have been able to get that. In addition, we are trying to lift our different institutions and cadres of engineering thereby elevating the image of the engineering profession.

Two years ago, the Royal Academy sponsored some African countries under a programme, The African Catalyst, to improve curricula at different levels of the engineering family. NAEng convened a committee which included NUC, NBTA, COREN – the engineering regulatory bodies – and we have published a small portion of the report. We looked at four levels of engineering: engineers, technologists, technicians and craftsmen. We found that insufficient attention is being paid to training technicians and craftsmen, so we adopted the old Yaba Trade Centre, now the Federal Science and Technical College. When we decided to intervene in the college, we discovered that most facilities including workshops, machines, etc were not functioning and gathering dust. The Nigerian Ports Authority has undertaken to help and upgrading the facilities will soon resume. This will be the first of this type of intervention, which we hope to replicate in Kano and Enugu.

What have been your challenges leading the highest engineering body in Nigeria?

My main challenge is funding because we do not get any support from government or even the private sector, so we have to rely mainly on goodwill, which means we may not be able to perform optimally. Our Fellows are however doing their best to raise funds from engineering establishments or from personal sources. Another challenge has been the quality of graduates at the different levels of engineering.

What legacy do you intend to leave behind you?

Legacy is difficult! Because we are still trying to establish ourselves, I cannot say the legacy of hard work. First and foremost, it's visibility. I tried to establish the legacy of visibility because engineers are not appreciated enough. So what I am trying to do over my two years is to bring out the Academy and not just bring them out in a glamorous way; but bring the Academy out in effectiveness. The Academy must continue to focus on engineering education including curriculum, development, teachers' capacity building and also equipment upgrade. Diversity, gender, must be in the main focus areas of the Academy.

On gender equality, how do you think a woman in engineering profession can cope with her family in the face of African culture?

Well! I am afraid that African culture is going slowly. Anybody who can train to be an engineer must learn to cope with the profession and family. The challenge is when women have young families; once the children have grown, women are freer. You have to devise a way of coping without losing your family or your job.

I would encourage young women to face the profession squarely, but at the same time not neglect the family. Where an engineer marries and engineer, it is easier because both understand all it takes to be a good engineer. We saw this especially in oil and gas industry. During our early days in engineering, we canvassed that women should not be treated differently from their male counterparts. If men go to the rig, sometimes for several days, then a woman should be able to do likewise. I'm happy to report that the women are up to the task.

Do you think engineers are given their right positions in Nigeria compared to their counterparts abroad?

Not completely and why not? The country does not have a technical background and we have not developed an engineering base whereby our government and other institutions can have respect for engineers. We complain up till now that there are some engineering institutions and places in government today that are being occupied by non-engineers and as long as we have that, the country cannot move forward technologically as we should.

What advice will you give to stakeholders in repositioning engineering practice in Nigeria and Africa as a continent?

I would say that engineers should become more involved in governance. We all talk about China, China, China. There was a time that all Chinese cabinet ministers were engineers. In Singapore, Malaysia and most Asian countries where similar conditions are in place, you witness phenomenal development. They have engineers in their systems but here we have to beg for recognition. The situation is however much better in the oil industry. In government generally, we are not satisfied with the current situation.

Apart from engineering, what else do you cherish doing?

I've been giving so much time to engineering issues, I do not even know what else I cherish doing apart from engineering. Ordinarily, before I became so very involved, I liked sewing and watching TV. ■

More information on the Nigerian Academy of Engineering at <http://www.nae.org.ng>

QS Association: change irregular expenditure by changing the watchdog



The News24 report of irregular expenditure on the on Winnie Madikizela-Mandela Brandfort is very concerning, but commonplace. The Association of South African Quantity Surveyors (ASAQS) says this will only change if the right mix of professionals is appointed at the tender phase of infrastructure projects of all kinds.

The report by News24 states that “the quantity surveyor’s report found fruitless expenditure of R593,622 with regard to the Winnie Mandela House Project.” (<https://www.news24.com/SouthAfrica/News/exclusive-this-is-where-the-money-for-the-winnie-madikizela-mandela-brandfort-museum-went-20180413>)

“The appointment of a Quantity Surveyor to calculate and oversee projects should not be an afterthought when budget allows,” warns Larry Feinberg, executive director of the ASAQS. “We strongly recommend that the appointment of a Professional Quantity Surveyor becomes part of the legislated tender process for all projects.”

A Quantity Surveyor (QS) is best placed to identify deviations from original tenders in terms of both scope and pricing. As such, they act as the client’s watchdog. In the case of public projects, the client is ultimately the taxpayer.

One of the key issues in any public project is to ensure that the tender is awarded to the right contractor at the right price. The training undertaken by Quantity Surveyors enables them to manage the financial and legal processes of a project.

“Professional Qs are also bound by a code of conduct,” explains Feinberg. “If they are found to have contravened the code, they will lose their licence to practice as a QS.” ■

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Nigerian wins German African Innovation Incentive Award

Dr Kolawole Adisa Olonade's research proposal for the re-use of cassava waste has won a German African Innovation Incentive Award.

Cassava or manioc is one of the most important foods in Africa and grown in increasingly larger quantities. Nigeria is by far the largest producer worldwide and the resulting quantities of waste can become valuable for industry.



Wolfram Schmidt (left) and Kolawole Olonade (3rd from left) in BAM's concrete laboratory (together with Nsesheye Msinjili (2nd from left) and Stefan Schacht (right)).

Source: BAM, Division Technology of Construction Materials

In a cooperation project between the German Federal Institute for Materials Research and Testing (BAM) and Dr. Kolawole Adisa Olonade (University of Lagos) it is planned to re-use these residues, which currently have no use and even cause environmental problems, in three ways. Firstly, residual starch can be recovered and used as a rheology modifier for concrete and building materials. Secondly, residual peels can be used as fuel, for example for firing bricks. Finally, the ash from the combustion process can be used as a sustainable supplementary cementitious material.

In cooperation with BAM, Dr. Kolawole Olonade, then at Obafemi Awolowo University, received the 'German African

Innovation Incentive Award' for this project research idea. The prize was announced and awarded by the Federal Ministry of Education and Research in 2017 for the first time. From a large number of applications, four projects were awarded a research incentive funding of a total of €150,000 each.

The project *Low-Carbon Livelihoods – Cassava Residues for Performance Materials (Local-Care)* started on January 1 and will run until April 2020. Dr. Kolawole Adisa Olonade had already been a visiting scientist at BAM in 2016 in Dr. Wolfram Schmidt's team in the Technology of Construction Materials Division. The cooperation initiated is continuing: the aim of the joint project is to technically evaluate the substances obtained – in particular, how much CO₂ can be saved, which new value chains can be created through the valorisation of agricultural residues, and which framework conditions are required to ensure safe construction and a quality infrastructure. Most importantly, awareness needs to be raised that agricultural residues are as suitable for high-performance building materials as are the established residual materials from metallurgy or coal combustion. Thus, a lecture series will be held in Algeria, Cameroon, Kenya and South Africa to disseminate the results. In the final stage, a real building made from 'cassava bio concrete' will be installed in Nigeria.

About the German African Innovation Incentive Award

The German African Innovation Incentive Award (GAIA) honours outstanding achievements of African researchers and recognises the central role of research and innovation in the development of modern knowledge-based societies. It also supports German research and innovation stakeholders in further developing their cooperation with African partners. The prize is awarded to African researchers linked to an institution in Africa. It is used in joint follow-up projects where the partners develop their research results for future use. Main topics are environmental science, health research, bio-economy, social development and process innovation, resource management and information and communication technologies. ■

More information at : <https://goo.gl/ue5GUP>

Kenya: construction of 30,000 low-cost houses to start soon

Kenya is set to commence the construction of 30,000 low-cost houses in Nairobi's Eastlands area, as part of the President's Big Four agenda.

The initiative is being undertaken by the Kenyan government and in the next six months, it is projected that construction of houses in Shauri Moyo (5,000), Makongeni (20,000) and Starehe (3,000) will begin. Breaking ground for the 2,000 houses on Park Road will commence within the next three months.

State House Spokesperson Manohar Espisu said that the team leading the regeneration of Nairobi has given itself a timeline of six months to embark on the mega project.

According to government statistics, Kenya has a shortage of decent houses in most of its towns and cities. The shortage



is presently estimated at 250,000 housing units a year, while housing and estate development firms only have the potential to produce 50,000 homes a year. ■

Source: <https://goo.gl/62gBV8>

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Adjaye Associates unveils design of new Ghana National Cathedral



Exterior at Dusk. Image Courtesy of Adjaye Associates.



Podium Entrance to Auditorium. Image Courtesy of Adjaye Associates.



Exterior Perspective. Image Courtesy of Adjaye Associates.

On the 61st anniversary of Ghana's independence, President Nana Addo Dankwa Akufo-Addo unveiled plans for a New National Cathedral of Ghana to be built in the capital city of Accra.

Led by British-Ghanaian architect David Adjaye of Adjaye Associates, the design is envisioned as a "physical embodiment of unity, harmony and spirituality" where people of all faiths will be welcome to gather and practice their faith.

"The Cathedral will address the missing link in our nation's architecture by providing a Church of national purpose," said President Akufo-Addo. "It will be an inter-denominational house of worship and prayer, as well as serving as the venue for formal state occasions of a religious nature, such as presidential inaugurations and state funerals as well as for national thanksgiving services."

The new Cathedral will be located on a 14-acre site adjacent to Osu Cemetery near Independence Square and the Accra Sports Stadium. An axial procession of landscaped gardens will lead up to the Cathedral, perched on a dramatic plinth and accessed via monumental staircases on the North-eastern and South-western ends.

Inside, Adjaye Associates will be collaborating with some of Ghana and Africa's most celebrated artists to create bespoke adornments and furnishings. The Cathedral will contain a number of grand chapels; a baptistery; a two-level, 5,000-seat auditorium; a vast central hall; a music school; choir facilities; an art gallery; a shop; and several multi-purpose halls. The building will also contain Africa's first Bible Museum and Documentation Centre, which will educate visitors on the history of Christianity and nation-building in Ghana.

President Akufo-Addo also announced the creation of a new ceremonial route and landscape that will connect the Cathedral to the capital's most important landmarks including Independence Square, the Osu Cemetery, the State House and Africa Unity Circle.

"It is an immense honour to be granted the opportunity to contribute something of this scale and import to my home country," commented Adjaye at the unveiling event. "I have sought to craft a building that not only understands its landscape but one that will be unique to Accra and the Ghanaian Nation. ■"

Source: <https://goo.gl/2Fh6eq>

Nigeria to construct Fourth Mainland Bridge

The Lagos State government in Nigeria has revealed plans to construct the Fourth Mainland Bridge. The construction work is set to commence before end of this year. This is according to Adebowale Akinsanya, the Commissioner for Works and Infrastructure. The announcement was made known to the public during a press briefing marking the third anniversary of Governor Akinwunmi Ambode by the Ministry of Works and Infrastructure.

The anniversary was meant to celebrate the Ambode-led administration's completion of 55 km of roads and 48 building projects between May 2017 and April this year. Meanwhile, 25 km of roads and 17 building projects are in progress across the various local government areas in the state.

Almost 30 years after the delivery of the Third Mainland Bridge; the State has experienced phenomenal growth to become a megalopolis such that the 38-km Mainland Bridge and expressway will become the longest bridge and expressway when completed. Additionally, the Bridge will decongest Lagos State traffic and serve as an alternative route to the Eastern axis.

Master plan

The Fourth Mainland Bridge will involve the construction of a bypass and a bridge in Lagos State. On completion the bridge will connect people and improve their ease of movement through an extensive reorganisation of vehicular, waterway, and pedestrian modes of transportation.



The bridge construction will have two levels which will not only function as a means for vehicular traffic on its upper level, it will also serve to stimulate and accommodate pedestrian, social, commercial and cultural interactions on its lower level. Additionally, in conjunction with existing road networks, the Fourth Mainland Bridge will establish a primary ring road around Lagos. The ring road is expected to provide alternative traffic routes from Lekki to Ikorodu, Ikeja to Ajah, relieving the Third Mainland Bridge of its overstretched capacity.

With the improved flow of people across Lagos, the city will be relieved of traffic congestion, and be able to maximise its great opportunities and grow better. ■

Source: <https://goo.gl/NWWQJX>

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'Bleeding' civils sector needs more state investment



Richard Tomes, sales and marketing executive, AfriSam.

At the heart of government's economic problems is a very bloated public service, costing about 35% of the total government spending and limiting the funds available for vital infrastructure development and maintenance, according to Dr Azar Jammine, director and chief economist at consultancy Econometrix. Speaking at an AfriSam event recently, Dr Jammine said it was unfortunate that government was continuing to over-spend in order to maintain the public service at its current size, instead of spending some of that money on building infrastructure. He had hoped to see some sign in the recent budget that the government wage bill could be reduced, in favour of promoting economic growth – but this had not been the case.

"If there is going to be an improvement in the business conditions of the civil engineering and building sectors over the next couple of years,

this will be mainly a result of the overall economic cycle now turning for the better," he said.

Richard Tomes, sales and marketing executive at AfriSam, said the economic outlook described by Dr Jammine did not bode well for the cement sector, which had been dealing with over-supply conditions for many years.

Jammine noted that civil engineering had "bled far more" than the overall economy in recent years, and the picture was not much better in the building sector. "Non-residential building has also taken a hammering, and in recent times residential building also started weakening somewhat."

Plans passed in the non-residential building sector showed a turn towards the positive, but residential remained slow – including little signs of life in mortgage advances on residential buildings. "It will take a while for real house price growth to become really positive," said Jammine. "At the moment it is about 0% so presents no incentive for investment into residential buildings."

House price inflation needed to rise faster before any improvements in demand for products like cement and concrete could be expected. Producer price inflation in building and construction was tight at just 2,5%, lower than the average for the overall economy.

The result was that the construction sector would feel little immediate relief, and that business in this and related sectors – like cement and concrete manufacturers – should not expect "too much too soon". While it was true that the new political leadership had opened the way for a more positive economic trajectory, he warned that more concerted economic restructuring was still required for a sustainable recovery.

He pointed to structural issues such as the poor position of state-owned enterprises, which have essentially "run out of cash" and are therefore not committing the volumes of revenue to infrastructure that would improve the outlook for the civil

The number of skilled people leaving the civil engineering sector would also hold back its recovery.



engineering sector. Another indication of the poor state of state-owned enterprises, he said, was that their liabilities – as a proportion of their assets – had risen in the latest budget from 69.5% to 71.5%.

“That is why I am saying: temper your enthusiasm,” he said. “At least the economic situation seems to be stabilising, but it will take quite a while for any recovery to start coming through.”

On a more positive note, he pointed to sharp declines in long term interest rates that will mean lower interest repayments on government debt, allowing for revenue to be channelled to other areas of spending. Fixed capital investment is also likely to accelerate.

“Businesses have been sitting on billions of rands in their balance sheets and maybe now, with President Ramaphosa in place, more of that will start coming through,” Jammine said. “All I am warning about is not to expect the results to be immediately obvious in the next few months; more likely they will only be seen in 2019.”

“Many municipalities don’t spend their budgets – the money is there but they don’t have the wherewithal to spend it. Two-thirds of municipalities have spent less than 85% of their allocated budgets over the past year. Only 10% are spending all the funds allocated to them.” Dr Azar Jammine.

He noted that state procurement lies at the heart of many of the blockages in infrastructure; “hopefully with the current attack on state capture, we will make progress towards better procurement practices.”

So dire is the current situation with state procurement that the Consulting Engineers South Africa (CESA) believes there should be a national directorate in Treasury to monitor infrastructure spending – which CESA argues would encourage the proper spending levels to be implemented.

Jammine said that the number of skilled people leaving the civil engineering sector would also hold back its recovery, as there will be a shortage of skills by the time the necessary infrastructure development started taking place.

“While the pipeline of qualified engineers is starting to improve, we need experienced experts to provide proper mentorship and allow effective skills transfer to take place,” he urged.

Rent-seeking practices at many municipalities would have to be corrected, but it was not just corruption that was causing problems in infrastructure delivery at municipal level.

“Many municipalities don’t spend their budgets – the money is there but they don’t have the wherewithal to spend it,” he said. “Two-thirds of municipalities have spent less than 85% of their allocated budgets over the past year. Only 10% are spending all the funds allocated to them.”

Tomes emphasised Dr Jammine’s point that fixed capital formation needed to be about 25% of gross domestic product if it is to really promote a sustainable growth path; it is currently closer to 15%.

“The last time South Africa managed to approach this target was around 2007 and 2008, when the country was investing heavily in infrastructure ahead of the 2010 FIFA Soccer World Cup,” said Tomes. “This short period of growth however came crashing down very fast when the global financial crisis set in. Although we have seen global markets recover since then, South Africa has unfortunately not kept pace with growth in the global economy.”

Continued on page 16



Plans passed in the non-residential building sector is showing a turn towards the positive.



There is a close correlation between GDP growth and cement demand; with South Africa’s expected growth of between 1.5% and 2.5%, the country will still have surplus capacity for many years to come.

AfriSam had to design concrete mixes that were both pumpable and suitable for slip forming for the PwC Tower and this included specialised retarded mixes that could be continuously pumped up into the moving slide around the clock.





Civil engineering has suffered far worse than the overall economy in recent years.

The cement shortage before 2010 led some players to introduce new production capacity, quickly causing a surplus. Tomes pointed to the close correlation between GDP growth and cement demand; with South Africa's expected growth of between 1.5% and 2.5%, the country will still have surplus capacity for many years to come.

"That is why AfriSam is of the view that there are too many players and too much capacity in the local cement industry, and why there is a need for consolidation to improve efficiencies," he said. "Even though the country's growth forecast has been raised to a possible 1.9% for 2018, it was not likely that cement demand would rise suddenly – either in South Africa or the rest of the continent."

With Eskom's electricity tariffs likely to rise faster after the 2019 elections – probably back into the double-digits, energy costs in the cement sector will remain a big cost driver.

"The cement sector cannot afford to have inefficient capacity, so we need to make sure that the industry focuses on using its most efficient capacity," said Tomes. "We don't share the optimism of some other players regarding the future of our sector on the rest of the African continent; based on what we've seen in this market and the GDP projections for African countries, we don't think that we're going to see a massive improvement in cement demand in the short to medium term."

While he acknowledged that the opportunities around the continent were certainly there, they were some way off.

"Taking a long-term view, Africa is certainly the place to be if you're in the cement game; we've seen population growth projections and high rates of urbanisation which all auger well for our industry, but I don't think we can afford to wait until 2030," he said. "There is a pressing issue right now to start to consolidate and fix our situation – so that we can gear ourselves for this growth, when it comes."

"Investors would rather see us improving on our efficiencies, managing our costs and de-gearing our balance sheet. This could be achieved through better procurement logistics as well as other synergies and driving down selling, general and administrative (SG&A) costs. Having a strong home base is the ideal platform from which to grow and take advantage of the opportunities in some of the more high-risk markets on the African continent. We have seen, with many of the larger players such as Dangote in Nigeria and LafargeHolcim in Europe, that a strong home base does create a buffer against some of the strong headwinds in other riskier parts of the world – the same is true for us here in South Africa", he said.

Tomes concluded by highlighting evidence that successful, global cement producers that have grown over time, are those that consolidated their home base, creating strong balance sheets from which to venture into riskier areas further afield. ■

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PPC IMAGINARIUM

Taking concrete creativity to unknown heights: The PPC Imaginarium 2018

By Daniel van der Merwe, Architect, PPC

The primary aim of the PPC Imaginarium Awards is to recognise innovation and design using Portland Cement-based concrete as a primary inspiration and/or material. In just over a year the programme has incentivised, awarded, mentored and allowed fantastic exposure and profiling to nearly a hundred emerging South African artists and designers.



Chris Soal was announced as the overall winner of the PPC Imaginarium Awards 2018.

South Africa's most supportive art and design competition for emerging creatives, the PPC Imaginarium Awards, has once again outstripped expectations with a dazzling selection of concrete pieces by upcoming local talent. A record number of finalists had been selected for 2018, testimony to the

increasing quality of the entries. The regional judges chose a total of 58 national finalists from 226 regional entrants. Each of the category winners received R50,000 in cash with the runners-up getting R15,000, bringing the total prize money for the competition to half-a-million-Rand.

The PPC Imaginarium Awards has been in existence for four years, with the entrants submitting work in one or more of the following categories: film, fashion, sculpture, jewellery, industrial design and architecture. Earlier this year, regional entries for the 2018 PPC Imaginarium Awards were showcased in a series of pop-up public exhibitions held in Durban, Cape Town and Port Elizabeth during February 2018. These regional entries were judged by a formidable panel of industry experts and practitioners, including scholars, artists and curators.

Unlike in previous years, entries in the Architecture category will be showcased and judged at the 2018 Architecture ZA conference, replacing the prestigious Des Baker Award for outstanding work by an architecture student. The winner will be seen as the best design student currently enrolled for a degree in architecture.

Award-winning artist and curator Raimi Gbadamosi judged entries from Pretoria, which sent 12 finalists to the national gala exhibition. Globally acclaimed sculptor Mary Sibande and accomplished curator Rolihlahla Mhlanga judged Johannesburg's entries, choosing 29 finalists, while Tumelo Mosaka, whose stellar career led to his appointment as curator of the Investec Cape Town Art Fair, chose 11 finalists from Cape Town. Award-winning sculptors Mellaney Ruiters and Eugene Hlophe chose three entries from Port Elizabeth and two from Durban, respectively, and Adelheid von Maltitz, sculptor and fine art lecturer at the University of the Free State, selected one from Bloemfontein.

At a gala event held at the University of Johannesburg Art Gallery on 4 April 2018, upcoming artist Chris Soal was announced as the overall winner of the PPC Imaginarium Awards 2018. The 24-year-old sculptor, a fine arts graduate from the University of the Witwatersrand, garnered R150,000 in prize money, and participation in an eight-month-long nationwide travelling exhibition.

Soal's artwork was chosen as the winner by the PPC Imaginarium Awards national judging panel which includes Mary Sibande, Daniel van der Merwe (who heads the PPC Imaginarium Awards), renowned artist Stephen Hobbs and UJ Art Gallery curator Annali Dempsey.

The national judges were also responsible for choosing the various category winners and runners-up.

Jewellery

Winner: Aleks Ashton. Tiara of the Heart and Head



This jewellery piece showcases the versatility of concrete as well as its potential to accompany traditional jewellery materials such as silver, jasper and turquoise used as aggregates.

The design is inspired by a celebration of life's physiology. All one's physiological systems develop around the nervous and circulatory systems. The heart and head form life's foundation, supporting life the way concrete supports civilisation. The piece is a re-interpretation of the traditional tiara which speaks about the head as the seat of consciousness with all its associated symbolism.

Runner-up: Daniella Sachs. An Architect's Love Letter to Concrete.



This piece was inspired by the Swiss architect Le Corbusier's Chapelle Notre Dame du Haut in Ronchamp, France, as well as the Zulu tradition of beaded love letters. It comprises a series of coloured concrete blocks triangulated as per the Zulu bead tradition and set in silver.

The concave and convex coloured concrete blocks, and the natural shadows they produce, evoke the faceted, jewel-like windows of the Ronchamp chapel. This piece is a testament to the love its designer bears for her favourite building material – concrete.

Fashion

Winner: Gabrielle Foulis. The Art of Destruction



Concrete symbolises life and community. To a greater extent, the city and its buildings influence us. This submission is inspired by the deconstruction of buildings, and specifically the lives of structures. It interprets the concept of deconstruction through the lens of Japanese garment design.

The materials and processes include: linen painted with cement; bronze details; concrete buttons; wire mesh; a chiffon chenille technique to produce a textured effect; and broken-down print graphic.

Runner-up: Nangamso Dana. Her Cloth



The designer is excited by the artists of her generation who have been bold and cross-cultural in their approach to self-expression. Clothing transcends its previous social role, where culture was more domestically oriented.

The fashion pieces reflect an attempt to move this narrative forward through exploration of traditional handwork and fabrics. The choice of light and heavy materials was influenced by a fascination with how different fabric types exhibit unique characteristics. Draping was incorporated for its sculptural appearance. Crochet and decorative handwork complimented the use of concrete in the rich texture and detail.

Continued on page 20

Sculpture

Winner: Chris Soal. Imposed Structure



The concept for this piece was inspired by materiality – of both cement and the object captured by the sculpture. The relationship between rebar and concrete is synonymous. Their use in construction is responsible for the architectural make-up of cities in general. For many children who grew up in cities, the environment is less one of grass, sand and wood than of concrete, steel and tar.

The work speaks not only to the realities of growing up in a city environment, but also to the relationship of soccer to South African industry. One example of this relationship is the 2010 FIFA World Cup. To this day, questions are posed regarding the event's benefit for the country.

Runner-up: Franli Meintjes. Award Worthy



The work speaks of concern about the high rate of poverty in South African society and attempts to discourage complacency regarding the country's many unresolved racial, social, cultural and religious divides. Casting chicken feet in concrete speaks about that as a dietary divide.

Industrial Design

Winner: Giovanni Zambri. GIO



This design aims to benefit the user by encouraging their psychological wellbeing and promoting physical health. The concrete bicycle is lightweight and functional; delicate in idea yet physically strong. The unique resilient concrete frame was achieved with carbon fibres, automotive resin and PPC Surebuild. The concrete contains the bicycle's history, showing that great designs never change but are developed into symbolic icons.

Runner-up: Anton van Reenen. The Z-light

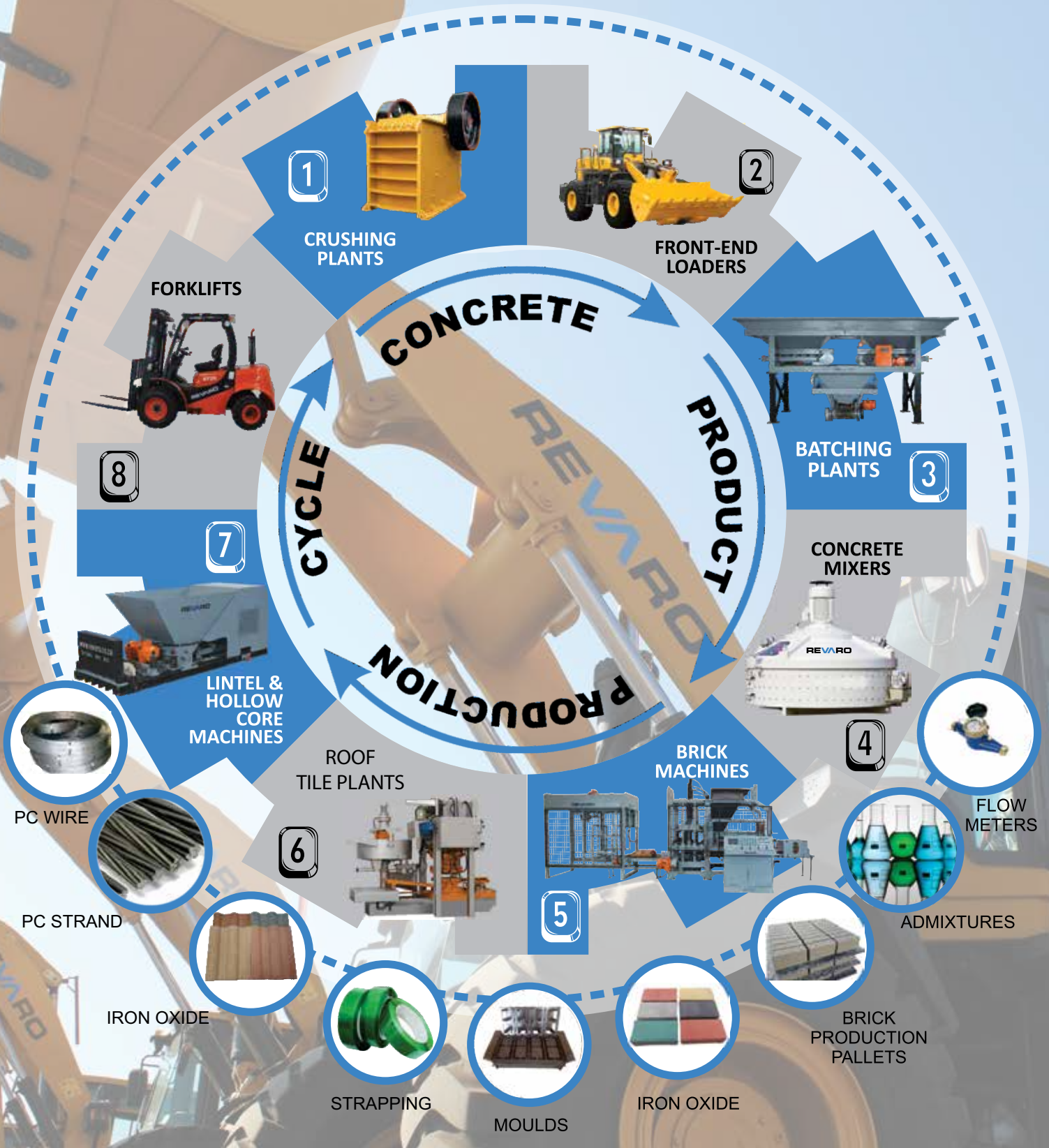


Inspired by the sculptural elements of architecture as well as a love of concrete, the designer created a concrete light through a process of discovery. Concrete has a will of its own. The functional statement concludes in a sensuous form and surfaces which play with light and shadow. ■

More information on the PPC Imaginarium at www.ppcimagarium.co.za, or follow us on Face Book, Twitter, Pinterest or Instagram.

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City View House: designed to be a journey of discovery

The brief for City View House in Groenkloof, Pretoria, designed by Mellet & Human Architects was for a modern, functional, energy-efficient house, incorporating in the design the footprint of a demolished house on the site. The property is situated against a north-sloping hill in the established suburb of Groenkloof, Pretoria. The large, steep stand affords views over the city to the north, and borders a nature reserve to the south which the client wanted to be taken advantage of in the design.

Groenkloof is a sought-after suburb due to its moderate climate, established character, vegetation and central location. Older homes, mostly built in the 1960s and 70s are bought by a younger generation and either changed or demolished to make way for homes better suited to a modern lifestyle.

"The challenge in architecture is to provide a solution to the client's requirements that is functional, aesthetically pleasing, and within the merits of good architecture," explains André Mellet. "In our designs, we always keep in mind that the experience of architecture should be a journey of discovery."

City View House is approached from the north along a steep driveway. The nature reserve lies ahead and a northern view of the house is provided. A parking area is reached passing the house on the east through a narrow alleyway, but the visitor is not yet aware of the view behind. The foyer is entered, and moving to the right the ground floor living areas open up and the spectacular view is exposed.

"Using the original footprint was ideal," says Mellet. "The house is positioned at the highest point of the property providing unobstructed northern views. In order to provide accommodation requirements another floor was added, creating the opportunity to visually link the first floor with the nature reserve on the south."

The total floor area of the house is 590 m² with the ground floor accommodating the main open-plan living areas, guest bedroom and study. A glass skin of sliding doors links the view, and extends the interior onto a covered patio, pool deck and boma.

Ascending the staircase to the upper level, a corner window at the staircase gives a glimpse to the nature reserve. The first floor features three en-suite bedrooms, and a TV lounge, while sliding doors provide these rooms with northern views. A south passage linking the rooms houses a collection of books, and a strip window above the shelves makes one aware of the nature reserve. The central TV lounge separates the main bedroom from the other two bedrooms, and a low wall separates the main bedroom sleeping area from the bathroom, creating an open plan effect, and affording views even from the bathroom.

The lower ground floor is totally separate and private from the main house with access to the external areas. It can function as a self-contained flat, but is currently used by the owner as a hobby room and to house a collection of South African memorabilia.

The design offers the modern, functional living the client required, while also incorporating sustainable initiatives. The building has optimal north-south orientation, the walls, floors and roofs are insulated and double glazing was specified on the doors and windows.

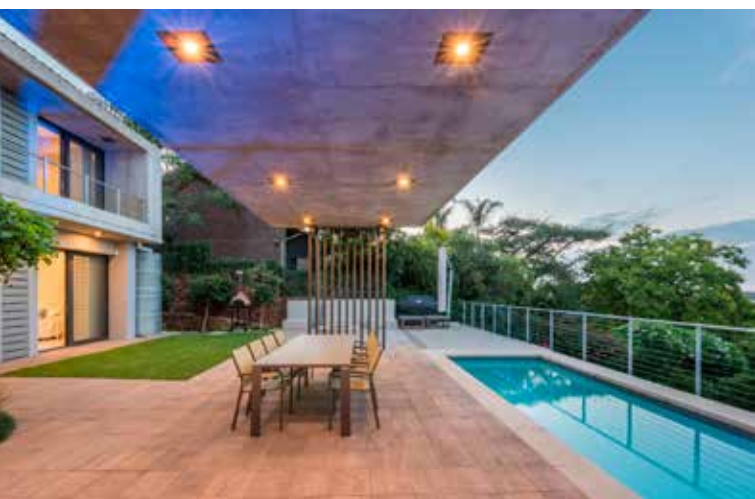
"Our fondness of Brazilian architecture inspired the aesthetics of the house. Externally an exposed concrete frame is a feature of the north elevation. It acts as architectural feature, is structural, but also provides sun control. Its extension to the west creates the covered patio next to the pool," explains Mellet. This concrete frame collects the rainwater from the Chromadek roof and diverts the water to galvanized rainwater tanks. These rainwater tanks are expressed as architectural features around the house, and below the pool deck.

Solar power is provided through an Icon Home Energy Hub, sufficient to support all the home's electricity needs and appliances. Energy efficient air-conditioning is installed, as well as solar geysers, while a heat pump maintains comfortable pool water temperatures. A freestanding pellet stove in the lounge helps to heat the interior during winter.

"Our client moved into the house a few months back," says Mellet. "They are happy with the design and functionality of the house, while we, as architects, are also satisfied. Our client decorated the house with furniture which complements the architecture and concept of the house."

With reference to the concrete used on the project, Paul Eloff of consulting engineers EVN Africa provided the following information.

The ready-mixed concrete used was supplied by Pretoria East Ready Mix. The unreinforced floors and strip footings took 50 m³ of 15-MPa concrete, while the reinforced concrete floors, columns and gutters were constructed utilising 172 m³ of 30-MPa concrete.



Asked whether there were any special challenges of the project, Eloff explained that they all related to “turning the Architect’s ideas into a safe buildable structure”.

1. The site is very steep and could not be negotiated by the concrete delivery truck, so the concrete had to be pumped.
2. A 4-m-high x 60-m-long retaining wall had to be built first before the rest of the work could commence.
3. The big concrete gutters at roof level cantilevered and that posed a design challenge.
4. The steel columns supporting the floors on the North Eastern side carry a substantial portion of the concrete and had to be narrow so as not to obstruct the view over the city.
5. A special marine environment paint specification was used to ensure long-term durability of the steel columns.
6. The concrete patio roof is supported on eastern side on a concrete nib and on the western side on RHS columns (architects feature).
7. The bases of concrete columns and steel columns received special attention due to the magnitude of the loads they were to carry.
8. Waterproofing and drainage behind retaining walls had to be done properly to ensure there are no damp problems.
9. The drainage of the roof and gutters were designed to feed the rainwater harvesting system
10. The paved new access road was designed with concrete ground beams at regular intervals due to the steep slope.

11. The layerworks were stabilised with 3% cement and special attention was given to compaction of the fill/layerworks to ensure that the soil would not sag and cause cracking.
12. Finally, the boundary walls are fairly high for security purposes and were designed with piers for stability.

Project Team

Architects: Mellet & Human Architects

Design Architect: Andre Mellet

Technical Architect: Willem Human

Consulting Engineers: EVN Africa

Contractor: Mammut Bouprojekte

About Mellet & Human Architects

Award-winning Mellet & Human Architects was established in 2000. The office has the design and technical experience to handle a diverse range of projects, mainly focusing on luxury residential and office buildings.

Their aim is to provide professional and personal service, with innovative and energy efficient designs, resulting in the best solution to their clients’ needs. Mellet & Human Architects is a registered member of the South African Institute of Architects (SAIA), The Pretoria Institute for Architects (PIA), and the Green Building Council of South Africa (GBCSA). ■

More information from Willem Human,

mobile: +27(0)83-306-9916

email: willem@mellethuman.co.za or

André Mellet, mobile: +27(0)83-306-9915

email: andre@mellethuman.co.za / www.mellethuman.co.za



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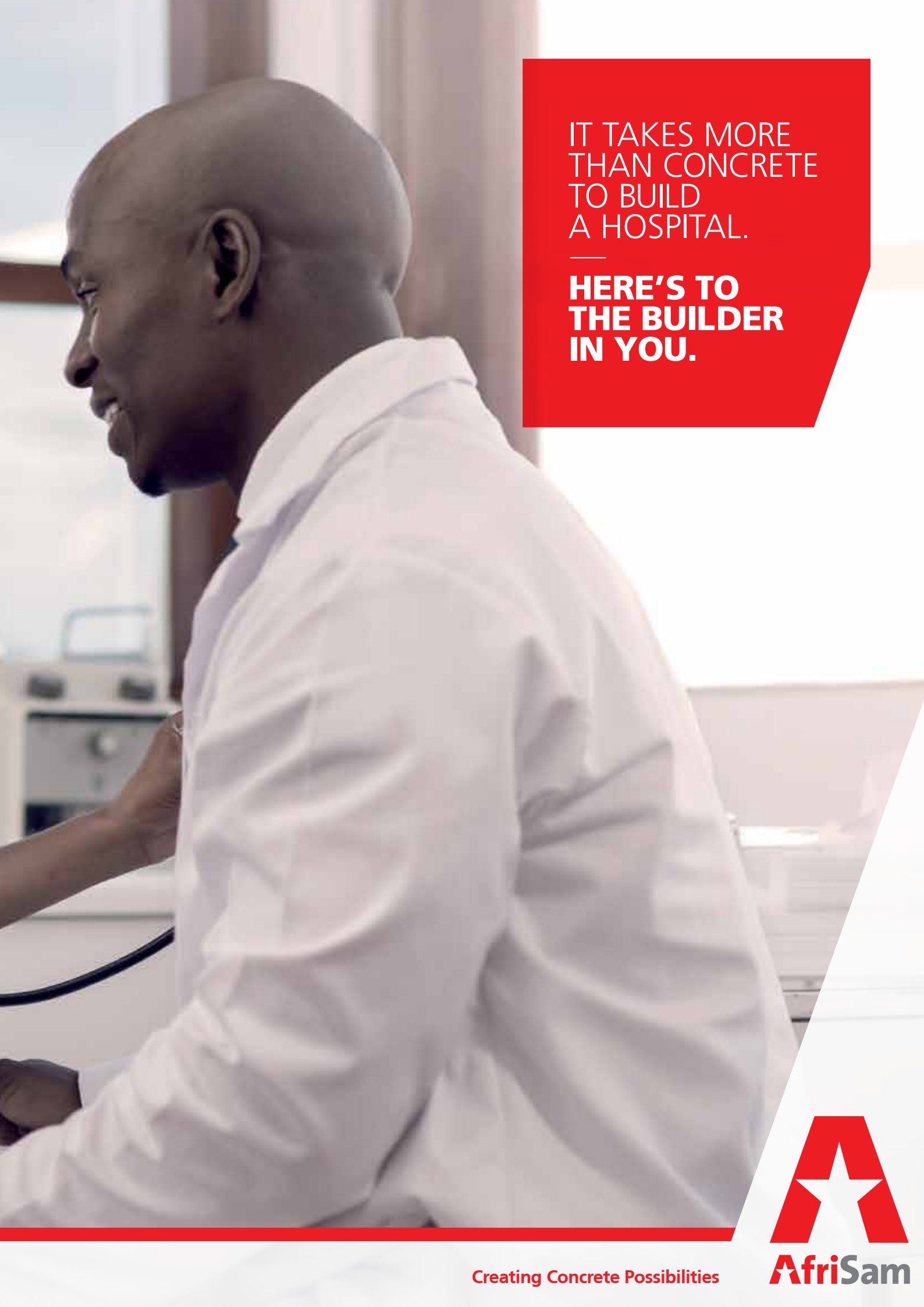
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JG Afrika's successful Groot Marico River Bridge repair keeps traffic moving



The badly cracked bridge pier before repair.



Installation of the piles.



Excavation for the construction of the concrete beam.

The swift action taken by JG Afrika on behalf of the Bakwena Platinum Corridor Concessionaire to repair the damaged Groot Marico River Bridge on the N1/N4 prevented further damage to the toll-road and provided road users with a more convenient alternative to a 36-km detour while repairs were being undertaken.

This busy highway from Gauteng to Botswana is operated and maintained by the Bakwena Platinum Corridor Concessionaire (Bakwena) on behalf of the South African National Roads Agency Limited (SANRAL).

JG Afrika, a leading South African engineering consultancy, is contracted by Bakwena to undertake regular inspections and oversee the maintenance of the major structures along the route. The Groot Marico River Bridge is among the largest of the 280 structures, including bridges and major culverts, along the highway.

JG Afrika first noted the crack in one of the bridge's piers in 2015 during routine bridge inspections which take place every five years. It was noted on the Bridge Management System, which JG Afrika uses to monitor the state of the structures and prioritise repairs that need to be undertaken.

Located in the North West province, the 80-m-long bridge is seven metres high and comprises six spans and five piers.

The first half was built in the 1970s and the second, tied to the original structure, was constructed in 2002.

After extreme flooding in the North West province in early January 2017 after a prolonged drought, the crack in the bridge pier widened. This resulted in the rotation of the pier and the settling of the deck structure.

G4 Civils' personnel who were operating in the vicinity reported the sagging deck to Bakwena and also to JG Afrika in early 2017.

Emma Day, a JG Afrika associate and highway engineer, who oversees the firm's bridge inspection and maintenance contracts with Bakwena, was appointed by the firm to manage this project.

Day was supported by colleague, Kobus Burger, who undertook the initial bridge assessments and repair design. Burger, a technical director at JG Afrika, is a SANRAL-registered senior bridge inspector who specialises in complex technical structural undertakings.

"The settlement was on the older side of the structure. We immediately closed this section and implemented a stop-and-go system to redirect the vehicle traffic to the newer portion of the bridge. This provided a safe short-term solution until we completed our assessments of the settlement to determine the actions that were required to repair the structure," Day says.

JG Afrika's assessments revealed that the failure resulted from erosion of the founding material below the old bridge's spread footings.

The initial design entailed installing piles at the four corners of the failed pier, and a concrete beam with a lip would be cast between the piles to support the pillar.

However, the engineering team had to quickly come up with an alternative solution when the damaged pier rotated further when piling commenced during the repair operations. They decided to dowel into the existing pier and to then cast it into the concrete beam.

As it turned out, this solution proved to be a more effective means of undertaking the repairs by doing away with the need

to excavate below the pier to construct the lip on the concrete beam. The solution was designed in only a week to ensure that the works programme progressed according to schedule.

Repairs started in the dry August period and the bridge was opened to traffic before the December holiday break when the highway experiences a significant increase in traffic volumes.

Completing the project in such a short time relied on careful planning of each step undertaken by the different contractors.

Day attributes much of the success of this project to excellent team dynamics between the resident engineer, Pieter Janse van Rensburg, and the representatives of the contracting teams. This is in addition to the combined skills and extensive experience of the contractors.

They included G4 Civils, the main contractor, and sub-contractor, Civilcon, which also advised and provided input into the final repair design. Stefanutti Stocks Geotechnical was appointed to undertake the piling and MBR undertook the jacking of the bridge deck.

"The river was diverted by means of a large berm before the installation of the propping and staging to support the bridge during the repairs. Piling commenced once the bridge deck had been supported. The scope of the piling works also included the construction of piled protection structures in front of the piers on either side of the failed pier to prevent the possible failure of the other piers," she explains.

After their installation, Civilcon started construction of the concrete beams to join the piles and support the pier.

A rapid-hardening, high-strength concrete was used to further accelerate the works programme, with the 40-MPa concrete achieving the desired strength in only seven days.

With the structure now stabilised, MBR jacked the bridge up by 100 mm to its original height. The bridge deck was then



The repaired pier and reinstated riverbed.

supported on steel shims of varying heights to accommodate the angle of the pier. This phase was followed by the repair of the crack and the reinstatement of the river bed to complete the repair works.

Day concludes that she is proud of JG Afrika's involvement in yet another successful project for a long-standing client that continues to demonstrate its unwavering commitment to operating a world-class highway. ■

**More information from Charmagne Denny,
Tel: +27(0)11 231 2200 / email: dennyc@jgafrika.com
www.jgafrika.com**



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Langbos Children's Shelter: a place of safety

The local community has come together to develop a brand new home for the Langbos Children's Shelter situated close to Addo Elephant National Park in Port Elizabeth after outgrowing the original community centre.

The construction of this unusual project would not have been possible without the input of the many companies and individuals who donated their time, products, and expertise.

With the innovative outlook of Intsikelelo President, Chris Grava, this project came together with the initial phase able to house 10 children along with a caretaker.

These children are either orphaned or come from unstable homes within the Langbos rural community. Many of the residents in this area do not have access to the basic amenities that many of us take for granted.

Engineer Rigo Govoni, from Structural Solutions, along with architect Jason Erlank, JE Architects, approached the local Sika Area sales manager, John Zehmke, for assistance with a product donation for the construction of the new centre. After evaluating the project needs, a total of 125 litres of Cemflex was donated to the project and used as a protective and waterproofing coating to the roofs and walls of the structure.

Cemflex is a universal waterproofer and bonding agent. This acrylic-based emulsion improves water resistance and adhesion



of portland cement-based composites, and was the perfect solution for the creative construction of the hut-like structures built as part of the new children's home.

The design of the Shelter is based on the local style of the Langbos settlement and includes sustainable elements and other features to create a homely environment the children so desperately need. A great deal of effort and investment went into the community as an upliftment initiative and local members were trained in the process of constructing and developing the shelter.

"It was great to be part of this community project and Sika is proud to donate product to such a good cause, enabling these children to have a safe, secure home," said Zehmke.

About Sika

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and automotive industry. Sika has subsidiaries in 100 countries around the world and manufactures in over 200 factories. Its more than 18,000 employees generated annual sales of CHF 6.25 billion in 2017. ■

More information at www.sika.co.za



About Langbos

- Langbos is an informal settlement with no running water, electricity, or paved roads, and many children suffer from unstable home lives, psychological trauma, as well as HIV, TB, and malnutrition. The Shelter will provide care and support for vulnerable children in the Langbos community, including housing for up to 12 children and employing a rotating local staff of caregivers.
- The shelter is being constructed using Superadobe, a low-cost, environmentally-friendly, earth building method intended to echo traditional earth building methods of indigenous South African cultures. It also allows for community training and involvement in the building process, which is especially valuable for a community with only informal housing.
- The locally-recruited building team includes about 30 men and women from the Langbos community. Builders are provided with Superadobe training, a competitive wage, and two meals every workday. Builders have also been given lessons in health, nutrition, and professional development, including CV writing.
- The shelter's design includes a variety of renewable energy systems including rainwater harvesting, grey water and waste water recycling, and biogas and solar energy.

This project is supported by GoPro for a Cause, Eco Domes Africa, Jason Erlank Architects, Structural Solutions, Aluminium Purpose, Scribante Concrete, ANSO Aluminium, Chris Howes Construction, Citrus Growers Association of South Africa, Sika South Africa, Bayview Construction, and Mayibuye Ndlovu Development Trust. It was made possible through the collaboration of these partners, as well as the generosity of individual donors and fundraising campaigns around the world.

Lompec Education Centre builds new classrooms and learning facilities

Located in Mamelodi East, the Lompec Education Centre is providing much needed educational facilities to the local community. The demand for affordable education has grown considerably since the Centre's inception in 1982, so much so that an additional ten classrooms were required to separate the junior school from the high school.

The IS Group of companies came on board to assist in the expansion of the Lompec Education Centre by donating materials and funding.

The IS Group has provided funding in the form of a donation in cash and kind to the value of R743,000.00. This was for the manufacture and delivery of 1,635 m² of Technicrete Bond Brick pavers, 77 m of Figure 7 1000-mm kerbs, 2,200 Technicrete Earthform grey retaining wall blocks and 87,000 Ocon Brick clay stock bricks. A cash portion of R456,590.00 was donated to Lompec. The combined donation was used to build 10 new classrooms, a library and a computer facility.

"We were delighted when the IS Group informed us they would be assisting in the much-needed expansion programme. In addition to the bricks and kerbs, we were able to complete two sections of the school with readymix concrete which was cast on the first floor; reinforcement steel was purchased and along with the donated bricks, enabled us to complete two wings," commented Barnard Mashiane, Emis Officer, Lompec Education Centre.

Group marketing and communications manager for the IS Group, Malebusa Sebatane, said "Access to education is crucial for the upliftment and skills development of previously disadvantaged communities. Without education there is no future. When we heard about the need for extra classrooms and learning facilities at Lompec Education Centre we offered to donate, through the manufacture and transportation of materials required, and assist in the center's expansion."

"The financial donation by the IS Group will enable us to buy paint and floor tiles as well as complete the storm-water erection, the paving installation, electrification elements and add finishing touches to Section C of the school," concluded Barnard Mashiane.

Lompec Education Centre offers conventional education from pre-grade R up to Grade 12 delivering good results. In 2017 the centre was staffed by 41 educators overseeing 924 learners. Lompec engages in skills development by partnering with local universities in teacher training and during 2017 monitored four UNISA students and one University of Pretoria student. Additionally, they gave bursaries to five learners.

The IS Group of Companies includes Technicrete, Ocon Brick and Rocla. ■

More information from

Malebusa Sebatane,

Tel: +27(0)11 670 7600

email: Malebusa.Sebatane@isgroup.co.za

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Planting your retaining wall to survive a drought

While the most critical contributor to the success of any segmental retaining wall (SRW) project will always remain detailed planning and competent workmanship, planting will transform a functional structure into an eco-friendly environment that can create a dazzling display of colour, scent and texture. Add to that the possibility of a drought and water restrictions, it is obvious that planting a retaining wall should not be taken lightly.



Planting in 2014, pre-drought.



Planting in 2018, during drought.

When the City of Cape Town planned a new head office for the Western Cape Electricity Department, Belville, Cape Town – a Green Star development designed by Bruce Eitzen of New World Associates Landscape Architects – the plans included an underground and large above-ground parking lot, necessitating cut and fill slopes that needed stabilisation.

To conserve space, and to create a green and aesthetically pleasing space around the building, Terraforce blocks were specified by NWE Consulting Engineers, because they are specifically designed to conserve existing natural areas on the project site by maximising the amount of open space relative

to the development footprint. They also maximise site usage and thereby reduce the total percentage of land area needed for development. Being hollow-core, the blocks additionally support vegetative growth as they are easy to fill with good quality soil, which provides improved storm water quality and better erosion control.

The gardens and plants in the Terraforce blocks, planted by Urban Landscape Solutions, were constructed in winter 2013 and had established over three summer seasons, before the water was turned off in November 2016 with the onset of Stage 3B water restrictions – meaning no irrigation. Over 90% of the planting has survived. The secret to the success? Good soil preparation, careful plant choice, and the advantage of three years ‘pre-drought’ plant establishment.

Here is our list of water-wise and indigenous plants suggested for use in retaining walls as recommended by Liesl Wasmuth, managing director and landscape designer, Graund:

Drought resistant plants

- Aptenia cordifolia (indigenous) is a tough, trailing succulent ground cover that will grow in any soil and is perfect for coastal conditions. It has a bright cerise red flower in spring and summer.
- Disphyma is also a succulent creeper, covers quickly and efficiently with little water.
- Othonna capensis, an indigenous succulent plant with small grey tubular leaves and small yellow flowers.
- Carpobrotus edulis (sour fig) extremely hardy succulent

Remember that all plants, even these, need watering when planted and for some time after to establish properly. Once they have established, they can survive on their own.

Plants for those who like it local

The plants in the water-wise selection are all indigenous, but a few more include:

- Arctotis (African daisy) forms a dense grey matt with colourful daisy-like flowers. Also quite hardy, but needs to be cut back from time to time.
- Carissa macrocarpa, great for covering low stone walls. Good in coastal conditions.
- Osteospermum ecklonis (creeping marguerite) for flower power like the Arctotis
- Plectranthus neochillus is a groundcover that is very easy to grow and useful for those difficult parts of the garden that are both dry and shady where root competition is a problem. It has fleshy green-grey foliage and produces lovely blue flowers for almost all year round. ■

Client: City of Cape Town

Terraforce Installer: Greymo Construction

Consulting Engineers: NWE Consulting Engineers

Civil Engineers: Haw & Inglis Civil Engineering

More information from Terraforce,

Tel: +27(0)21 465 1907 / www.terraforce.com

New pipes turn old quarry into upmarket retirement estate

Waterkloof Quarry, which is an old 58-hectare landmark, situated on the border of Waterkloof Ridge and Monument Park near Pretoria, is to be developed into an upmarket retirement estate known as the Waterkloof Marina Retirement Estate and is due to launch early in 2019.

Rocla was selected to manufacture and supply all the stormwater (spigot and socket) and interlocking pipes for this substantial project.

Hannes Bezuidenhout, estimator from Advance Projects said: "This exciting development was certainly not without its challenges. The size of the pipes required for the development and the proximity of the pipe trenches to existing roads created some logistical issues in terms of excavation materials, pipe deliveries and existing traffic flow. Rocla understood these issues and ensured that pipe deliveries were as we requested and that pipes were off-loaded as close to the excavated trenches as possible for ease of installation," Bezuidenhout commented.

"The timeframe for pipe delivery was a mere three months and it was Rocla's capability to meet this timeframe, their competitive pricing and product availability that secured them the contract to supply over 614 assorted stormwater pipes. The whole project duration is six months said Bezuidenhout.

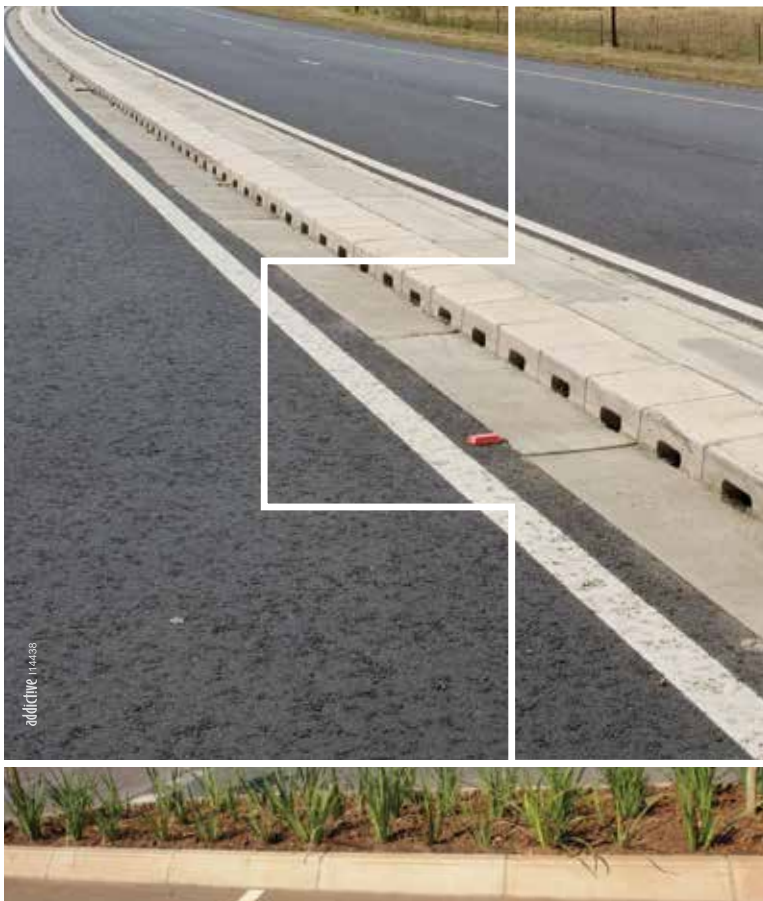
"Obviously when there are existing roads nearby or trench excavation working space is small, the delivery of large storm-

water pipes can be problematic for contractors on site. Thus the Waterkloof Marina Retirement Estate project these factors needed to be addressed, particularly for all the deliveries of our large stormwater pipes, so that there would be no major inconvenience or disruption to excavation scheduling. Rocla successfully met these specific challenges" said Brendon van Vuuren, sales consultant for Rocla.

Rocla's spigot and socket stormwater pipes use the rolling rubber ring principle and no lubricant is required. Pipes within this category may be ordered as both stormwater culvert (SC) or stormwater and irrigation (SI) pipes. SI pipes are hydrostatically tested after manufacturing.

Rocla is one of South Africa's leading manufacturers of precast concrete products for the infrastructure sector and is part of the IS Group of companies which includes Technicrete and Ocon Brick. ■

**More information from Malebusa Sebatane,
Tel: +27(0)11 670 7600
email: Malebusa.Sebatane@isgroup.co.za
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Cape Town International Airport cladding project wins CMA trophy

The Cape-based cast-stone manufacturer, Revelstone, was one of four Overall Trophy winners in this year's CMA Awards for Excellence competition.

The award was made at a gala-dinner ceremony in Melrose Arch, Johannesburg, on March 24, for a wall-cladding project at Cape Town International Airport's international departures hall. The mural initially took an Aesthetic Excellence Award,

however, the judges subsequently concluded that it was the outstanding entry in the Aesthetics category and the award was escalated to Overall Trophy Winner status.

Commenting on the project, the judges said that besides displaying an African wildlife scene, the mural embodies the creative use of precast concrete, demonstrating how the material can be successfully deployed for works of art.

Revelstone director, Alexander Cyprianos, says that the project is a prime example of how precast concrete cladding, in this instance Revelstone's Viking Random Cladding, can be used to mimic natural rock, and how it assisted the artist on this project to skilfully portray cheetahs in their natural habitat.

Based on the inspirational input from the conceptual team of the main contractor, Matrix Communications, the mural design and the construction of the wall was executed by Matrix Communications artists, Warren Barren and Archie Birch.

Once the concept and its ensuing design had been approved by the client, it was transposed onto the wall which measured 25 m x 2.5 m. This process involved identifying the shape, size and colour of each cladding block and its precise position – much like working on a jigsaw puzzle.

Before the site work began only dry walling separated the departures hall from the adjacent chamber. Therefore, to provide a structure which would support the weight of the blocks, a wooden framework, covered by chicken mesh and bonding cement, was mounted against the dry walling.

Produced in three colours, Autumnstone, Charcoal and Robben Island, and cast in 20 individual moulds, some of the cladding blocks were cut by hand to achieve a faithful rendition of the design.

Family-owned, Revelstone has been producing customised cast-stone products since 1993 for both the domestic and commercial markets. The company uses traditional masonry skills combined with modern moulding techniques to painstakingly produce master moulds from original rocks and stone. This hands-on approach allows the creation of custom-made products, enabling Revelstone to supply pavers and cladding units that were uniquely tailored to its clients' specific requirements. ■

**More information from
Alexander Cyprianos,
Tel: +27(0)86 117 3835
mobile: +27(0)82 462 0466 or
Jeanine Pomario,
Tel: +27(0)86 117 3835
or mobile: 083 244 5046
www.revelstone.co.za**



Cape Town International Airport's international departures hall where Revelstone's Viking Random cladding took one of four CMA Awards for Excellence trophies.



HDPE lined pipes for Driftsands Collector Sewer Augmentation Project

Increased residential and commercial development in the Walmer area of Port Elizabeth as well as the estimated needs requirement by the year 2020 was a crucial factor in the Nelson Mandela Bay Municipality's decision to increase the capacity of the existing Driftsands Collective Sewer Augmentation.



Construction of a 1,400-mm concrete HDPE lined sewer 1,850 m in length forms part of Phase One of this four-phase project which commenced in the second quarter of 2017. Rocla were selected to supply Class 75D high-density polyethylene (HDPE) lined pipes and manhole access pipes. The sewer starts from the Driftsands Waste Water Treatment Works and terminates at the Airports Company South Africa (ACSA) boundary.

The existing sewer was constructed in 1983, and is a gravity sewer which cannot be upgraded from a technical perspective. Therefore a realignment of the line route is currently being undertaken. The first 1,460 m is parallel to the existing 1,050-m Driftsands Collector sewer and then branches off to by-pass the planned ACSA extension of the Port Elizabeth Airport runway.

Rocla sales consultant in Port Elizabeth, Graham Howell, said: "We started manufacturing the 780 lengths of the 1400-mm-diameter Class 75D HDPE lined pipes in May 2017 at an average rate of eight pipes per day. We achieved this by double stripping our four available

moulds, and we delivered the first pipes to site in July 2017.

"We made minor improvements to the product after making numerous on-site visits and we continued with production for the remainder of the year. In addition ten manhole access pipes were also ordered and these were cut in the Rocla yard to specification, which enabled the laying of pipes to continue uninterrupted, and gave the contractor the opportunity to achieve good production on site," said Howell.

Rocla also had to make further design changes during the manufacture of the manhole rings and cover slabs with added internal HDPE liners. This new design could become the accepted and required standard for all future Outfall Sewer Projects.

"With Phase One completed, the second phase is due to start during 2018 which will most certainly present Rocla with more new and interesting challenges as the conditions include rock and very deep trenches, but we are more than confident in our ability to overcome these as well as in our manufacturing capabilities," concluded Graham Howell.

The value of the Phase One project is R52.8 million and consists of 1,850 m of 1,400-mm concrete HDPE lined sewer, 26 manhole structures, as well as one diversion chamber and bulk earthworks.

On completion, the 4.2-km four-phase project will have addressed the sewerage requirements for existing and for future developments in the western suburbs of the Nelson Mandela Bay Municipality.

Rocla is Southern Africa's leading manufacturer of precast concrete products for infrastructure, which includes pipes, culverts, manholes, poles and various other related products. The IS Group of companies also includes Technicrete and Ocon Brick. ■

More information from
Malebusa Sebatane,
Tel: 011 670 7600
Malebusa.Sebatane@isgroup.co.za
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CoreSlab capabilities fast-track another commercial property development

Golden Bay Property Developments is known for an ability to accelerate its property projects to swiftly supply a significant demand for office and industrial space in Polokwane, Limpopo's capital city.

This latest project will provide 40 additional offices to a growing number of small, medium and micro businesses which are establishing their operations in the hub of the largest urban node north of Gauteng.

By February 2018, the property developer's building division had already commenced brickworks on the second and final storey of the structure.

The impressive production rate achieved on this project can also be attributed to the use of hollow-core slabs that ensured that 800 m² of flooring at the second and final level of the structure was completed in only two days.

Once levelled and grouted, brickworks could commence promptly to complete the shell of the structure at this level, while the specialist trades started fitting out ground floor.

Over 90 hollow-core slabs, each 8 m x 1.19 m, were delivered to site from CoreSlab's state-of-the-art factory every day in line with the works programme.

"We had two of our trucks travelling between the factory and the construction site most of the time during the installation



More than 90 hollow-core slabs, each 8 m x 1, 19 m, were delivered to site from CoreSlab's state-of-the-art factory every day in line with the works programme.

phase to ensure timely delivery of the items. They were lifted directly from the trailers using our own mobile crane and one element was installed every six minutes by our competent teams," CoreSlab's Clifford Mogale says.

He was involved in this project from the outset when CoreSlab was approached by Golden Bay Property Developments to supply and install the hollow-core slabs. The company's work scope also included assisting the client in designing an optimal layout of the hollow-core slabs to ensure that they could be rapidly installed.

CoreSlab has helped Golden Bay accelerate 10 other projects in the Waterberg area. This is in addition to CoreSlab's involvement in other leisure, retail and residential property developments, as well as building projects for the state, ranging from student residences to civic centres and schools.

The precast concrete specialists' services and modular system eliminate the need for propping and staging, and enables timely co-ordination of construction activities, from steel fixing to stripping of concrete shutters.

Instead, the high-quality hollow-core slabs, each no less than 40 MPa, are manufactured off-site and transported to site where they are placed on thin mortar bedding prepared by the main building contractor the morning before installation by CoreSlab's team.

This approach to constructing the floors of the structure shaved five weeks off the overall construction schedule.

Mogale says clients also benefit from the high accuracies that are achieved by manufacturing the elements in an environment where conditions are controlled.

"Workers are not exposed to the many variables on a general building site that may hinder precision levels. They also work at ground level, while the installation component of the programme is assigned to small skilled teams, making for a safer construction project," Mogale says.

In addition to reducing the number of people required on site when constructing the floor, this method eliminated the need to co-ordinate the timely delivery of multiple consumables, as well as building materials in the bustling built-up Polokwane Central Business District.

CoreSlab's installation team of up to 10 people includes a highly experienced foreman, rigger and crane operator.

A 160-ton Liebherr crane was deployed for the efficient and safe lifting and placing of the elements – each weighing in at a substantial 40 tons.

The crane was deployed to site ahead of the arrival of the precast elements and installation team, and was strategically placed next to the structure to accelerate the installation.

The CoreSlab teams worked alongside Golden Bay Property Development's site manager, Rodney Chauke, who says CoreSlab's ability to provide a comprehensive precast concrete solution also added significant value to this project.

Jaco de Bruin, MD of CoreSlab, concludes that he is proud of the company's long association with Golden Bay, noting that moderate growth in gross-domestic product indicates the start of economic recovery that will have a profound positive impact on the embattled building sector. ■

**More information from Tel: +27(0)87 232 2462
email: info@coreslab.co.za / www.coreslab.co.za**



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SA's first precast concrete parkade wins CMA Award

Echo Prestress has been awarded the prestigious Concrete Manufacturers Association's NPC Building Elements Award for Engineering Excellence, for its pivotal role in the construction of South Africa's first precast concrete parkade. Comprising seven storeys and a total floor area of 65,000 m², North East Parkade is also SA's largest precast concrete structure to date and was built as part of an expansion and revamp of the Fourways Shopping Mall Fourways, North of Sandton in Johannesburg.

In making the award, the panel of judges commented that the project has broken the mould for the design and construction of parking structures and is an example of efficient, streamlined engineering.

North East Parkade was initially conventionally designed using cast-in-situ technology. However, time constraints and

According to Echo technical director, Daniel Petrov, hidden column and beam connections were critical in complying with the architectural design criteria and these had the added advantage of simplifying the installation process.

"Vertical load transfers up to 900 t/column were facilitated by purpose-designed connector bolts and shoes which enabled the columns to be simply bolted together. The columns were cast in two-storey lengths to minimise the number of joints. As soon as the columns were secured in position, rectangular beams were seated on steel billets which had been cast into the columns. Thereafter, the placement of the slabs onto the beams could follow immediately," said Petrov.

Only 475 mm deep, the shallow beams were designed to suit the restricted 3,060-mm floor-to-floor height. A floor screed was applied as a structural component and enhanced the stiffness of the beams by more than 200%. During load testing under a live-load application this resulted in deflections that were not more than 2 mm on a 7,850-mm beam span.

The detailed structural design was carried out by Precast Concrete Consultants, (Precon) who utilised specialised software for the creation of the construction drawings. This resulted in fabrication drawings being made available as part of the specialist design process and further reduced the complete project time cycle. Close cooperation between Precon and the overall project engineers, WSP, ensured that all structural details were well coordinated and complied with WSP's requirements.

"With all the advances in construction technology and techniques available today, precast structures of this type will become indistinguishable from those constructed using non-precast methods. Designers are no longer obliged to work within tight constraints. Due to the availability of an increasing number of precast elements they are now able to incorporate increasing variety and design complexity in their buildings.

"North East parkade is a functional and aesthetically pleasing end product which will surely be classified as one of South Africa's ground-breaking structural applications.

"The true value of this flagship project is yet to be fully realised and it should promote greater liaison between the precast producer and the design team. However, it already represents a significant shift towards prefabricated construction methodology and is encouraging construction professionals to take a fresh look at the benefits of precast.

"Educating the current and upcoming generation of young professionals in the correct use and appreciation of precast construction is one of our primary objectives as professionals and North East Parkade will provide a valuable reference point for South African professionals and educators who are involved and/or considering similar projects.

"Moreover, continuous investment and innovation by the South African precast concrete industry will pave the way for increasingly more complex layouts and external treatments," concluded Petrov. ■



An aerial view of the parkade under construction.

a need to minimise disruption to traders and their customers were important design considerations. This prompted the design team to investigate and to then propose an alternative design using precast columns, beams and slabs as the frame's main structural elements. Together with other precast elements such as crash barriers, balustrades and stairs, they would be combined with cast-in-situ concrete, to create a hybrid construction system.

Besides being faster and causing less disruption to retail activity, precast construction would be propless and would allow the early occupation of the lower floors while the upper levels were still under construction. Moreover, its fast, repetitive modular construction technique and consistent factory-produced quality would yield superior productivity and improved safety on site.

These factors persuaded the Fourways Mall owners, Accelerate Property Fund, to make history by building South Africa's largest precast framed structure to date.

Echo Prestress manufactured 78,000 m² of slab material which was used for the flooring and retaining walls. Echo was also the prime mover in the switch from in-situ to precast construction and played a major role in the precast engineering, input which was crucial to the success of the project.

More information from Daniel Petrov or Melinda Esterhuizen, +27(0)11 589 8800 www.echo.co.za

CMA Aesthetics Excellence award for Smartstone P.E.



SmartStone's Port Elizabeth branch has taken home the Aesthetics Excellence (wet cast stone) award at the Concrete Manufacturers Association Awards for the use of its products at the Constitution Hill Urban Renewal project in Port Elizabeth.

The Urban Renewal Project has afforded SmartStone Port Elizabeth the opportunity to be a part of the modernisation of this historic area and honour and maintain the traditional design elements that were present when the area was first established many years ago.

Briefed to be sympathetic to the area's heritage, the developer used the SmartStone Port Elizabeth's Huguenot cobble (110 x 110 x 50) Legogote cobble in various sizes (110 x 110 x 50, 110 x 220 x 50, and 20 x 220 x 50).

"Cobbles give one the ease of installation like a standard brick, but with a much

stronger, elegant and refined finish," remarks Smartstone Port Elizabeth manager Daniel Rupp.

"Traditionally cobbles are one size, with a gap between each stone. The design used in The Donkin Village used four different sizes, which were placed flush to one another to give the road and pavements a contemporary look with an old-world feel."

The judges complimented the project and the use of SmartStone Port Elizabeth products saying: "Textures and colours are complementary to the natural surroundings. Contextuality is very appropriate. A picture pretty project." ■

More information from
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It is definitely time for this South African ready-mix pioneer

Jerome Perils is special – as is his company, Kenako Concrete. Not only is he the first black industrialist in Port Elizabeth to be funded by the Department of Trade and Industry (the DTI) and the Industrial Development Corporation (IDC), but the 71-million Kenako Concrete operation in the Coega Industrial Development Zone is the first 100% black-owned ready-mix concrete company in the whole of South Africa.

After 20 years of working for others, growing their businesses and enriching them, Jerome Perils now thinks it's his time – hence the apt name of his business, Kenako (it is time) Concrete.

Of the years working for some of South Africa's top ready-mix companies, such as Scribante Concrete, Lafarge and Concrete 4U, Perils says they have given him the extensive knowledge and experience to make his own business a success.

And a success it certainly is. Being the only ready-mix plant in the Coega IDZ, he is positioned to take advantage of all future or prospective tenants wanting to set up inside the IDZ. "We will be the nearest to their construction sites compared to our opposition and Coega has a lot of construction work such as warehouses, factories to be constructed going forward," explains Perils.

"From our locality inside the Coega IDZ we also service the whole of P.E. and surrounding areas. We travel up to 150 km outside Coega, which includes, for example, Grahamstown, Kirkwood, Patensie, Alicedale and Addo."

In addition, he says: "We recently had our SARMA (SABS ISO) audit and we passed with 98,5% - the highest among the Eastern Cape ready-mix companies. And we are a start-up, trading for only six months when audited and 100% black. I think it's a big feather in our cap. I am very proud of this achievement. We have a level 1 BBBEE Certificate which helps all our customers on their BEE scorecard under their procurement."



"We installed and commissioned our concrete plant at the end of September 2017 and we started sales and production on the 1 October 2017.

Production capacity and range of mixes

"We can produce 150 m³ of concrete per hour with our wet concrete plant, which is manufactured by Euromecc in Italy and is state of the art. It was supplied and installed by Pieter Els of Konkrete Global, the South African agents for the brand," Perils says. "So theoretically in a 10-hour day we can produce 1500 m³ of concrete. We have a fleet of 15 Mercedes Benz ready-mix concrete trucks and pumping facilities available. We also offer technical advice to all our customers and the concrete industry in and around Port Elizabeth."

Kenako Concrete manufactures and supplies all types of ready-mix from 10 MPa to 60 MPa. Their extensive offering includes ready-mixed retarded mortars, plasters and toppings as well as pumped concrete, special floor mixes, fibrin concrete, waterproof concrete, accelerated quick-drying concrete, self-levelling concrete, freezer-room concrete and coloured pigmented concrete. In fact, any type of concrete required for any specialised application can be supplied.

"We can also do any kind of custom concrete mix you desire or may need. We have a specialist in-house technical department that does all our concrete mix designs," he states.

Ensuring quality concrete

Asked what makes his concrete better, Perils replied: "Well, firstly we have a wet concrete plant compared to our opposition in Port Elizabeth, who have dry concrete plants. With a wet concrete plant all our aggregates and cement, water and admixtures are mixed together inside our 3-m³ drum mixer and then discharged into the ready-mix trucks.

"Our opposition's dry concrete plant means they add all the cement, aggregates and admixtures into the drum of the ready-mix truck and use the drum to mix everything together. Our concrete is therefore more homogenous than theirs and of better quality. Also, because we can load a truck in five minutes, we can supply customers faster than our opposition. Finally, our concrete trucks are brand new so we can offer a much more reliable service to our customers.

Kenako supplies all segments of the construction market. This ranges from low-cost housing contractors, to townhouse developer contractors, from smaller contractors who are CIDB 1 to the biggest who are CIDB 9.

"In terms of quality control, we have a in-house concrete technologists who does all our quality concrete and concrete mix designs. They are on par with the best in the country," declares Perils.

"What made me choose my equipment supplier? In all my 20 years' experience of being in the ready-mix concrete industry, the most reliable and best manufacturers of concrete plants are either the Italians or Germans. I chose Euromecc from Italy as I was very impressed with the quality of their product and the innovation and latest technology that they have incorporated in to their ready-mix concrete plants. Their agent in South Africa, Konkrete Global, was a very supportive partner in our endeavour."

Challenges overcome

"The process of obtaining the loan was not easy. I applied to IDC and they have a strict vetting process and also do their homework to check that you really are who you are saying you are. Do you have the experience and know-how? Have you managed your own ready-mix concrete company before? They examine your track record in the industry; how many staff and workers you previously employed and managed. They check everything," Perils adds.

"If I have any advice for future entrepreneurs it is this: Make sure that your business model will work in your specific industry and that it will be sustainable. Remember that even though the IDC is the government bank and its mandate is to fund new black start-ups and existing black businesses, they don't just give you money. You must be able to prove everything you say you did previously in the industry and also going forward in the industry.

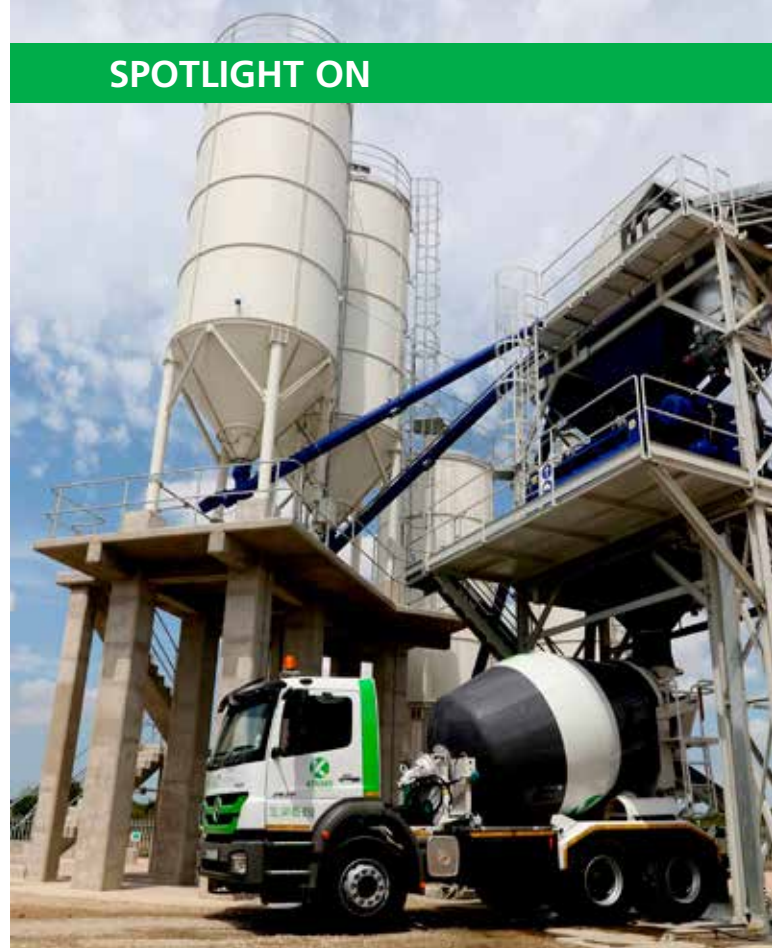
"I take my hat off to IDC. They are a sterling example of what a developmental funding institution should be. They do their own due diligence before your application goes forward to their credit committee," notes Jerome Perils.

"IDC recommended that I apply for the Black Industrialist Grant Funding as it had just been launched by Government. The Black Industrialist Program is run by the DTI. Again the DTI was very thorough in their evaluation and they also double-checked everything exactly as the IDC had done.

"Remember that nobody, least of all Government, is just going to give anybody grant funding. They must be 100% sure your business will succeed. Remember too that the Black Industrialist Program is to assist black business to pay a percentage of their fixed assets so that they can compete against established white companies where most of their fixed assets are already paid for. The mandate of Black Industrialists is to help transform our economy to be representative of all our people, to create new jobs to reduce unemployment and to assist other black SMME in any way possible.

"I really can't stress enough the sterling job IDC and the DTI is doing and I encourage any budding entrepreneur who wants to start his own business to approach them. It's not easy but if you persevere and can prove to them that you are who you say you are; have the relevant experience and knowledge; have a watertight business plan and financials model and, above all, the drive to run your own business, you will succeed."

Perils concludes: "The main challenges for any new start-up black business are to get market share and also to have enough working capital to carry you from start-up to when you eventually break even on your sales. Those are the two main



issues. Fortunately the DTI gave us grant funding towards our fixed assets and the IDC gave us working capital."

Job creation and environment

Kenako Concrete is contributing to job creation and has, so far, created 46 new jobs. However MD Jerome Perils is confident that this number will increase because he is sure that the construction industry in the Eastern Cape is poised for growth.

With green issues top of mind at the moment, it's gratifying to find that, in addition to being a successful operation, Kenako Concrete is also environmentally conscious and recycles 90% of the water used to clean the trucks.

As successful as Kenako Concrete now is, there is no doubt that in Jerome Perils' hand it will grow from strength to strength. ■

More information from Jerome Perils,
Tel: +27(0)41 406 0151
email:Jerome@kenakoconcrete.co.za
www.kenakoconcrete.co.za

a.b.e flooring systems have provided decades of service

The heavy-duty concrete flooring systems from a.b.e. Construction Chemicals have for many decades been extensively used in numerous high-profile industrial as well as commercial flooring projects throughout South Africa.

Peter Jones, a.b.e.'s national sales manager: Flooring, says some a.b.e. flooring products have in fact been around for more than 50 years and have become household names among contractors as well as property improvers throughout the sub-continent.



Tekton Autobody Repairs, Western Cape.



BMW workshop, Durban.



Cold Harvest's cold room in Paarl.



a.b.e floor systems have given decades of service.

A typical example is a.b.e.'s abeco mastic flooring system: a cold-laid bituminous mastic consisting of stone chippings, portland cement, sand and a binder, flintkote 3. abeco mastic has been installed in warehouses, railway platforms, heavily trafficked corridors, factories, goods sheds and cold rooms all over South Africa.

abeco mastic floors at the BKB building and Mercedes-Benz SA plant in East London have given over 50 years' service. More recent noteworthy projects include ABSA Capital (Tiber House) parking garage in Sandton, Cold Harvest's storage facility in Paarl, and a.b.e.'s own warehouse in Boksburg.

Jones says: "With our abeco mastic flooring, there are no joints as any construction joints disappear after a few days of exposure to traffic. abeco mastic makes an excellent repair material for potholed, damaged or ravelled concrete floors. Patching carried out on a Saturday morning is usually ready for full operation on the following Monday morning with no danger of the patching pulling out."

Some of the other benefits of abeco mastic include the fact that it produces a jointless, non-dusting and resilient floor surface that is non-slip, vermin-proof, damp-proof, non-flammable, and self-healing under traffic, including the heaviest loads carried on steel, plastic, or rubber-wheeled vehicles; and

It does not disintegrate and may be laid over any firm, sound, clean sub-flooring including concrete, asphalt, well-compacted crusher run, steel and timber.

Other popular a.b.e. flooring products include:

- abecote WD 337, a two-component, solvent-free, water-dispersed epoxy emulsion that produces floor coatings with a paint smooth finish;
- abecote 400 Hi-build: an epoxy floor coating that is seamless, hygienic and can be applied to a variety of surfaces. "This product can also serve as a binder for abrasive grit to yield non-slip flooring," Jones explains;
- abescreed: mortar flooring system providing seamless finishes without crevices to hold dirt and bacteria;
- abescreed SLC P: a rapid hardening cement-based screed for self-levelling floors, ideal for situations where quick setting is essential so that carpets, ceramic tiles, vinyl, wood block or cork can be installed quickly;
- abescreed SLC primer: which is applied prior to abescreed SLC P to improve the self-levelling screed's adhesion to the concrete substrate, reduce surface absorbency, and seal the substrate;
- abescreed PU: polyurethane mortar with exceptional chemical resistance, and the ability to resist heat of up to 120 degrees Celsius;
- abeflo: a self-levelling compound for decorative, seamless, hard-wearing and chemical-resistant flooring;
- abeflo HPU: a polyurethane self-levelling chemical resistance mortar;
- abecron LA dustless: a dry-shake mineral-aggregate surface hardener that prolongs the working time to make it easier to apply; and
- abedur S: a blend of natural aggregates and shrinkage-compensated cement that produces a hard-wearing granolithic type of floor. ■

**More information from Elrene Smuts,
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Concrete industrial floors: getting them right. *Part 1*

By Bryan Perrie, MD of The Concrete Institute

Floors on the ground differ from structural suspended slabs, and require different design and detailing. Details used by structural engineers for suspended slabs are often translated to floors on the ground, despite there being a current code of practice for them. Floors on the ground are more like pavements, and should be designed using pavement principles rather than structural principles.

The SANS 1200 and SANS 2001 set of standardised specifications, normally used for floors on the ground, do not contain clauses specific to floors on the ground as they are for construction of structural concrete.

The Concrete Institute (TCI) publication *Concrete Industrial Floors on the Ground* gives guidance on design and construction as well as explaining the causes of common problems and repair suggestions. Two SANS codes of practice, SANS 10109-1 and SANS 10109-2, cover ground floor slabs and their finishes.

Subgrades and subbases

While concrete floors don't necessarily require strong support from the subgrade, the support must be reasonably uniform, without abrupt changes in degree of compaction. The upper portion of the subgrade should be of uniform material and density, as the design of ground floor slabs assumes having uniform subgrade support.

It is important to control areas of non-uniform support, such as expansive soils, hard and soft spots and backfilling. Where the subgrade is not uniform, the slab will bridge over the soft spots and ride on the hard spots, ultimately causing cracking. Uniform support is more important than strong support, as strength can be built into the slab itself.

Concrete and its properties

Concrete used for industrial floors should have high wear resistance, good dimensional stability and adequate flexural strength.

While the choice of cement type depends on the type of floor and the environment in which it will be used, all cements should comply with SANS 50197. Most important is the concrete's ability to reach adequate early strength for cutting the joints, if jointed floors are used, and its abrasion resistance.

Coarse aggregates should comply with SANS 1083. The nominal size of coarse aggregate should generally be a maximum of 25% of the thickness of the floor and the maximum possible size of coarse aggregate should be used.

A carefully considered mix design will minimise the bleeding of the fresh concrete.

When using admixtures to modify the properties of the concrete, the effects of the admixture on both the fresh and hardened concrete should be evaluated by testing it with the intended materials and conditions of use.

The most important properties of fresh concrete for floors, are:

- Workability, which is generally assessed by the slump test;
- Consistency, which refers to the stiffness or sloppiness of the concrete;
- Cohesiveness, or the tendency of the concrete to resist segregation; and
- Bleeding, which occurs when solid particles in fresh concrete settle and the water migrates to the surface.

With excessive bleeding, zones of weakness tend to develop in hardened concrete where water was trapped under large particles and potentially reduce the bond between concrete and reinforcing steel if water has been trapped under the reinforcing bars.

In hardened concrete, the following properties are important:

- **Abrasion resistance:** Concrete floors require a high degree of abrasion resistance, and a minimum compressive strength of 30 MPa is normally specified, although higher strengths may be necessary.





Levelling and compacting with a laser screed.

- **Shrinkage:** Since the volume of concrete reduces as it dries and hardens, it will exhibit drying shrinkage whether it is damp cured or not. While drying shrinkage does not cause cracking in itself, if the shrinkage is restrained, the resulting tensile stresses can cause cracking.
- **Concrete grade:** The strength of the concrete is usually assessed by measuring its compressive and flexural strength under specific conditions. For floors on the ground, compressive strength is not a critical property, but it does give an indication of the hardness and impermeability of the concrete. Flexural strength is the ability of the concrete to resist tensile failure due to bending, and is an essential property of concrete floors. Recommended minimum strength for concrete industrial floors at 28 days is 30 MPa.
- **Surface tolerances:** These are critical for floors in a warehouse. Tolerances should be specified in accordance with the fourth edition of *Technical Report 34* from the Concrete Society in the UK.

Design & Detailing

Cracking is the most common problem in floors on the ground, often resulting from incorrect design, detailing, specification and construction. TCI's book *Concrete Industrial Floors on the Ground*, details what designers of floors need to know.

Design of floor thickness

When a load is applied to a concrete floor on the ground, it causes bending of the slab, producing both compressive and flexural (tensile) stresses. Of the two, flexural stress is the more critical; thus it is concrete's flexural strength that is considered in determining the thickness of the slab.

The objective of a design for a concrete floor on the ground is to ensure its satisfactory performance under all applied loads. It is important to prevent:

- excessive flexural stress, which will result in cracking;
- excessive bearing stresses on the concrete surface;
- excessive punching shear stresses due to concentrated loads; and
- excessive or differential deflections due to settlement of the subgrade.

For most floors, the governing design consideration is the flexural tensile stress induced in the concrete by wheel or post loads.

Slab design must take into account the wheel loads of industrial vehicles such as fork-lift trucks and straddle carriers; concentrated static loads such as those exerted by posts of storage racks; distributed loads from materials stacked on floor; and the properties of the concrete itself.



Compacted concrete awaiting finishing.

For post loads, the objective is to keep flexural tensile stresses in the slab within safe limits.

While cracking in aisles can be controlled by selecting an adequate slab thickness, the settlement of a slab under distributed loads is not affected by its thickness. For exceptionally heavy distributed loads, however, the amount of settlement should be examined using methods for the design of spread footings or raft foundations.

While wheel loads, post loads and distributed loads will seldom be exerted simultaneously on a given area of floor, the cumulative stress that will occur under a combination of loads should be considered.

Cracking

Shrinkage: As the concrete in a floor dries, it tends to shrink. Shrinkage can also result from decreased temperatures. The tendency to shrink is resisted by friction between the floor and its supporting layer, generating tensile stresses in the concrete. These stresses increase in magnitude with their distance from the free edges of the slab, and while they are too low to crack small slabs, they can cause cracking in large slabs. In long strips of concrete without joints, cracks will be mainly transverse. Providing reinforcement in the floor will not prevent shrinkage, but does distribute cracking.

Warping: When slabs on the ground are hardening and drying, differences in the temperature and moisture contents develop between the top and bottom of the slab. This causes differences in the lengths of the top and bottom surfaces, causing the slab to curl upward or downward at its edges, and producing stresses within it. Both shrinkage and warping stresses are cumulative with the stresses caused by imposed loads on the slab, so that a slab under traffic can crack at any time or place where the concrete's strength is exceeded.

Expansion: Concrete pavements expand as the temperature and moisture contents increase. The expansion characteristics of concrete vary according to the characteristics of the aggregate and those of the concrete mix, among other things. Thermal and moisture-induced expansion can be accommodated within the openings at properly located joints unless there are exceptional operating conditions. The joints, however, must be effectively sealed against intrusion of incompressible material.

Control of cracking

Random irregular cracking of floor slabs due to shrinkage, warping and expansion are unacceptable. Not only are they unsightly, but spalling and ravelling occur along their edges. Cracks also tend to proliferate and open with time and impair load transfer and thus the load-carrying capacity of the slab. Methods for preventing random cracking include provision of joints, provision of distributed reinforcement, the use of steel fibres or the use of post-tensioning.

Continued on page 44

Reinforcing: In general, reinforcing is not required in concrete floors having joints at circa 4 to 5-m centres. It is, however, essential to provide reinforcing in slabs where the recommended joint spacing for unreinforced slabs is exceeded, or where odd shapes are unavoidable.

Light distributed reinforcement's function is to hold the fractured faces of cracks together, assuring adequate load transfer across them. It is not designed to increase the load-carrying capacity of the floor slab. The minimum required quantity of reinforcement considered sufficient to control cracking is approximately 0,1% of high-yield steel or welded-mesh fabric.

Alternatively, steel fibres in the concrete or post-tensioning can be used in slabs with joints further apart than 5 m or in 'jointless' floors.

Joints: Joints are provided in concrete floors in order to control cracking, which may result from restrained contraction and from the effects of restrained warping and traffic loads. Joints divide the floor into practical construction increments, and accommodate floor movements.

Joints fulfil a number of functions, which should be carefully considered. They should be chosen depending on which of the following functions they will be required to perform:

- accommodating drying shrinkage;
- accommodating dimensional changes due to changes of temperature and moisture content;
- isolating the floor from fixed structures;
- providing for planned or emergency interruptions of concrete placing;
- facilitating control of surface levels during concrete placing;
- providing an adequate load transfer across joints.

The first three of these functions have a major influence on the positioning and spacing of joints, and require that joints be capable of accommodating movement throughout the floor's service life.

Load transfer: To base slab thickness design on flexural stresses occurring in the interior of a slab, it is necessary to provide joints which will ensure adequate load transfer. This provides shear transfer for wheel loads moving across or adjacent to a joint. Adequate load transfer provision also helps prevent differential vertical movements of adjacent slabs, thus helping maintain the regularity of the surface.



Levelling and compacting with a vibrating truss.

Load transfer can be provided by aggregate interlock, which is the simplest method; by trapezoidal or rounded keyways at construction joints, or by mechanical load-transfer devices such as dowels or tie bars. Aggregate interlock and keyways are only effective in providing load transfer with joint spacings under 5 m.

Joint types

Three types of joints are generally used in floor construction – contraction joints, construction joints (planned and emergency) and isolation joints.

Contraction joints: These allow horizontal movement of the slab, relieving stress which might otherwise cause random cracking. They can be formed only between panels which are placed, initially, in a continuous operation. Essentially, they consist of a plane of weakness created either by sawing or forming a groove, to a typical depth of one quarter of the slab thickness. Shrinkage, warping and traffic-load stresses then cause the slab to crack below the groove.

The spacing of contraction joints depends on the shrinkage properties of the concrete, whether the steel reinforcement or dowels are provided, subgrade or subbase friction, slab thickness and floor type.

Contraction joints are formed by sawing a groove in the top of the slab after the concrete is sufficiently hard, but before uncontrolled cracking occurs.

Construction joints: These are provided between sections of concrete which are placed in separate operations. Planned construction joints form the floor jointing pattern, and are intended to prevent random cracking. They also act as formwork for the placement of further concrete. Construction joints are designed to provide load transfer, which is achieved by the use of keyways or dowelled butt joints.

Isolation joints: Isolation joints permit horizontal and vertical movement between abutting settlements, and should be provided between a floor slab and other fixed parts of the building, such as columns, walls, machinery bases, etc. This prevents the development of stresses which could result from restraint.

They are generally formed by providing a suitable non-extruding, compressible preformed filler material over the full depth of the joint to provide complete separation.

Floor types

Several types of floor can be identified, distinguished essentially by differences in their joint details and/or the provision of some means of reinforcement.

Generally, jointed unreinforced construction and 'jointless' fibre-reinforced construction are preferred for concrete floors on the ground. Floors are usually laid in sections; the chosen dimensions of the sections and the method of laying them must take into account the type of floor and the constraints imposed by equipment dimensions, maximum placing rates and maximum finishing rates.

Surface tolerances

These are critical for effective use of the floor in a warehouse. Tolerances should be specified in accordance with the fourth edition of UK Concrete Society's *Technical Report 34*. ■

**More information from TCI on Tel: +27(0)11 315 0300
www.theconcreteinstitute.org.za**

Part 2: Floor finishes will appear in the August 2018 issue of Concrete Trends

Concrete flooring options available for every project



TAL StoneFlow produces a uniformly textured terrazzo effect suitable for applications exposed to heavy traffic and abrasion.

With the designers all over the world exploring a minimalist, industrial look, concrete and concrete-look flooring remains a popular aesthetic for both commercial and domestic spaces. In addition to the on-trend appearance of concrete floors, they are also smooth, high-strength and hard-wearing floor surfaces which are easier to maintain and require little maintenance.

For residential and light commercial interior applications, TAL SuperFlow, a cementitious self-levelling decorative screed provides a smooth floor surface with a homogenous finish. This rapid-setting decorative overlay can be installed on a new floor surface, or over an existing substrate.

Revive or upcycle an existing concrete floor by covering it with an epoxy coating such as TAL EpoxySeal FLR100, which will increase durability, add colour and improve the finish. To create a non-slip surface around pools and high-traffic areas, anti-slip granules can be sprinkled over and anchored into the resin of the epoxy coating.

For a completely different look, create a custom floor with TAL StoneFlow. This cementitious overlay includes a selection of aggregates, or small stones, which is then ground and polished to a smooth surface, producing a uniformly textured terrazzo effect suitable for applications exposed to heavy traffic and abrasion, as well as commercial spaces. Be aware that the process of grinding and polishing can be quite dusty and this floor covering is therefore best installed in a new building rather than retrofitting an existing floor.

Given the range of products available, which one is best suited to your project? Consideration of the service conditions is key when selecting the right floor covering. Specifying the performance required for the specific project, in addition to correct application, will ensure success.

Concrete floor finishes are available in a broad colour palette of warmer, earthy shades of grey. ■

More information from the TAL Technical Advisory Service on 0860 000 (TAL) 825 or visit www.tal.co.za

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MATERIALS RESEARCH



AfriSam's support to UJ civil engineering students led to two research papers being presented at the International Conference on Advances in Sustainable Construction Materials & Civil Engineering Systems.



Training is regularly facilitated by the Centre of Product Excellence, and ranges from a high-level course for experienced engineers to a course for beginners.

AfriSam supports UJ research presented at international conference in UAE

Research work by the University of Johannesburg (UJ) on recycled aggregates, conducted with the assistance of construction materials leader AfriSam, has been well received at an international specialist conference held recently in the United Arab Emirates.

Johannes Bester, technical lecturer in UJ's Civil Engineering Science department, presented the research work of student Broadley Miller at the International Conference on Advances in Sustainable Construction Materials & Civil Engineering Systems at the University of Sharjah earlier this year.

AfriSam's Centre of Product Excellence (CPE) makes its specialists and laboratory facilities available to UJ for its students

to receive practical learning as well as to conduct research; this support from AfriSam enabled two papers to be researched, prepared and presented at the conference.

The research – *The use of a concrete additive to eliminate returned concrete waste volumes* authored by Bester, Miller and Deon Kruger – investigates the effects of a recently developed two-component powdered product in separating returned fresh readymix concrete into fine and coarse aggregates. The product is made from polymers and inorganic compounds, and is mechanically mixed into returned concrete to achieve this result. "This allows for the reuse of the returned concrete as aggregates in the manufacturing of new concrete," says Bester.



AfriSam makes its specialists and its laboratory facilities available to UJ students, both for practical learning as well as to conduct research.



Johannes Bester is the technical lecturer at the UJ Civil Engineering Science faculty.

“The returned concrete waste can therefore be eliminated, thus reducing virgin aggregate usage, as well as reducing the environmental impact of returned concrete.”

As part of the research work, the treated recycled fresh concrete was separated into fine and coarse aggregates, and then used at replacement levels of 0%, 25%, 50%, 75% and 100%. For each of these replacement values, the effect of the product on the material classification – as well as on important fresh and hardened properties of the concrete – then underwent testing.

“For the fine aggregate, the results indicate minimal changes in both the fresh and hardened properties. For the coarse aggregate, the results show a marked improvement of flexural strength, with an increase in replacement value when coarse aggregates are used. Very high replacement levels may be used with very little effect on the quality of the new concrete,” Bester explains.

The study concludes that the slump for both the sand and stone replacement was not affected at any of the replacement values – and neither was the slump retention.

“There is an increase in the flexural strength of the concrete that was made using the stone fraction of the treated concrete, but a very slight decrease in the sand fraction,” he says. “The results from this study indicate that the two-component powdered product may be used on returned concrete, in order to allow the returned concrete to be used in new concrete – with minimal changes to the mix design.”

In a second paper prepared by the three authors for the conference, they found that the use of recycled fine aggregate as a replacement of virgin materials in the manufacture of concrete has a much greater negative impact than the use of coarse recycled aggregates. In addition, the presoaking procedure of fine aggregates warrants special attention.

In the presentation of the paper, Bester mentions that the presoaking procedure used was problematic when used with fine aggregates and caused a large amount of excess water to be added to the concrete mix as a result. This study highlights the importance of planning the demolition process of a structure to ensure that the best possible quality of recycled concrete aggregate can be extracted.

The authors conclude that using recycled aggregate from the demolition of an unknown structure is likely to negatively affect the final properties of the mix, as well as its durability. To address these negative effects, adjustments need to be made to the mix design – which will increase the cost of the concrete. ■

More information from Maxine Nel,
Tel: +27(0)11 670 5893
email: maxine.nel@za.afrisam.com / www.afrisam.com



AfriSam’s Centre of Product Excellence has a SANAS-approved testing facility.

AfriSam Centre of Product Excellence

Achieving cost-effective solutions that will not compromise on quality is a key driver of AfriSam’s Centre for Product Excellence.

According to manager Mike McDonald, this means working closely with customers to develop customised solutions that consider their specific application needs; it also involves ongoing product development. This puts the centre in daily contact with customers, answering their various technical queries and support needs – a role that is undertaken by a team of skilled and experienced individuals who fully understand the application of product.

They are able to leverage their intimate knowledge of AfriSam products – and also work closely with commercial admixture companies – to develop activators to ensure normal concrete performance even when high levels of supplementary cementitious materials are added.

Training is regularly facilitated by the Centre of Product Excellence, and ranges from a high-level course for experienced engineers to a course for beginners. This focus on training includes external initiatives such as supporting final-year civil engineering students, by giving them access to the centre’s laboratories and providing them with mentorship or external examination for their projects.

McDonald highlights the value of the final-year students, the postgraduate students and the tertiary education personnel to the future of the built environment – which has prompted the Centre for Product Excellence to sponsor their membership to the Concrete Society of Southern Africa. ■

AfriSam
 Creating Concrete Possibilities

Decorating concrete – the CHRYSO way



CHRYSO® Beton Cire creates a high quality mineral effect which is durable and easy to maintain.



The CHRYSO® Deco range makes it possible to modify the appearance and texture of concrete.



Protective products applied to concrete will protect against traffic, greasy stains, micro-organisms and UV rays.



CHRYSO® Beton Cire creates a high quality mineral effect which is durable and easy to maintain.

With a well-known French decorative products company now part of the CHRYSO Group, local concrete additives experts, CHRYSO Southern Africa, can offer their customers a wide range of solutions for new projects for renovations being made to residential, industrial and urban developments.

This range, based on its 13-year legacy as a leader in the decorative concrete product market in France, adds to the aesthetic value that concrete brings to construction projects, according to Hannes Engelbrecht, general manager inland sales at CHRYSO Southern Africa. Its products also raise levels of concrete protection and durability to new heights.

For new concrete, stamped concrete using the CHRYSO® DuraPrint process can create unique horizontal surfaces by realistically reproducing the appearance of natural materials such as stone, wood, paving stones or slate – or even contemporary patterns like pixels or metal. Similarly, on interior or exterior walls, CHRYSO® Vertic'Art technology enables decorative effects to be created with use of reliefs, textures and colours on fresh concrete.

In public spaces, these solutions are applied on pavements, sea fronts and playgrounds, while in residential areas they are popular in gardens and on pool sides, stairs and terraces. They offer a wide selection of classic and contemporary designs, as well as many colour combinations, low maintenance and excellent durability.

For new concrete, there is also a non-slip sanded effect now available for these applications: CHRYSO® GraniStab® transforms a concrete slab into a continuous seamless granite surface, while CHRYSO® ColorStab® ensures a stabilised sanded effect while resisting heavy pedestrian traffic.

New concrete outdoor areas like walkways, terraces and pavements can also be enhanced by exposed aggregate concrete, which gives horizontal surfaces a warm, natural look. The CHRYSO® Deco Brush is a range of surface retarder emulsions for sites demanding high environmental quality, and can be cleaned by dry brushing. There is a wide range of positive and negative surface retarders available in the CHRYSO® Deco Lav range.

Also used in the process to create exposed aggregate concrete is the CHRYSO® Deco Wash range of surface-retarder emulsions, which are resistant to high temperatures, and the CHRYSO® Deco Wash Pico micro-surface retarder for a homogenous sanded effect.

Luminescent concrete – which contains particles that glow brightly in the dark for up to 10 hours – can be created with CHRYSO® Lumin P and P+. These particles, made using recycled materials and mineral pigments, give the surface an excellent abrasion resistance.

The range of products for new concrete developments also includes shaped, pervious and coloured concrete solutions.

In the concrete renovation range, CHRYSO's millimetric Béton Ciré creates a high-quality mineral effect for contemporary and durable interiors; it can be applied on floors, walls, furniture and worktops. Popular in the hotel, residential and other sectors, it is easy to maintain and is available in a wide range of colours.

For creating reliefs, textures and colours on old concrete, CHRYSO® RenoPrint offers the Microscreed process – a thin alternative to stamped concrete that can reproduce the look of natural materials such as stone or wood. It provides the same rendering as stamped concrete, but is only 6-10 mm thick and comes in classic and modern matrices with a wide range of colours. RenoPrint is equally applicable in outdoor public spaces as it is in residential areas or in parks.

Another millimetric coating – just 2 mm thick – is the CHRYSO® Texture Top® solution, which is great for applications like esplanades, pavements, terraces and paths; it provides a new textured surface over old concrete, with an anti-slip coating and excellent mechanical resistance.

For a quick-drying resin finish in outdoor applications, CHRYSO® ResiCoat offers the complete renovation of a horizontal surface within 24 hours. These polyaspartic resins give the existing horizontal concrete surface a very high resistance to traffic and chemicals.

To restore the faded colours of old concrete, CHRYSO has various processes on offer, depending on effects required and the properties of the existing concrete. CHRYSO® ColorTop Patinas, for example, bring an aged effect to the concrete, reacting to the base material to create unique effects. It is an active colouring agent for old concrete and waxed concrete, and is available in seven shades.

Ink can also be used to colour very dense and polished concretes; for this purpose, CHRYSO® ColorTop Dyes are available in 11 shades. A metallic finish is another option, using the CHRYSO® Metalis cold metallisation coating; this gives the concrete a sparkling, industrial appearance – and is available in tin, bronze, iron, copper, brass and aluminium.

"These decorative concrete solutions will enhance CHRYSO's existing aesthetics product range as well as adding certain technologies to a.b.e. Construction Chemical's flooring offering for its various market channels," Engelbrecht says. ■

More information from Elrene Smuts,

Tel: +27(0)11 395 9700

email: elrene@chrysoa-abe.co.za / www.za.chryso.com



Exposed aggregate concrete gives a warm and natural look.



CHRYSO® DuraPrint makes it possible to create reliefs, textures and colours on fresh concrete.



CHRYSO® Color provides a mineral rendering which is rich in colours and resistant to UV rays.

A.Shak Construction Chemicals specialists in release agents for the concrete industry

A.Shak (Pty) Ltd was established in 1958 by Alec Shakinovsky to supply the concrete industry with specialised quality release agents designed specifically for the different types of concrete casting methods that were used at the time. We have products suitable for precasting or in-situ cast concrete.

Over the years the company has evolved and added many new product ranges to the basket. As the retail division of A.Shak grew, the current owners of A.Shak decided to split the Company to specialise in the retail range of products which falls under the A.Shak (Pty) Ltd banner and the Construction products which make up the products in A.Shak Construction Chemicals (Pty) Ltd.

Release agents for concrete require a knowledgeable sales force who are able not only to recommend the correct product for a particular application, but who can also analyse any problems the customer might experience with the releasing of the formwork or moulds.

The common belief is that any release agent should work in all applications or types of casting of concrete but this is not so. The precast industry is where we supply the most varieties of release agents – from oils which are suitable for small moulds used to manufacture decorative items to large moulds for manufacturing storm water pipes and culverts, plus everything in between.

The small precast yards which manufacture garden statues, water features and pots can use a variety of moulds, from fibreglass, polyurethane or



A stack-cast structure with panels being lifted by crane.

natural rubber moulds. These products are usually cast with a dry mix and are seldom vibrated or steam cured. The moulds are delicate and so a good quality mineral oil not containing solvents like our AS666 would be the recommended product to use for these applications.

Yards manufacturing precast walling and kerbing stones would, in most cases, be using steel moulds for these applications. The moulds would be vibrated and in some instances, depending on the size of the yard, the curing process would be accelerated by steam curing the products. AS88, a diesel based product, is most successful in these applications. SUPERSTRIP could also be used depending on what type of mix the precast yard is using.

Stack casting is becoming a popular way of fast-tracking the building of larger developments like shopping centres. The contractor casts precast slabs on top of each other and when they are cured lifts them into place. Our AS666 serves as a bond breaker to prevent the cast slabs from sticking to each other and gives the surface of the slabs an off-shutter finish.

The infrastructure or pipe industry in South Africa utilises many different ways of casting the pipes from vertical moulds to centrifugal spun moulds – all requiring different release agents. SUPERSTRIP and ROCOIL P are probably the two most frequently utilised products in this industry as well as AS118 which is an emulsion option which can be diluted with water.

The differences between precast yards and the types of concrete mixes or casting options they prefer are many and one yard is never the same as the next. This is the reason our Technical Sales Team likes to work closely with the foreman or owners of these operations to ensure we offer them the correct products for their needs.

A.Shak and A.Shak Construction Chemicals are proudly South African and all our products are locally made and our raw materials locally sourced. ■

**More information from Tel: 0861127425 (ASHAK) or +27(0)11 822 2320 / email: sales@ashak.co.za
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a.b.e. powdered waterproofer blocks moisture, preventing dampness in mortar and plaster

a.b.e. Construction Chemicals now supplies duraproof cem block, an easy-to-apply powdered product that, when added to portland cement plaster or mortar mixes, streamlines waterproofing by obstructing the capillaries and restricting moisture movement.

a.b.e. is part of the Chryso Southern Africa Group.

Elrene Smuts, communications manager of the Chryso SA Group, says duraproof cem block can be used in cement/sand mixtures to waterproof mortar and plaster in floor screeds, rendered facades, plastered walls, and brick and block mortar. "The fact that the economical product is supplied in easy-to-use powdered form is a particular advantage for contractors facing time pressure on projects," Smuts states.

She says although duraproof cem block blocks moisture it allows for the passage of water vapour out of the concrete and



a.b.e. Construction Chemicals' duraproof cem block is a powdered cementitious waterproofing product that is easy to use and streamlines the waterproofing of plaster and mortar.

waterproofs it without altering the characteristics of the plaster or mortar nor its compressive strength.

"Chloride-free duraproof should be thoroughly mixed into the plaster or mortar mix to maximise its waterproofing properties. But duraproof cem block will not improve a poor plaster or mortar mix, aggregate or grading and mix design, or incorrect cement-water ratio. The newly-applied plaster or mortar must be kept damp for at least five days to promote good curing and the required strength and durability," Smuts cautioned.

duraproof cem block is part of a.b.e.'s growing cementitious waterproofing range which also includes a.b.e.'s original duraproof concrete and mortar waterproofing product.

duraproof is an additive with fine particles that combine with the lime in cement to form water-repellent particles that obstruct capillary action in concrete.

a.b.e. also supplies the well-known and trusted duraflex, a flexible waterproofing slurry suitable for concrete exposed to positive and negative pressure.

For more specialised concrete waterproofing applications, the a.b.e. duraproof range furthermore includes:

- duraproof dekfex: a highly flexible high-performance multi-layered waterproofing system especially developed for concrete flat roofs, reservoirs, ponds, tanks, screeded roofs, and concrete balconies;
- duraproof hydrokote: a dual-component hydraulic micro-mortar used for concrete protection and waterproofing; and
- duraproof krystalkote: a coating that protects and waterproofs concrete structures by crystallisation. ■

**More information from Elrene Smuts,
Tel: +27(0)11 306 9000 / www.abe.co.za**

Mapei is gearing for future growth



Mapei South Africa has unveiled its impressive new manufacturing facility in Germiston where it expects to manufacture a wide range of products to meet burgeoning demands for construction chemicals for the next 15-20 years.

Since entering the market in 2011 the company has earned a reputation for technical expertise, leading to a growing customer base and significant market share. Its focus on quality has seen it become a prominent local supplier of construction chemicals and adhesives in Southern Africa.

Mapei South Africa general manager, Antony Offenberg, says the company's growth largely results from its customer-centric approach and focus on quality. "While growing the business in South Africa we have carefully noted the requirements of the market and individual customers to develop solutions that meet their current and future needs.

"We found that customers wanted high-quality products, widely available, with sufficient stock to complete projects anywhere in the sub-region. They also needed assurance that products meet international and SABS quality standards.

"The advanced new manufacturing plant, supported by smart technical teams, as well as laboratories and training facilities, is the culmination of meeting these requirements.

"Despite today's tough economic conditions we have invested heavily in the construction industry, knowing that we will be best positioned to support the industry when the economy picks up. With this kind of infrastructure we will easily meet the requirements of the retail industry, of contractors and of professionals who are currently planning largescale projects and infrastructure upgrades," says Offenberg.

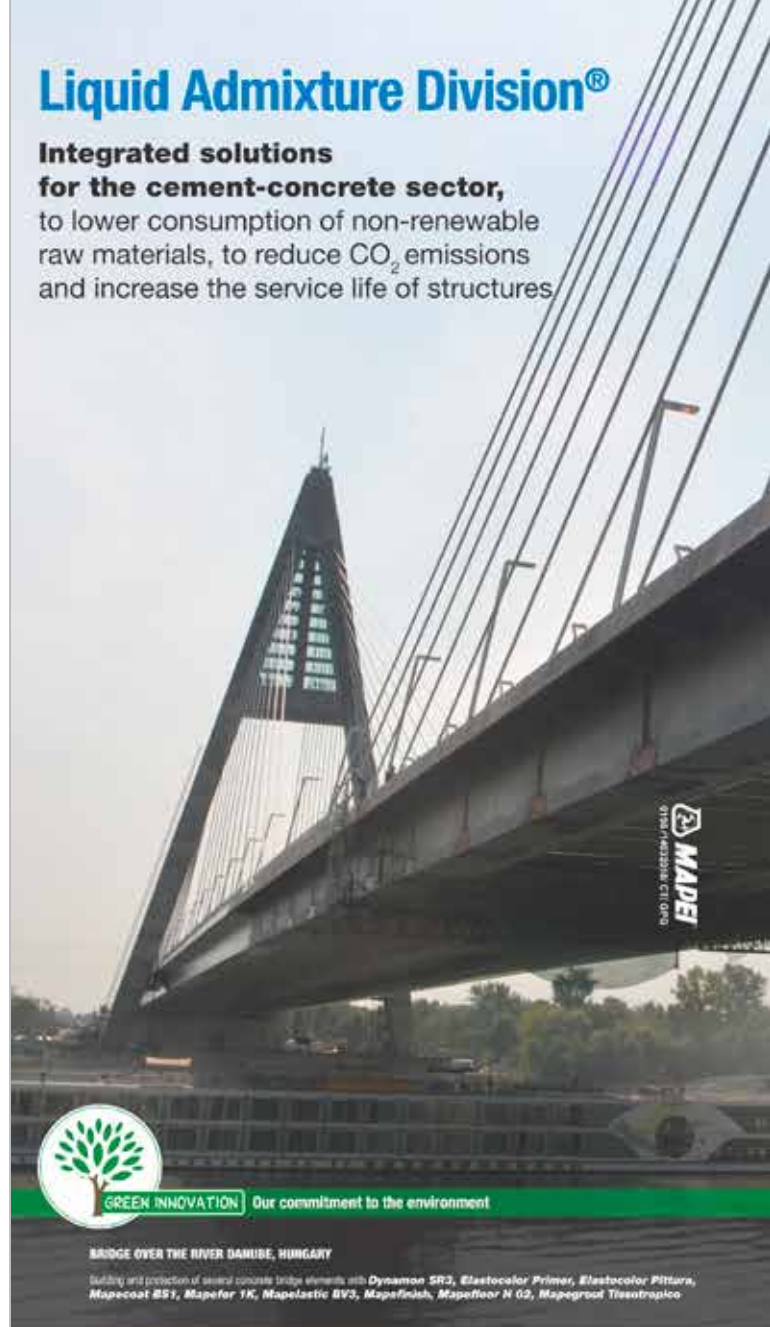
He adds that Mapei South Africa will remain customer centric. "As a family-owned business we will always take a considered and caring approach to meet customers' requirements and one where our technical staff evaluate requirements and make recommendations based on their own technical skills and the combined intellectual property of our global group."

The company's product range includes additives used in cement and concrete manufacture, adhesives and wide range of specialised construction and related chemicals. All products meet the relevant standards and comply fully with sustainable environmental practices and standards. This is carried across through all training courses and seminars offered at Mapei's state-of-the-art onsite training facility where global experts share their skills with contractors, installers, and building industry professionals. ■

More information from Geoffrey Green,
Tel: +27(0) 11 552 8476 / email: g.green@mapei.co.za
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Medium (20-150mm):

GripGrout F

Thick (30-300mm):

GripGrout BG

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GripEpoxy 107N from SCC is a versatile modified epoxy adhesive with 6 hour open time and very high adhesion properties to concrete, brick or steel. It provides the essential structural bond between the existing cured concrete and the new wet application. It is also an effective anticorrosive coating for steel rebar. With great compressive, tensile and shear strength, it will ensure your bond is almost unbreakable.

2. Repairing



SCC provides a full range of concrete repair mortars to suit your specific application. Our range of solutions are specially formulated to be anti-corrosive, anti-shrink and non-metallic. They are also premixed for simple application by adding water and designed for high flow or hand packing to ensure superb placing and finishing. See our range alongside for applications of varying thickness.

3. Curing



Finally, to ensure a long lasting, fine finish, SCC has developed **GripCure Acrylic**, a clear, single application water-based acrylic emulsion concrete curing compound that renders the repair waterproof and seals in moisture to assist with hydration of the cement for higher strengths, increased durability and minimal surface dusting. GripCure Acrylic is also formulated with no film breakdown so as not to interfere with subsequent concrete surface treatments.

Our flexibility is your strength

Seven ways robotics is transforming the construction industry

Robotic technology is providing the construction industry with numerous advantages. With the objective of automating processes and increasing productivity, robotics is being used to get work done quicker, cheaper and with more precise detail. This article outlines certain areas of construction that are being impacted by robotic technology, discussing its current impact on the industry, as well as what you can expect to see in the future.



A bricklaying robot in action.

Automated Technology

One of the varied uses of robotics is to allow for greater automation of various processes. In many aspects of construction, specifically manufacturing, packing and building, more automation of these processes is becoming the goal. With greater development in robotics and machinery, construction companies are becoming more open to utilising technology. With robotic technology, you can expect all the traditional construction activities like welding, material handling, packing, dispensing, cutting and packing to be fully automated. This will not only allow for precision and accuracy throughout all construction processes, it represents a significant time and financial saving as well.

Altered Workforce

According to a report from the World Economic Forum, roughly five million jobs are expected to be lost by 2020. They attribute much of this job loss to artificial intelligence, machine-learning, 3D Printing and robotics, all of which will significantly impact the construction industry, accounting for an anticipated 10% of job losses,

The WEF predicts that these technologies will be slowly integrated, replacing specific tasks, not jobs entirely. However, with machines taking over certain aspects of a job, this allows companies to employ fewer staff who become responsible for a variety of activities. In a few years, with automated processes increasing, the core skill set of construction workers will look drastically different than it does today. Although it looks as though the construction industry will be hit hard by this

robotic revolution, the WEF predicts that over 400,000 jobs in architecture and engineering will be needed.

Lean Construction Practices

One of the biggest and most important movements in construction is lean construction. This contemporary ideology aims to increase efficiency and productivity, often centred on the elimination of waste. Traditional construction practices produce an inordinate amount of waste, which is not only bad for the environment, but significantly affects profitability. Robotic technology however can help reduce the amount of waste created because of its ability to ensure accuracy and precision. An investment in this technology, like 3D printers for example, may be a daunting task for many businesses. In the long run however, reduced waste and standardised materials will positively impact profitability.

Higher Quality

With most robotic systems completely automated, manufacturing parts and materials will be much more consistent, with a higher quality. By removing human error and inconsistency, these machines will be able to take advantage of speed, efficiency and repeatability to ensure better overall quality.

3D Printing

The introduction of 3D printing is continuing to grow in the construction industry. Now it is possible to print complex, layered, parts and objects that can be used in the construction of homes, buildings, bridges and roads. In Addition, robotic machines can standardise the production of pieces that can be used throughout various projects, saving both time and money.

Demolition

One of the earliest uses of robotics in construction has been demolition. Considering the vast number of construction projects currently in place, speeding up the demolition process can provide a large saving of time and money. Breaking down walls, crushing concrete, and gathering all debris is the first step in many construction processes, and robotics is making these processes much more efficient.

Bricklaying

Although there is a belief that robotics is used for modern processes only, this is not the case. Machines have been developed to increase efficiency in tasks like bricklaying. Although residential construction has been slow to adopt technology and change, robotics in bricklaying should be a serious consideration. It is a rather simple process whereby construction workers simply feed bricks into a machine, and using CAD software, it is laid out accurately and precisely. Some of the most advanced brick laying machines can complete an entire house within a few days. ■

Source: <https://goo.gl/LAAsQj>

German climbing robot “can cut scaffolding labour costs by a third”



Munich start-up Kewazo has created a robot that it says can reduce on-site labour costs for scaffolding by as much as 33%.

The company says more than 80% of scaffolders' time is spent moving elements from one part of a site to another. The robot aims to make assembly more efficient by delivering the parts to the workers where and when they need them.

According to Kewazo this ability to deliver poles by robot saves 33% on labour costs and knocks 42% off the time required to erect the scaffold. This is particularly significant given construction's periodic labour shortages, and the low productivity of the industry in general.

The use of a robot would also reduce the risk of an accident and avoid the effect of continual lifting on workers' long-term musculoskeletal health.

Kewazo's robot uses the scaffolding to move up, down and along a building with its loads, it can 'see' its surroundings, and it can plan its journey to the workers who need the poles using a path-finding algorithm, and this can be refined using machine-learning, so the robot builds up a better picture of how its human co-workers operate.

The company says its technology could be applied to other areas such as bricklaying, roofing and painting.

The firm has partnered on the project with German semiconductor maker Infineon Technologies.

The company was founded by Sebastian Weitzel, a former student at the Technical University of Munich. It employs two hardware engineers, two software engineers, a civil engineer and a business administrator, all of whom are in their 20s. According to Weitzel, the company expects to sell more than €40m of robots by 2022.

Kewazo have won the #JosefUmdaschResearchPrize2018, in which they were selected as the best in the category Smart Settlement & Urbanization and secured the opportunity to receive a contract with one of the companies in the #Umdasch Group. The Group is one of the leaders in the construction sector and promotes innovation and sustainability around the globe. Kewazo also acknowledges #DokaVentures for their support. ■

Sources: <https://goo.gl/cCcQrG>

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Azuri Peninsula: Nigeria's new residential paradise on the Atlantic shoreline

In the Marina district of Eko Atlantic City in the heart of Nigeria's business capital Lagos, the Azuri Peninsula is one of the most ambitious and spectacular residential construction projects in all of Africa. Doka is supplying the automatic climbing formwork systems and the technical expertise for three residential towers on this project.

The name Azuri comes from the two words 'zuri' (Swahili for beautiful) and 'azure' (the shining blue of the sea). Azuri Peninsula is part of the holistic plan of Eko Atlantic City in which we should expect over the coming years, luxury apartments, modern office spaces and large shopping centres to be built on some 100,000 m² of man-made land. The project on the Atlantic coast is currently also one of the African continent's biggest urban development projects.

Since December 2016, work has been in progress on three residential high-rises named as Orun Tower, Oban Tower and Zuna Tower, which in future will house a wide choice of luxury modern apartments. Average tower height will be 140 metres, 32 floors. The three towers together will accommodate 224 luxury apartments, twelve super-luxury complexes with two villas and ten townhouse apartments. A five-storey platform complete with parking facilities, pools, gardens and service areas interconnects the towers. Construction work is scheduled for completion by the end of 2020.

Working closely with the high-rise specialists at headquarters in Amstetten, the Doka branch in Nigeria developed a practical formwork and safety concept adapted to the tight construction schedule and the severe limitations of the assembly space available. All this was necessary for the three-tower build.

Fast climbing and reduced crane usage

Doka's automatic climbing formwork can climb the payload along with the platforms, and on this build two units of the SKE50 plus system and one unit of the SKE50 system are helping minimise crane usage. All-hydraulic repositioning from the first pouring section upward enables craneless climbing at any time, saves on manpower and speeds up the construction process.



Since December 2016, work has been in progress on three residential high-rises (Orun Tower, Oban Tower and Zuna Tower).

About Doka:

Doka is a world leader in developing, manufacturing and distributing formwork technology for use in all fields of the construction sector. With more than 160 sales and logistics facilities in over 70 countries, the Doka Group has a high-performing distribution network which ensures that equipment and technical support are provided swiftly and professionally. An enterprise forming part of the Umdasch Group, the Doka Group employs a worldwide workforce of 6,700.

Each climbing assembly carries several platforms, so work can proceed on various levels at the same time. This makes the cycle even shorter. On this project one floor per week is completed in six working days. Compliance with high safety requirements during climbing is ensured by a full enclosure, wide working platforms enclosed on all sides, and well-planned access routes. The 1,500 m² of Large Area Top 50 formwork speeds up progress even more, because it is integrated on retractable frames within the platforms. In addition, given the natural weather conditions and the location of the project beside the ocean, Doka's climbing steel parts are all galvanized, thus assuring the long lifespan of the system and investment of the contractor.

About the project

Project:	Azuri Peninsula
Location:	Marina District, Eko Atlantic City, Lagos, Nigeria
Type of structure:	Residential high-rise/ Mixed-use
Height:	140 m
Floors:	32
Developer:	Eko Development Company Limited
Construction work by:	ITB FZE, a subsidiary of ITB Nigeria Limited
Designer:	Gensler
Architect:	MZ Architects & Design Group Nigeria Limited
Start of construction:	December 2016
Scheduled completion:	Late 2020
Formwork planning:	Doka Nigeria, Engineering (HQ) Amstetten)

Systems used:

Products: Doka automatic climbing formwork SKE50 plus, SKE50, Large Area Formwork Top 50
Services: Planning of the assembly and climbing steps, assembly of the automatic climbing formwork systems and platforms on site, formwork instructor service, training

Photograph Copyright Wissam Achkouty, approved for Doka

More information from Michael Fucker,

Mobile: +43/664/9610657

email: michael.fucker@doka.com / www.doka.com



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Versatile Nordimpianti Evo Extruders for wall panels and hollow-core slabs

The new generation of EVO series extrusion machines represents the state of the art in the production of prestressed hollow-core slabs.

Available in five versions depending on the type of elements to be produced, the NORDIMPIANTI extruder offers cost-effective solutions for companies who are looking for a flexible approach to producing hollow-core slabs in various sizes.

The extruder machine casts elements in a single phase using the extrusion method without the need for vibration, thus keeping the noise of the machine to a minimum.

The machine is modular and the power unit together with the hopper can easily be transferred to another forming insert to enable a panel with a different height to be produced. Standard heights range from 150 mm to 520 mm while the widths available are 600 mm, 1200 mm, 1250 mm, 1500 mm and 2400 mm.

In 2016, prestressed hollow-core slab manufacturing at Nordimpianti's customer factory in Vietnam, called Bao Quan, underwent an important production change that enabled the company, not only to improve product quality but above all to simplify the production process while at the same time lowering production costs. Till then, Vietnamese factory Bao Quan had produced hollow-core slabs using a Slipformer machine. This meant that they were missing out on substantial advantages that could be gained by using the extrusion casting method – in particular the extrusion casting offered from Nordimpianti's EVO 120 Extruder machine.

Elements of the same height produced by the Nordimpianti EVO 120 Extruder rather than the Slipformer machine are:

- Between 17 and 24% lighter, therefore using less concrete per square metre of floor,

- Of a better finish quality with higher compaction,
- Less complicated to produce than with the Slipformer machine.
- In addition to the reduction of element weight, the amount of cement used in the concrete mix has also been considerably reduced, by around 14% falling from 420 kg/m³ to 360 kg/m³. With an estimated annual production output of 100,000 m² of flooring, Bao Quan has been able to lower concrete consumption by 2500 m³ and save over 875 tons of cement per year.

At about the same time as commissioning the new Extruder technology to produce hollow-core floor slabs, Bao Quan wanted to add non-load bearing partition wall panels to its product offering. This type of product, widely used in the countries of South East Asia, China, India, Russia and Northern Europe, is usually produced by fixed, inflexible and very expensive extrusion plant.

The advantages of constructing with this product are:

- It can be produced at high daily output rates to satisfy growing market needs,
- It is available in both standard and lightweight versions. The standard version uses conventional concrete at 2400 kg/m³ while the lightweight version at 1400 kg/m³ utilises lightweight aggregates such as expanded clay,
- Construction is very fast compared to conventional block concrete systems or other materials,
- Available from 80 mm to 120 mm thickness depending on the type of application required.

The choice facing Bao Quan was either to use a fixed system, with all the disadvantages mentioned above or to use a mobile Extruder machine. Nordimpianti, having already supplied an Extruder machine as a replacement for the slipformer machine on the previous production line, was able to work with Bao Quan on an idea to help the company make an informed decision.

Fixed production plants generally used for the production of partition wall panels can produce only 600 mm wide elements and have absolutely no capability to produce prestressed floor slab panels.

So, with all the above in play, in July 2016 the contract was signed to create a new machine, the NANO Extruder. Notwithstanding the many challenges that the company faced, Nordimpianti's team was able to design and build the new machine in just six months and initial testing began in Italy in February 2017.

The NANO Extruder machine represents the state of the art in the production of hollow-core slabs suitable for use as either non-load bearing partition walls or as a thin floor slab elements.

Depending on the type of elements to be produced, the NANO extruder from Nordimpianti offers cost-effective solutions for companies who are looking for a flexible approach to produce thin hollow-core walls and floors in various sizes and applications. ■



**More information from Nordimpianti System SRL,
Tel: +39 0871 540222 / email: info@nordimpianti.com
www.nordimpianti.com**



For more information, visit the Extruder Nano page on Nordimpianti's website

Extruder NANO Non-load bearing partition Walls and thin Floor Slabs



Extruder Nano



2x600 mm Partition Wall Panels



Packaging of Partition Wall Panels



Erected Partition Wall Panels

The NANO Extruder machine represents the state of the art in the production of hollow core slabs suitable for use as either non-load bearing partition walls or as a thin floor slab elements.

Depending on the type of elements to be produced, the NANO extruder from Nordimpianti offers cost-effective solutions for companies who are looking for a flexible approach to produce thin hollow core walls and floors in various sizes and applications.

The machine is modular and a slab-specific product module can easily be changed in order to produce an element with a different height.

Standard heights range from 80 mm to 120 mm in element widths of either 2x600 mm or 1200 mm.

The heights of the elements, as well as the thickness of the vertical ribs can be varied within certain limits according to the application and the element specifications required.

Acotec: a quick-to-install, moisture-resistant, sound-proof solution for buildings

ACOTEC is the first quick-to-install non-load bearing precast partition wall element that can be used world-wide in residential buildings, on public premises – such as hospitals, schools, and service flats – in warehouses and as security fences and noise barriers. Acotec is made from Leca or concrete, ensuring great resistance against moisture and temperature differences while also dampening sounds from elsewhere in the building.

“Acotec can be used in practically any application. Thanks to the innovative manufacturing method, the length and thickness of the wall can be adjusted on the production line for specific applications and the construction requirements. Increased wall thicknesses can result in up to 120 minutes of fire resistance. This is vital in senior homes and hospitals, where evacuation takes longer,” says Jani Eilola, product director at Elematic.

“A thicker wall also dampens sounds from other rooms and apartments, making for more comfortable living. Engineering and utility rooms in hospitals and office buildings are often full of noisy equipment, so the sound insulation must be good. Acotec has the perfect solution for this,” Eilola continues.

“Because Acotec is made from stone, it won’t rot, become mouldy or deteriorate as other materials do. Thus, it can be used even in wet rooms. For the same reason it is not susceptible to attacks by vermin and withstands the turns of the seasons,” Eilola explains.

Acotec can be installed up to six times faster than partition walls are built. Thanks to its standardised shape and light structure, Acotec panels can be installed up to 90 m²/d by two workers, whereas a simple wall averages 50 m²/d. Even

ELEMATIC ACOTEC Technical information in brief	SEMI	PRO	EDGE
Nominal production capacity	80 m ² /h	100 m ² /h	120 m ² /h
Production personnel	5 – 7	3 – 4	1 – 2
Automated processes	Casting, sawing, stacking, restacking, plate handling	Casting, sawing, trimming, stacking, restacking, cleaning & oiling, plate handling, pallet circulation	Casting, sawing, trimming, stacking, restacking, cleaning & oiling, plate handling, pallet circulation, curing, packing
Required factory space	900 m ²	900 m ²	900 m ²
Required land area	3 000 – 5 000 m ²	3 000 – 5 000 m ²	3 000 – 5 000 m ²
Slab length	2 200 – 3 300 mm	2 200 – 3 300 mm	2 200 – 3 300 mm
Slab thickness	68 – 120 mm	68 – 120 mm	68 – 120 mm
Slab width	600 mm (300 mm also available)	600 mm (300 mm also available)	600 mm (300 mm also available)

compared to block partitions, Acotec installation is up to three times faster.

“Acotec is a very cost-effective solution. It is always 60 cm wide, and as high as required for individual applications. Installation is easy: an Acotec element is simply lifted into an upright position, and elements are cemented together to the floor and to the ceiling. The ceiling joints are sealed with urethane,” Eilola explains. The panels are bound together with high quality Tilefix joint glue. The next work stages are also swiftly completed as the panel surface is smooth. There is thus no need for any thick plastering, a thin putty will be sufficient. ■

More information from Nina Lehtonen, Elematic Oyj,
email: nina.lehtonen@elematic.com
www.elematic.com

Elematic production lines for Acotec partition wall panels: Profitable, easy to install, simple to run

Elematic Acotec production lines for manufacturing light, non-load bearing, room-high precast partition wall panels are quick and simple to install, run and maintain and require very limited land area. Acotec lines come in three choices – SEMI, PRO and EDGE – which differ by the degree of automation and capacity.

Elematic Acotec lines cover the entire panel production process from concrete batching to storage yard management and beyond. They are automated and very reliable as they consist of proven, standard components.

There are three technology levels: SEMI, PRO and EDGE

The SEMI line, with a production capacity of 80 m² per hour, is the simplest of three and is an excellent choice for anyone starting up in the business. It features automation only for the key processes. The PRO line offers a higher capacity of 100 m² per hour with automated functions for all main processes: sawing, trimming, stacking, restacking, cleaning and oiling, plate handling and pallet circulation. The fully-automatic Acotec EDGE offers a top-rate capacity of 120 m² per hour and needs only two operators to run.

All lines feature an advanced production control system and a simple, modern user interface that displays detailed data on every

function of the process. Reports on production rate, running hours and more, are generated automatically. The modular structure of the lines and their integrated electricity with ETHERCAT bus system guarantee short installation and start up time of all lines, and the line can also be installed in existing production facilities. The production process is environmentally friendly, being silent and non-vibrating, and the raw material can be recycled so no waste is created. Low energy consumption also keeps the production costs low.

Elematic production lines also feature an innovative Atrex crushing mixer which enables the use of lightweight aggregate up to grade 30 as raw material. This is convenient as Leca is manufactured worldwide from natural materials and therefore the particles vary slightly from country to country. ■



CARMIX: making community development possible in all locations

Carmix, Africa's most rugged and reliable self-loading mobile concrete mixer, was recently utilised to complete three community centre floor slabs of 35 m³ each and 52 RDP house foundations of 13 m³ each.

On the deeply saturated mud grounds of the Tshikondeni mine close to Pafuri, the Northern gate of the Kruger National Park, the Carmix 3.5TT unit went about its business with no issues due to its 4x4 drive and active 4-wheel steering. Good progress ensured that each community centre floor slab was completed in the desired time to enable the floating crew to take over.

With the closest batch plant over 100 km away, on-site mixing was the answer. With the Carmix unique load cell weigh batching system that ensures accuracy and consistent quality of concrete, the customer had found the ideal solution for his particular application.

The unit is equipped with four load cells placed evenly under the drum in order to weigh every material – water included. The easy-to-use and large in-cabin computer screen allows for 99 different mix designs and 24 different types of materials to be stored and programmed. The in-cab printer will ensure a batch receipt for each batch is recorded to ensure strict quality control is maintained on the job site.

With the jobsite at Tshikondeni being literally out in the bushes, reliability for any piece of equipment is vital. Carmix units are designed with this in mind by being as simple as possible without any sacrifice on quality and technical advances.



Full 300-degree discharge radius with the Carmix 3.5TT.

As demands on jobsites are increasing and standing time an everyday occurrence, having full control of your supply is becoming more apparent to contractors. Not only control of the supply but also of quality and costs. ■

More information from Bruce Cousins,
Tel: +27(0)11 608 4929 / email: bruce@carmixsa.co.za
www.carmixsa.co.za

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Revaro: providing intelligent solutions and affordable innovation

Since its establishment in 2000, Revaro has developed in many aspects that have contributed to its growing success. Staying committed to its promise of 'affordable innovation', Revaro has positioned itself as a one-stop shop in the concrete and construction industry offering exceptional value for money to everyone, from start-up to more established businesses. The company's products are designed and manufactured from the highest quality materials to meet individual needs.



Where it all started

The business originally started out as an IT company, which then developed into a business management consultancy that specialised in business turnarounds. Revaro MD, Reyno van Rooyen, was a consultant at the time for an institution funded by the Department of Labour, Productivity SA. Here he focused on offering turnaround solutions to rescue struggling companies and avoid job losses.

How 'affordable innovation' entered the market

Van Rooyen's last turnaround strategy during his consulting career was for a brick-making company. As part of the strategy, it was suggested that the company diversify its product range and distribute into a broader geographical area. During his journey on this project, Van Rooyen states: "It was from that point that I realised that pricing was the biggest hurdle, especially for start-ups", and immediately grasped the opportunity to explore the international market, source affordable machinery to supply the local market at affordable prices.

The sources

Revaro products are sourced from more than 50 factories across the globe. Through relationship building with these suppliers, the company managed to secure the most cost-effective way to offer solutions to its clientele, without compromising on quality. Revaro is currently sourcing from countries such as China, India, Turkey, Italy, Austria and Germany – and constantly casting its nets wider. It is absolutely crucial for Revaro to ensure that the correct product is utilised for each of its market segments.

The product range

Revaro is truly a one-stop shop to the concrete and construction industry. They are supplying complete solutions from crushing

plants, aggregate batchers, concrete mixers, machines for manufacturing blocks, pavers, roof tiles, kerbs, and concrete pipes. The range includes ready-mix concrete plants, brick production pallets, self-loading concrete mixers, front-end loaders, TLB's, forklifts, door- and road-barrier formers, gutter forming machines, wire tensioners and concrete saws, PC wire and strand, iron oxide as well as galvanised and chromadek rolls. The company will soon be expanding into the mining industry with well-priced yellow metal equipment such as wheel loaders, backhoe loaders and excavators. Revaro's business strategy is to introduce a new product to its range every year.

Revaro and its customer

Revaro guides its clients from start-up phase to established company, with full training and assistance provided on the manufacturing of bricks, pavers, blocks, roof tiles and all other concrete products. As every customer's product range and production demands grow, Revaro is there with them every step of the way.

Financing available

On average, Revaro's pricing is 50% lower than that of some premium suppliers, staying loyal to their promise of quality, affordability and customer satisfaction. The latest addition to the company's offering includes financing and easy payment terms to assist its clientele in achieving their goals.

The future

Revaro's long-term objective is to collaborate with private-equity BBBEE partners to expand and further develop the mining business. The aim is to offer a complete mining package, from drilling and blasting, through to excavators, crushing plants, wheel loaders and possibly mining trucks.



Van Rooyen concludes: "We have such a big focus on our after-market support capabilities. As we expand our market, many service agents are in place and we are actively expanding our dealer base throughout Southern Africa. Another part of our growth strategy is to set up a sales and service network throughout the SADC region". ■

More information from Tel: +27(0)11 794 8271
www.revaro.co.za / www.brickmakingmachines.co.za
www.brickpallets.co.za

Excavators at the ready to boost the economy



A large shipment of Sumitomo excavators has arrived in South Africa in anticipation of future growth of the economy.

ELB Equipment is aggressively gearing its excavator offering to meet an anticipated demand upsurge as the economy turns upwards.

"Excavators are at the heart of any construction or mining operation and their availability is pivotal to getting projects off the ground. For this reason, we have brought in extra units, especially 21-tonners, as they are the most commonly used excavators in South Africa. We have also tagged them at competitive prices along with extras and extended-hour warranties to help ensure the success of these new projects.

"Made in Japan, Sumitomo excavators are known to be among the fastest-working and economical excavators that are purpose-built for 24-hour production type operations. Tougher and more durable than the average excavator they are able to boost new contracts and help kickstart the economy," says local distributor ELB Equipment's Rhett O'Neill.

Top performers

Sumitomo is a specialist excavator manufacturer with more than 100 years of experience in mining and earthmoving. The company produces premium-brand excavators that excel in tough conditions and often match bigger and heavier machines outputs on site.

These qualities have led to Sumitomo excavators winning Japan's prestigious "Good Design Award" and "Grand Award for Energy Conservation" in the same category as the country's legendary automotive counterparts. Not only are they fast, powerful and durable, but they are easier to maintain and

operate for extended periods of time on site with less maintenance required.

Another characteristic that endears Sumitomo excavator to the local market is its low diesel consumption that ranks among the lowest in its class. It also has three modes of operation namely: Speed Priority, Heavy, and an Auto option, which gives operators the ability to choose the mode best suited to the kind of operation encountered. Either to speed up work, reduce diesel consumption by as much as 20% or a mixture of both when working in mixed terrain.

Local team

ELB Equipment has represented the Sumitomo brand of excavators in South Africa for almost 30 years during which time the brand has earned an enviable reputation for productivity and reliability. Simultaneously, the distributor has proven to have the best interests of its customers at heart with extensive support offered through its far-ranging branch and support network throughout the country and entire southern African region.

In tough economic times ELB Equipment has also sourced more cost effective but equally good quality Service Genuine undercarriage and service parts through Sumitomo which makes owning and servicing a Sumitomo more affordable than ever before. ■

More information from
Rhett O'Neill, Tel: +27(0)11 306 0700
email: rhetto@elbquip.co.za
www.elbequipment.co.za



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**More information from Schlüsselbauer Technology GmbH & Co KG, Tel.: (+43) 7735 7144-0
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Geocycle: a key role in creating a zero-waste future

Recently launched in South Africa, Geocycle is the global waste treatment and management operation of the LafargeHolcim Group.

Realising that a key process for solving the problem of hazardous waste was to consume it in cement plant kilns as alternative fuel, the Group established Geocycle more than 30 years ago. The services it offers cover the management and processing of non-hazardous and hazardous waste streams such as tyres, industrial waste, municipal waste, waste oil and other sludges, biomass, pharmaceuticals and solvents.

Geocycle has evolved into a leading provider of municipal, industrial and agricultural environmental management services with a presence in 61 countries and over 10,000 customers worldwide. The company is today renowned for its responsible management of more than 14 million tons of waste each year. It is playing a significant role in preserving natural resources, minimising the health hazards associated with waste, and reducing the carbon footprint of waste.

A massive escalating problem

Globally, it is estimated that approximately four billion tons of waste are generated every year and South Africa alone produces 108 million tons. It is a massive and rapidly escalating environmental problem with currently 49% disposed of in landfills and with controlled dumping, while 30% is not collected and merely finds its way onto open dumps or is burnt. Only 13% is recycled and 8% is used for energy recovery or incineration. The waste problem consumes 80 km² of land for landfills every year.

"It is difficult to visualise the impact of such large numbers," says Brent Mahoney, Geocycle South Africa general manager. "To give an idea of the land that is being consumed through landfills and controlled dumping, one of the biggest dumpsites in the world at 136 hectares is in Brazil: this equates to almost 200 football pitches!"



The Geocycle management and processing services embrace an extensive variety of waste streams such as used tyres.

"At Geocycle, we have a passion for health, safety, the environment and landfill diversion at the heart of everything we do," says Brent Mahoney, GM Geocycle South Africa. "Our mission is to offer well-proven solutions for landfill diversion and for working towards a better, zero-waste future."



The co-processing solution

The process that Geocycle has developed for hazardous waste is called 'co-processing', the careful introduction of it to a cement kiln as Alternative Fuel (or AFR) to replace natural fuel resources such as coal, oil and gas. The emphasis is on 'carefully' as the waste has to be sorted, blended and 'pre-processed' before introduction to the kiln to ensure tight quality control.

Conditions in a kiln are ideal for the safe and total destruction of the waste stream because gas in the kiln reaches 1800°C compared with a conventional incinerator's temperatures of 800 °C or 900°C. Also, the waste is exposed to these conditions for a longer residence time.

While co-processing as an Alternative Fuel is a critical solution for diverting hazardous waste from landfill sites and dumps, it is only part of the extensive service offered by Geocycle, which incorporates a full needs assessment, waste collection and transportation, laboratory analyses and pretreatment. The waste is separated into material suitable for recycling such as certain plastics and glass, and AFRs, as well as alternative raw materials (ARMs) for cement manufacture.

Committed to addressing waste beneficiation in South Africa

Geocycle offers a sustainable solution to the South African economy's waste problems, in line with local legislation and as per the promulgated banning requirements (August 2013 base year). The Waste Classification and Management Regulations and supporting Norms & Standards Disposal Requirements for waste prohibited or restricted in terms of disposal compliance for hazardous waste with a calorific value greater than 25 MJ/kg (23 August 2017).

Geocycle has a Waste Management Licence issued by the Department of Environmental Affairs and is a member of the Institute of Waste Management of Southern Africa (IWMSA), a multidisciplinary non-profit association that is committed to supporting professional waste management practices.

"Geocycle is ready and has the international experience to be a trusted partner in ensuring compliance on waste management and a leader for landfill diversion procedures in South Africa," says Mahoney. ■

**More information from Brent Mahoney,
Tel: +27(0)11 657 2390 / www.geocycle.com**

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Introduction

Construction Services, a business unit of Eskom Rotek Industries, specialises in both civil and electrical construction. Backed by decades of experience in serving the power generation business, Construction Services offers energy efficient installations, general road maintenance, power line and substation construction, cabling and switchgear and electrification services.

Mixed civil construction

We have the capacity to run mixed civil construction projects focusing on earthworks, concrete works and drainage, fencing and water management solutions. In addition, Construction Services offers road construction and pothole repair services and specialises in road to rail projects (new or improvement of existing rail infrastructure).

• **Earthworks:** These services range vastly but vary from minor trenching to full terrace construction and soil stabilisation.

• **Concrete works:** Refers to reinforced concrete structures e.g. foundations, structures and holding dams, walls, suspended slabs, platforms and plinths. We also offer extended general maintenance services.

• **Drainage and water management services:** We offer storm water solutions, drainage, sewers, potable and fire water distribution, drainage canals, general erosion control and cable and pipe trenches.

• **Facilities maintenance:** For peace of mind Construction Services can maintain electrical and water supply systems, as well as air conditioning units after construction of your building.

• **General road maintenance:** We offer construction from gravel to regional and provincial black topped roads, opening and closing of borrow pits, crushing, layer works, pothole repairs and surfacing.





Electrical construction

Construction Services provides a turnkey solution from initiation phase to final handover of electrical construction services.

We are capable of construction works pertaining to all related electricity projects.

- **Cabling and switchgear:** Construction Services can assist with the quantification of cable requirements and offers technical and testing services, as well as reticulation and maintenance services. It includes the supply, installation, testing, commissioning and maintenance of general and site specific cabling and switchgear related equipment. We offer extended testing and support services for fault finding at breakdowns and dive into problem solving solutions to minimize unplanned down times.

- **Substation construction:** We can construct and upgrade all

substations and related elements from platforms, plinths, access roads, foundations, trenching, earth mat, steelwork etc. of all voltages from 132 - 400 kV.

- **Power line construction:** Our experience in power line construction spans than a decade with a focus on high voltage (275 kV to 400 kV) and medium and low voltage (11 kV to 132 kV) transmission lines. It includes the construction, maintenance and refurbishment of lattice structures, wood poles, steel and concrete mono poles, tower foundations and the assembly and erection of towers. We can refurbish, upgrade and strengthen all power lines and can install complete rural overhead reticulation networks and metering systems.

- **Electrification:** With the specific focus on new electrification of residential dwellings, our services include low voltage overhead distribution lines, structures and fuses, maintenance and line refurbishment, tests and commissioning of meters and bases and underground reticulation.



Renewable energy services

For energy efficient lighting services, Construction Services and can provide luminance calculations and the measurements thereof. These installations offer the benefit of reduction of the existing carbon footprint. In addition we are adept at constructing solar and wind farms and can assist with most of our clients renewable energy needs.



Contact us

For more information on the services Eskom Rotek Industries Construction Services offer, contact the New Business Development Manager.

Michael Oliphant
 Tel: 011 629 5924
 011 629 4000
 Email: OliphaMM@eskom.co.za
 ERInfo@eskom.co.za
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Local ceramic adhesives to raise the bar



South Africa's building trade is set for a shake-up as global construction chemical giant, Mapei, launches its advanced range of locally manufactured ceramic adhesives on to the market.

They are being produced at its newly outfitted facility in Roodekop, Germiston, where the factory employs the latest manufacturing equipment and techniques to ensure consistently high-quality products throughout its product line. The efficiency of the new plant also contributes to lower cost production and keener pricing for the local market.

Even Mapei's new packaging is sufficiently advanced to ensure longer shelf-lives for cementitious products, which is particularly insightful in the local market considering the rural nature of parts of the southern African region where deliveries may be less frequent.

Resources aplenty

There is more good news for the local market too, according to Mapei commercial manager, Tracey Harris. "Local manufacture ensures sufficient stock holding and easier distribution throughout the region. Engineers will also have access to our technical resources to specify or develop products for special technical requirements.

"While our technical products are manufactured to suit specific applications, our standard products are also advanced in the way they are designed to substantially increase the speed and efficiency of installations on site.

"With less harmful volatile organic compounds (VOCs), they are also safe to use in confined spaces and will contribute to an all-round safer working environment. What's more, all our products are manufactured to Mapei's own sustainable green standards known as The Green Innovation."

Good timing

Ceramic adhesive specialist, Zamaswazi Ntobela, adds that the timing of the Mapei's entry into the market could not have been better. "There is a niche in the market for technical products that are easier to install and more durable than standard offerings.

"Our offering also provides technical support and backup for professionals to make the right decisions when specifying, buying and using our adhesives. Whether it is an off-the-shelf product they are using, or one of our technical products, we want to offer them peace-of-mind that Mapei products will last at least as long as the flooring solutions they are installing." ■

More information from Geoffrey Green,
Tel: +27(0)11 552 8476
email: g.green@mapei.co.za
www.mapei.co.za

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Strongest and fastest breath alcohol tester on the market. AlcoBlow Rapid Test requires the smallest breath sample and ensures accurate results first time, every time. Results are obtained within seconds. Very economical operation, no disposable mouthpieces are required. The subject simply blows into a cone at the end of the instrument.

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Sika introduces Sikaflex High Tack



Sika is proud to announce the launch of Sikaflex® High Tack, a powerful construction adhesive with high initial tack, suitable for bonding most construction materials over different surfaces for both professional customers and private end users. Sikaflex® High Tack complements the industry-renowned range of Sikaflex® technology, including Sikaflex®-11FC+ and Sikaflex® Crystal Clear.

Sika has, as always, proved its capacity to bring innovations into the market. Now, we are excited to inform our customers that besides the powerful initial tack, Sikaflex® High Tack is a CE marked sealant for use in interior and exterior façade joints (EN 15651-1 F-EXT-INT 20HM). Sikaflex® High Tack is unique in the market, being a high tack adhesive and an elastic sealant for façade elements.

Various Applications: Due to its powerful grab and fast curing properties, Sikaflex® High Tack is recommended for bonding objects on vertical surfaces or for overhead applications. Sikaflex® High Tack can be used for bonding wood boards, mouldings, panel bonding, ceramic tiles, roof tiles, metal boxes, interior and exterior wall decorations and various accessories, in bathroom, kitchen, workshops etc.

Sikaflex® High Tack bonds building materials such bricks, stones, ceramics, different metals, concrete, hard, PVC, timber and much more.

Unique Characteristics: Sikaflex® High Tack has a high initial tack, especially developed for vertical or overhead applications. Sikaflex® High Tack is very easy to apply, solvent free and has very low emissions. It is water- and weatherproof and the elastic bonding allows for the vibrations and shock to be absorbed. Another ideal characteristic is that it is paintable and suitable for damp surfaces.

About Sika

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and automotive industry. Sika has subsidiaries in 100 countries around the world and manufactures in over 200 factories. Its more than 18,000 employees generated annual sales of CHF 6.25 billion in 2017. ■

**More information from Tel: +27(0)31 792 6500
www.sika.co.za**



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A range of products built on the foundation of quality and durability

Aggregates



Concrete Based Products



Industrial Minerals



Contracting International



Commodities



Inspiring growth through the consistent delivery of solutions that empower our people and our customers.

Concrete Based Products include bricks, blocks and readymix. The Concrete Products Division operates primarily in Gauteng, KwaZulu-Natal, the Free State and in the Western Cape, manufacturing concrete blocks and bricks. The precast factories manufacture precast walling and moulded concrete products of which the majority carry the SABS seal of approval.

The Readymix Division supplies concrete primarily to large-scale civil engineering and infrastructure projects through fixed and mobile readymix plants where concrete is batched on demand and then transported to site by concrete mixer trucks. While the mobile concrete batching can be set up in any part of the country, the fixed plants are based in the Western Cape, KwaZulu-Natal, Free State and Mpumalanga.

Close to 90% of the division's raw material needs (excluding cement) are sourced from the group's own quarries. All sales personnel are certified by the Concrete and Cement Institute of South Africa. The Concrete Based Products Division is part of Afrimat Limited, a leading black empowered open pit mining company.

www.afrimat.co.za

Tel +27 21 917 8840 Fax +27 21 914 1174 info@afrimat.co.za

Afrimat, defying trends through agility and astute market adaptations

Afrimat Limited is a leading black-empowered open-pit mining company providing industrial minerals and construction materials. Listed in the 'Construction & Building Materials' sector of the Main Board JSE Limited since 2006, Afrimat continues to expand its footprint into Africa.

The group is backed by more than 50 years' experience and operates through five key divisions: Aggregates; Industrial Minerals; Contracting International; Concrete-based Products and Commodities.

Afrimat supplies a broad range of construction materials and industrial minerals ranging from mining and aggregates, metallurgical dolomites, agricultural lime, concrete products (bricks, blocks and pavers) to readymix. Further, Afrimat has established a strong foothold in contracting services comprising drilling and blasting, mobile crushing and screening.

The group's growing geographical footprint covers vast sections of urban and rural Southern Africa, supported



Aggregate from the Afrimat Lyttelton Quarry, Gauteng.

by the fleet of mobile crushers which offers flexibility beyond fixed areas of operation. As a result, the group's integrated product offering is today distributed across the Western Cape, Eastern Cape, KwaZulu-Natal, Free State, Gauteng, Limpopo, Mpumalanga, and Northern Cape.

The group's capabilities enable Afrimat to service projects of any scale from major infrastructure and construction projects for state-owned enterprises and parastatals through to small private-sector contracts.

Afrimat's consistently low staff turnover has resulted in a deep skills pool. Genuine transformation, starting with staff and management and extending to community upliftment, is integral to the group's sustainability. In addition, environmental conservation is a pivotal element of Afrimat's growth strategy. ■

More information from
Tel: +27(0)21 917 8840
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Afrimat's Cape Lime plant in Vredendal.



Afrimat's precast factories manufacture concrete bricks, building blocks, brick paving, walling and moulded concrete products.

Finally, expansion jointing that works!

Sanika Waterproofing Specialists and Emseal Expansion Joints save the day at Eastgate Shopping Centre.

Eastgate Shopping Centre was experiencing major water ingress through the rooftop parking deck, which caused damage to ceilings, tenants' stock and was, in addition, an eyesore to customers.

After an extensive site inspection, it was confirmed that the existing jointing system on the rooftop parking area had perished and accounted for 80% of major water ingress. The existing jointing system utilised a closed cell on the structure gap, which had deteriorated and become brittle. The anchor bolts had penetrated through the underlying membrane – which allowed major water ingress. The success of this type of project is directly related to the quality of the expansion joint. Eastgate had called upon numerous waterproofing specialists, and all had failed to contain the leaks from the rooftop parking deck expansion joints.

Eastgate, along with facility manager, Excellerate, contracted Sanika Waterproofing Specialists to replace the existing jointing system. After conducting in-depth research and a year-long trial, the joint was found to be a great success.

Sanika Waterproofing Specialists have cemented their position over 25 years as a leader in the waterproofing industry in Southern Africa, while Emseal have provided watertight expansion joints for thousands of projects around the world for over 30 years.

Sanika is the exclusive distributor and applicator of Emseal products in Southern Africa.

In addition to being 100% watertight and providing the best guarantees in the industry, the Emseal SJS Expansion Jointing System utilises a less invasive application, which enables minimised disruptions at a busy shopping centre like Eastgate.

Other expansion jointing systems cannot handle multi-directional movement as the system relies on the underlying EPDM Membrane. However, Emseal SJS Expansion Joints can handle multi-directional movement in these high-traffic areas.

While other jointing systems do not allow for heat welding which causes leaking at transitions and terminations, Emseal SJS Expansion Joints have custom made transitions that maintain continuity of the joint to avoid any water ingress.

The Emseal range in conjunction with Sanika Waterproofing Specialists offers expansion joint covers and sealants that are waterproof, fire rated, trafficable, sound attenuating, insulating, air, wind, seismic, and watertight for immersed, interior and exterior structures, stadiums, bridges and below grade.

Although the Eastgate expansion jointing project is still ongoing, tenants who had experienced severe water ingress via the rooftop parking deck expansion joints have had complete water tightness since the completion of the Emseal SJS Expansion Jointing System in specified completed areas by Sanika Waterproofing Specialists. ■

For all your waterproofing needs, please contact us on:
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CemteQ established to supply smart, sustainable building materials



Waddeville-based Sun Silicates has established a sister company, CemteQ Building Solutions (Pty) Ltd, that specialises in developing and marketing unique, value-adding products for the building and construction industries.

Initially CemteQ will focus on using high-quality Perlite produced by Sun Silicates as an aggregate replacement, together with cement and special admixtures, to produce unique and bespoke solutions for plaster, screeds and concrete applications. Due to the nature of Perlite, these composite products offer significant insulation, fire-resistance, lightweight and acoustic properties.

CemteQ is committed to developing, manufacturing and distributing world-class, smart, sustainable building materials that make meaningful changes to the way people live and build.

The company is launching with a construction-grade loose Perlite and a value-added white plaster composite product. Specially formulated, value-added floor and roof screeds as well as a grey plaster will follow in the second quarter of 2018.

SunPerl construction-grade loose Perlite will be available in 100-l polypropylene bags with a bulk density of 70-80 kg/m³. For the past 70 years, loose Perlite has been widely used in the construction industry in Europe and the USA for its exceptional insulating and lightweight properties. The construction-grade Perlite is the same aggregate used in high-temperature-insulating refractory concretes. Perlite excels in these applications, due to its high melting point, low density and chemically inert nature.

A super-smooth, easy-to-apply composite for trowel-on plaster and low-velocity pumped plaster applications will be introduced. This will combine a formulation of exfoliated Perlite with quality cement, various admixtures and fibres in a unique bagged, one-coat plaster solution without the requirement for a skim plaster.

The plaster product will be introduced in white and grey and will offer significantly better insulation properties than ordinary plaster, saving significantly on heating and cooling costs. The R-value for 15-mm ordinary plaster is approximately 0.021m².KW whereas the R-value for a perlite plaster is 0.0105m².KW to 0.111m².KW, offering significantly better insulation than ordinary plaster. Perlite plasters also weigh 8.4 kg/m² at 15 mm thick on the wall whereas normal plaster weighs in excess of 27 kg/m². This reduces the weight of plaster alone by one ton per 54 m² at 15 mm thick.

Says CemteQ managing director, Victor Bouguenon: "We worked closely with AfriSam and Sika to develop a one-coat, white plaster product with a superior finish and unmatched lightweight and insulating properties and believe that we have set a new bar in sustainable building materials."

Development of additional composite products is at an advanced stage and CemteQ will be launching its value-added screed products in the second quarter of 2018. Perlite-based screeds for floors and roofs will be available for standard lightweight and insulating applications as well as for ultra lightweight and insulating applications to achieve maximum R-values.

Perlite-based screeds are specifically designed to prevent downward heat loss in floors with underfloor heating, saving significantly on heating costs. They will also provide an ultra-lightweight, insulating solution for roofs, providing suitable

run-off and preventing water damage. It will be possible to apply the products to flat, uneven or curved surfaces.

All CemteQ's Perlite-based products offer excellent fire protection. They have low linear expansion characteristics which greatly reduce the development of cracks, ensuring that the temperature of the structure and load bearing members is maintained below the critical point at which weakening or failure is likely to occur. They release no smoke or toxic gas and do not disintegrate or spall when cooled suddenly with a fire hose.

The products also provide very efficient sound dampening, particularly for pulsed sounds, are inorganic and do not rot or decay over time.

Exfoliated Perlite and how it is produced

Perlite is a naturally occurring amorphous volcanic glass formed by the rapid cooling and solidification of volcanic lava which traps crystalline water into its mass.

The highest quality raw Perlite is imported from Turkey and heat-processed by our sister company, Sun Silicates, using state-of-the-art technology. The process of exfoliating Perlite is based on the presence of two to six percent combined water in raw Perlite rock. When quickly heated to above 870°C, the raw particles expand to between four and twenty times their original volume as the combined water vaporizes and creates countless tiny bubbles in the glassy material.

This results in a snow-white material with excellent thermal and acoustic insulation properties on floors, walls and roofs together with exceptional lightweight and fireproof characteristics and a very low carbon footprint.



Perlite is widely used in construction in the Middle East, Europe and the USA. Its low density and relatively low price make it ideal for use in eco-friendly mixtures with cementitious materials. Typical applications include:

- Lightweight and insulating plasters
- Insulating screeds on concrete floors or flat roofs
- Lightweight and insulating concrete
- Loose fill in cavities for insulation
- Fireproofing of structural steel columns
- Lightweight precast cladding
- Decorative applications ■

More information from Victor Bouguenon,
Tel: +27(0)11 824 4600 /email: victor@cemteq.com
www.cemteq.com

EXCELLENCE IN WATERTIGHT CONCRETE



SIKA® WT-200P

The crystalline admixture enables concrete cracks to self-heal and therefore block water, even when under extreme hydrostatic pressure and it will continue to be reactivate whenever water is present.'

Benefits of using Sika® WT-200P in waterproof concrete:

- Increase in service life of the construction
- Significantly improved durability and sustainability of the hardened concrete
- Ensured watertightness without other expensive measures
- Reduced maintenance costs
- Enhances the self-healing properties of concrete and promotes the ability to heal concrete cracks

www.sika.co.za

BUILDING TRUST



Castrol's three High Performing Lubricants: key drivers of operational success

As a brand, Castrol is driven by innovation, technology and always striving to go further. Today, more than ever, it's vital that your manufacturing operations are running smoothly at all times – creating value. However, when a single plant contains thousands of pieces of equipment on different lubrication schedules, it's also more challenging to protect your parts. This is why 60% of mechanical failures are related to lubrication.

Castrol is proud to introduce three High Performing Lubricants, Castrol Molub-Alloy, Castrol Tribol and Castrol Optigear. These multi-purpose ranges of lubricants provide reliable performance in a wide variety of applications.

Castrol Molub-Alloy: Our strongest lubricant for your heaviest loads

Your equipment is subjected to extreme loads, pressures and temperatures, as well as constant stress in harsh environments. Heavy-duty applications demand tough protection. If you fail to adequately lubricate your surfaces you put your equipment at risk of wear and expensive failure – not to mention a loss of productivity and profit.

Innovation protection: The Castrol Molub-Alloy range comprises a vast array of solutions – from those formulated to resist rust to these developed for use with minimal environmental impact. Each product has the power to keep your vital equipment working for longer, offering robust friction reduction no matter the application. This is because these advanced, multi-purpose lubrications contain several microscopic solid packages that bond to the surface of metal under heavy loads and shock loads, separating frictional surfaces to prevent metal-to-metal contact.

Increased productivity: The Castrol Molub-Alloy range helps to extend the lubrication cycle – so you can keep working, no matter what. Trust Castrol Molub-Alloy, for the complete peace of mind that your equipment is running as effectively as are your operations.

Castrol Tribol: Adaptive protection for equipment reliability

Multiple uses for many machines: Castrol Tribol is a family of advanced

lubrications, formalised by our liquid engineers to support a variety of different applications. Its products empower manufacturers to overcome their complex industrial setup, with active molecules that adapt to your operating conditions to take on the task at hand.

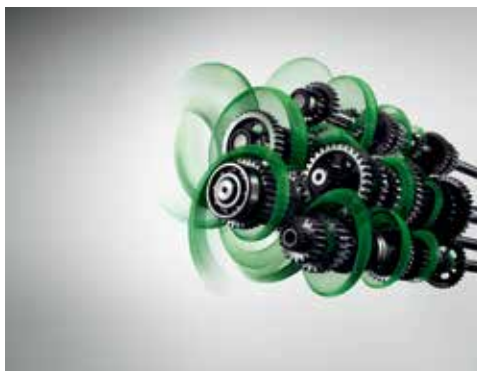
Reduced cost. Lower temperatures. Less noise: Whatever your difficulties, Castrol Tribol can help. By lengthening the operational life of your equipment, extending lubrication cycles, and reducing downtime for maintenance and repair, it can help to cut costs – and variants in its range can also lower operating temperatures and reduce noise levels to improve the environments for your workforce.



Castrol Molub-Alloy: Provides long-term or lifetime-of-component lubrication, even under the most difficult operating conditions, for highly loaded rolling and sliding bearings.



Castrol Tribol: Excellent adhesion on metal surfaces and outstanding penetration ability. Antiview additives provide excellent lubrication properties under medium and heavy loads.



Castrol Optigear is a range of leading high-performance gear oils that are proven to reduce friction, actively resist wear and extend the life of your gearbox.

Castrol Optigear: Protect against pitting, Protect your productivity

Stop friction in its tracks: If your gearbox is subject to regular or too much downtime, high friction could be the culprit, it's the enemy of efficiency. Castrol Optigear has been specially formulated to help overcome these obstacles. Putting you back in control, it offers supreme wear protection – even operating at elevated temperatures and under heavy loads – to improve your operating efficiency and extend service life.

More than protection: What's more, Castrol Optigear boasts Microflux Trans Plastic Deformation (MFTPD) technology – which not only protects against the harmful effects of friction but also actively improves the surface profile of contacting gears.

Castrol's comprehensive ranges of High Performing products are designed to help you improve your productivity and profitability. Our Liquid Engineers' in-depth understanding of machinery manufacturing and its varying operations can help you choose the right solutions while at the same time offering efficiency-enabling services to help you stay competitive in an increasingly complex world. ■

More information about Castrol or the availability of Castrol Molub-Alloy, Castrol Tribol or Castrol Optigear, at www.castrol/industrial or contact the Technical Help Line (South Africa): 0800 111 551 or Customer Service and Orders (South Africa): 0860 347 872.

Getting your structural concrete repair right

Selecting a concrete repair system for your project can be tricky. Stanton Construction Chemicals have after many years of research and development come up with a system they believe solves the main technical issues facing good repairs.

A successful repair system must be able to adhere to the host concrete and turn the multi layers of the repair into one monolithic piece and behave as it was originally intended to. This requires the repair to remain bonded and to also move like the host concrete as well as protecting the steel reinforcing.

The main cause of failure is the different tensile forces occurring between the repair and the host concrete. If the repair material and the tensile forces between the repair and host are greater than the bond strength then the repair will delaminate or curl. If the bond to host is too great the material will crack.

Stanton Construction Chemicals GripRepair SR30 MCI is designed to work with GripEpoxy 107 Wet to dry epoxy to overcome these problems. A good repair mortar must achieve a high early strength to be able to resist drying shrinkage and start moving with its host as soon as possible, while not being too strong at its final strength so as to be brittle and incompatible with the host. Yet it must have enough open time to be able to place it properly and achieve a good finish that closely resembles the host concrete.



The crucial bond agent has been carefully designed with a 6 to 7 hour setting time. Allowing time for application and, most crucially, allowing for some tensile stress relaxation between the interfacial bond to allow for a good bond without delamination or setting too soon and causing the exposed face to crack. ■

**More information from Neville Stanton,
el: +27(0)10 593 4454 / email: neville@sccsa.co.za /
www.sccsa.co.za**

Enza becomes first black-owned Wacker Neuson dealer

Wacker Neuson is proud to announce the successful conclusion of a dealer and distribution agreement which sees Enza Capital Equipment as the first 100% black-owned Wacker Neuson dealer in South Africa.

Enza is a member of the Asani Group, a diversified industrial holdings company with operations in capital equipment, industrial services, engineering, petrochemical infrastructure services and energy. Enza specialises in the sale and rental of industrial capital equipment from Original Equipment Manufacturers (OEMs) to a diverse range of clientele across a large number of industries.

“We have identified a substantial gap in the South African market which offers tremendous potential and opportunities for a mainstream industrial equipment company that can provide superior services backed by reliable technical and OEM expertise,” says Asani Group CEO, Zweli Dladla

“There is space for another mainstream company to play at this level. But success and true value, especially in the capital equipment business, hinge on the right reputable OEM partner with a proven well-respected brand and a diverse range of quality products. Recognising Wacker Neuson as that partner, we approached them on the premise of bolstering our industrial and capital equipment portfolio offering.”

Wacker Neuson occupies a significant footprint in the construction space and has an experienced management team that understands the market and industry dynamics.

According to Dladla quality products, expertise, and excellent service and after-market offerings are fundamental to a



good customer experience and building strong long-term customer relationships. “This is what Wacker Neuson brings to the table. By enabling Enza to support industry better and respond faster, this partnership will give us competitive edge and take us to the next level,” affirms a confident Dladla.

“While we have a distinctive brand supported by quality products and service a new approach to markets like parastatals that we have found difficult to penetrate, was needed in order to secure a sustainable way forward,” states Wacker Neuson Sub-Saharan Africa’s MD, Dennis Vietze.

“We needed a partnership but we also recognised the importance of finding the right partner. So when Enza approached us on becoming a Wacker Neuson dealer, we listened and we liked what we heard. Through Enza, Wacker Neuson will be able to maintain and increase its market share, while entering into new markets where Wacker Neuson previously did not have a footprint. There is no doubt that both companies will benefit from a joint go-to market strategy. Following a strategic analysis and my attendance of a BEE training course, our homework was complete and we were ready to finalise the agreement.” ■

**More information from Tel: +27(0)11 672 0847
www.wackerneuson.co.za**

Pursuit of a better way: the Mace Management Services story

Building Information Modelling (BIM) is trouncing hundreds of years of accepted norms within the built environment. The true revolution has started and Dylan Rishworth, who heads up the BIM and Digital Strategy at Mace Management Services (Pty) Ltd, part of Mace Group gets it! Rishworth and the Mace team are leaders of the BIM revolution and attribute their refreshingly tech-savvy approach to project management to the corporate culture at Mace, not only in South Africa, but across the globe.

Jon Harris, director of BIM for Mace Group globally says, "Mace has a Building Information Modelling (BIM) policy statement that sets out Mace's strategic commitments called Ali360 Asset Lifecycle Integration. Our goal is to redefine how we can better create and care for the built environment. We are committed to making a difference through Building Information Modelling and digitally integrated working."

What is BIM?

Building Information Modelling (BIM) is a set of technologies, processes and policies enabling multiple stakeholders to collaboratively design, construct and operate a facility in virtual space.

- It's about the data
- It's a different approach to collaborative working – a smart way of thinking
- It encompasses structured sharing and coordination of intelligent digital information throughout an asset's entire lifecycle

As a term, BIM has grown tremendously over the years and is now the 'current expression of digital innovation' across the construction industry.

"People have lost sight of the fact it is not purely about having a Common Data Environment, it's about having a collaborative connected workspace. It should be a combination of software and workflow used to ensure effective and accurate exchange of information within the project. Many CDEs have become common filing cabinets and these solutions greatly hinder and slow this workflow as they are not willing to be connected between different software systems and would rather tie you in to one ecosystem. We should be looking for greater clarity, better integration and communication, productivity gains and ultimately better efficiency," continues Jon Harris.

BIM and Project Managers

South Africa (and the continent as a whole) has been slow to embrace using Project Managers (PMs) to coordinate BIM projects, but it is in fact a perfect fit.

"PMs help clients achieve their objectives for on-time delivery, within budget, at optimal quality, with zero accidents, optimised operational (or lifecycle) cost and reduced environmental impact and technology. BIM balances all these objectives and promotes stakeholder engagement, throughout the project," says Vaughan Harris, BIM Institute's executive director.

"Strict governance is the foundation of Mace projects, and BIM ensures this. There is nowhere to hide sloppy work in a BIM project. All data is tracked and there are no shortcuts in the process. If somebody doesn't do their job correctly and to spec it is guaranteed to come to light down the line when it has a knock-on effect. The client is paying to have his project done professionally, and BIM quickly unveils any service provider who comes up short," explains Rishworth.

Should we BIM?

The first question the project manager must answer for the client is whether BIM should be used on the project, and why. The answer relates to the client's control of scope, time, costs, quality, safety and sustainability on a project, ensuring the client gets value for money, and that their risks are being effectively managed. This is compounded by the benefits BIM can provide from a Facilities Management viewpoint.

PMs act as the client's advisor and proxy. They are engaged from the outset to implement the control mechanisms and governance that influence the direction of the project team in the fast-paced effort to achieve project objectives. With 36% of projects failing to deliver on the initial KPIs due to failed communication, poor information, and lack of focus, a PM running the BIM processes on the project is an invaluable tool, and the best way to achieve the cost and time savings promised by BIM practitioners across the globe.

Mace is proof of this, successfully running its global enterprise on BIM processes. This is not a company that dabbles in BIM and does just enough to be compliant, its UK BIM Champions sit on the boards and are members of the groups that are driving BIM compliance from level 2 to level 3 and beyond. With its UK and Dubai offices offering engineering, architectural, project management and cost management services, the company



lives and breathes innovation and BIM underpins this. Its motto is "Pursuit of a better way," and it has, with BIM.

Mace have developed training modules to educate and instruct Project Managers and Technical Advisors within the organisation thus increasing BIM awareness and facilitating BIM requirements. This decreases project costs and improves the company's service quality.

Producing information that is poorly co-ordinated, unnecessary, confusing, unstructured and difficult to find adds 20-25% to the cost of our built environment. Having greater integrity and taking more care in the way we structure our data can eradicate this waste. Greater clarity will produce improved levels of efficiency, leading to time and cost savings. This approach requires more discipline, not more work.

Mace's Australian and African branches focus on PM and Cost Consulting services, but this does not preclude them from working 'the Mace Way.' This means working from a central source of truth, on a CDE (Common Data Environment) defaulting to shared data and working collaboratively. This makes them uniquely set up to extend these practices and resources to include every member of a project team should they require (or prefer) BIM compliance. The Innovation teams from all Mace's offices worldwide have call-in meetings at least once a month to share insights and lessons learnt on ongoing projects, and these resources are available to be tapped whenever necessary.

Software choices

The company's sub-Saharan African offices (in Johannesburg and Cape Town) use Autodesk Navisworks and Oracle Primavera for their BIM processes, as they oversee the projects and costs without doing the actual design, although they also have the software and hardware solutions to plug into design software as necessary.

Client facing

Rishworth points to the advantages that BIM offers the client, and the importance of having a member of the team that is client facing and can strip the BIM process (as well as the rest of the construction project) of the jargon and explain the progress and any snags in layman's terms.

"The client is worried about timing and cost," says Rishworth, "It is our responsibility to present the facts to the client – often in these terms – in a way that keeps him engaged and makes sense to him."

He sees BIM outcomes at the handover phase as invaluable, with the drawings, data and lifecycle information as saving the client time and money for the lifecycle of the building. The question is really whether the client sees the long-term benefit in explicitly demanding that the design and build team manage the 'information' (drawings, schedules, specifications, bills of quantities, product data etc) using a digital process to a recognised industry standard during the project?

"The truth is that the client is paying the team to do the work anyway, but do they value 'data' over 'paper'?" asks the BIM Institute's Vaughan Harris. "If so, then BIM is a far more effective way of producing and managing information, as well as sharing and communicating that information with others."

"BIM is the new era of information management; it reduces waste, risk, effort, misunderstandings, delays, cost overruns and disputes.

"Using BIM also means the client ends up with good-quality, digital, searchable, accessible and accurate information, at the end of the project, to improve future operations and facilities management," Vaughan Harris continues.

Mace's Jon Harris states, "Many are still stuck in the era of documentation – paper and file based or mimicking the drawing board CAD."

"Mace have been on a journey with BIM, the era of optimization, and BIM continues to accelerate the process today. New technology constantly questions the way things are designed and made. The Mace team is building upon our BIM and digital transformation portfolio with cloud-enabled technology and platforms in 'pursuit of a better way', the era of connection."

The requirements for BIM on a project are driven by two distinct business needs:

- To have the 'information' required to get building projects designed and constructed in an efficient and effective way – Project Information Model (PIM) Requirements.
- To have the 'information' required to maintain and operate the building in an efficient and effective way – Asset Information Model (AIM) Requirements.

Signed and sealed

Rishworth says that the best case scenario is to have BIM compliance contractually stipulated across the board.

One of the roles of project managers is to help the client get their appointments and contracts in place. If BIM is not a contractual requirement, then the team may try to avoid using it, and revert to traditional practices, which will then affect others ability to engage with BIM.

Flow of information

Rishworth believes that controlling and monitoring the flow of information is one of the most important roles of the PM. He points to the combined knowledge of the Mace team – including designers, engineers, cost consultants and PMs – that have underlined the lack of co-ordination on BIM projects.

"We have found that there is often nobody driving the flow of information and the general compliance of everybody involved in a project. Without this central point the project is set up for failure. Designers and engineers as well as contractors are crying out for someone to take charge.

If the PM understands the processes and principles of BIM they can manage the information effectively and enforce the use of the processes, and track the use of the data across the board. Information flow is a key part of managing any project, and a PM frees up the other members of the team to concentrate on their speciality, updating their specific parts of the data without having to police the rest of the team," he concludes.

"Certainly there is need to understand the value of our information assets better. This involves having a data / digital strategy as well as the hardware and software to support it. We need to work in multiple platforms, our clients expect us to do this, it makes sense for us to do this," concludes Rishworth. ■

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IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.



Reaching to the sky to honour Indian statesman

India's new towering Statue of Unity will have concrete as its core, writes **Jan de Beer**.

Concrete is playing a major role in the construction of India's new Statue of Unity which – at a staggering 182 metres tall – will be the world's tallest statue when completed.

When completed in October this year, the awe-inspiring monument will be almost twice as high as New York's Statue of Liberty and over 30 metres taller than China's current world record holder for statues: Spring Temple Buddha. To put the size into even more perspective, Christ the Redeemer in Rio de Janeiro is 38 metres tall, and the well-known bronze statue of Mandela in Sandton is a mere six metres high.

It's taken four years and 2,400 workers, and the Statue of Unity's final cost has been estimated at between US\$325 million (the official estimate) to well over half-a-billion dollars, suggested by critics who are not all that excited about the project, questioning the wisdom of the magnitude of the spending as well as the environmental impact as thousands of trees were cut down to prepare the site.

The statue is being constructed utilising steel framing, reinforced concrete and bronze coating – a lot of each, one must add. No less than 75,000 cubic metres of concrete, 18,500 tons of steel reinforcement, 5,700 metric tons of steel, and 22,500 tons of bronze sheets will be needed for the monument dedicated to Indian independence movement leader, the Iron Man of India, Vallabhbhai 'Sardar' Patel, who died in 1950 at the age of 75. He was the first deputy Prime Minister of India, serving under Nehru, and guided India's integration into a united, independent nation.

The statue – surrounded by an artificial lake – is being built in Gujarat, facing the Narmada Dam. The enormous edifice to unity together with its many ancillary attractions will occupy an area of around 12 km² and house an exhibition centre at its base, memorial garden, designer bridge connecting Sadhu Island with the mainland along the Narmada River, internal 5-km-long roadway, administrative complex, management facilities, and an upmarket hotel and conference centre.

The massive building contract was allocated to Larsen & Toubro (L&T), the biggest Indian multi-national firm. The company provides technology, engineering, construction, manufacturing and financial services with its products and systems marketed in over 30 countries. L&T has been given the responsibility for design, engineering, procurement, construction, operation and

maintenance of the Statue of Unity. L&T has had more than its fair share of coping with tall structures, including the building of control towers at several international airports in India which are all soaring slender structures, the tallest being the 101-m-high tower at New Delhi International airport.

The company was also awarded the contract for many high-rise residential complexes such as three of 60, 75 and 76 storeys in Mumbai for which it is using automatic climbing formwork. But India's famous Baha'i temple is perhaps the best representation of L&T's capability of managing complexity in construction.

One of the most intricately curved geometrical structures in the world, the 'Lotus Temple' has three rows of nine thin concrete shells, forming the lotus petals, with a dome surrounded by nine pools.

A consortium which comprises Turner Project Management India as leader with Meinhardt India and Michael Graves & Associates will provide the design, engineering, project management and construction management services. Many of the consortium members have been involved in the making of some of the world's tallest structures. Turner Project Management, in fact, managed the construction of the 820-m-high Burj Khalifa in Dubai.

The Indian artist and sculptor, Ram V Sutar, a recipient of India's highest civilian accolade, the Padma Bhushan Award, and creator of over 50 monumental sculptures over the past 40 years is the designer and sculptor for the Statue of Unity.

So what sort of foundation is needed for such an enormous skyscraping statue?

According to available data, the raft foundation has a safe bearing capacity of 2,300 KPa and more than 4,000 m³ of concrete were compressed with ice to ensure that there was no heat in the mixture for the raft base which is vital to keep the structure upright in all environmental conditions. Although the area experienced four low intensity earth tremors in February, the site has been termed 'safe' from seismic hazards. Nevertheless, the engineers opted for slicing technologies to shape the foundation site to prevent any disturbance to the base of the Statue's hillock.

And precautions have even been taken against the threat to the world's tallest statue from the tiniest of creatures. Included in the plain cement concrete (PCC) mix design specified for the foundation were anti-termite chemicals! ■



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