

CONCRETE

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trends

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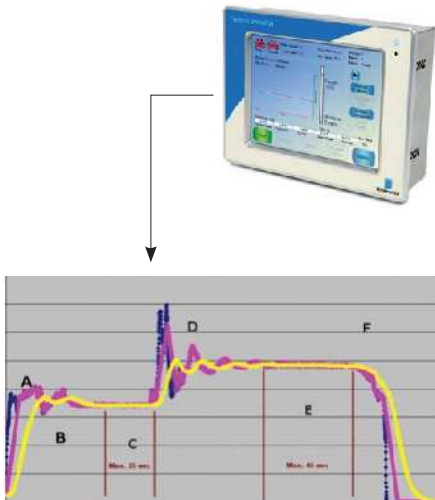
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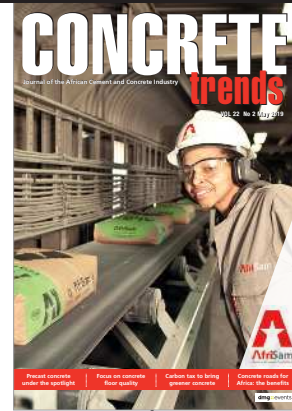
CONCRETE trends

Volume 22 No 2 May 2019

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COVER



As a cement producer, lowering its footprint has long been a strategic priority within AfriSam. **Page 12**



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Now the real work begins

With the election and inauguration behind us, the sighs of relief emanating from South Africa must surely be heard clear across the world. And they've probably been heard by the ratings agencies too, who with us, are hoping for tangible proof that President Ramaphosa's promises are being put into effect – but their hope is tinged with scepticism, a scepticism that we need urgently to dispel.

The extent of the damage the 'Zuma years' have wreaked on the economy is almost unimaginable, so the recovery will not be as fast as we would wish. However, there have been positive signs since our new President wrested power from the extremely resistant incumbent.

We have seen the start of action against corrupt members of state owned entities as well as the public and private sectors who have been milking the gravy train with impunity for far too long. In addition, the various commissions of enquiry, with their revelations, have raised our hope that the rule of law can once again prevail.

The construction industry, so hard hit last few years, is certainly hoping for a new confidence in the economy that will again woo investors to our shores and bring long-awaited infrastructure spend. However, government must intervene to stamp out the violence and intimidation that is bringing multi-billion-rand projects to a standstill as the 'construction mafia' is left unchecked.

All construction industry associations came out in support of SAFCEC chief executive, Webster Mfebe's urgent plea to the President and various cabinet ministers to intervene to save the construction industry. His letter emphasised the fact that gangs had disrupted and halted at least 78 projects worth a minimum of R25.5 billion.

He provided a list of the names and skills of 110 engineers and skilled technical people who had already left the country due to these incidents because of the personal risk to their lives and the lack of work because of projects being disrupted at gunpoint. He said losing these key skills would create a serious capacity problem for the future construction industry in South Africa.

But, says Wayne Duvenage in the Daily Maverick: "We live in the most interesting times for our nation's future. Aside from Madiba's inauguration, South Africa has never been in a better position for a massive national prosperity boost than where we sit today. The high-road/low-road scenarios of strategist Clem Sunter beckon once again, but this time much louder than ever before."

It is my fervent wish that the high-road scenario will become a reality. ■

Gill Owens, Editor



We are there when you create



Making beautiful concrete? Our Information Centre has an inspiring collection of resources for architects and artists.
Explore concrete with us.



Celebrating 40 years of commitment

Quality and technical excellence have been at the forefront for Terraforce since 1979.

Terraforce, the well-known Cape Town-based precast concrete manufacturer specialising in modular hollow-core concrete blocks, has maintained a strong foothold in the South African concrete retaining wall market.

This year marks 40 years of involvement in the earth retaining and erosion control industry. Starting as a supplier and installer of wire mesh gabions, Terraforce soon switched to the more sustainable concrete block method of their own design which was pioneered in 1984. Proven as a solid choice, and with only one competitor in this sector situated in Europe, the business has grown steadily and now has dedicated licensees on all continents.

Terraforce has established production in the United Kingdom, Canada, Australia, Spain, India, Algeria, Morocco, Nigeria, Swaziland, Lesotho, Ghana, Namibia and the United Arab Emirates. Their product presents one of the most energy-efficient segmental retaining wall systems.

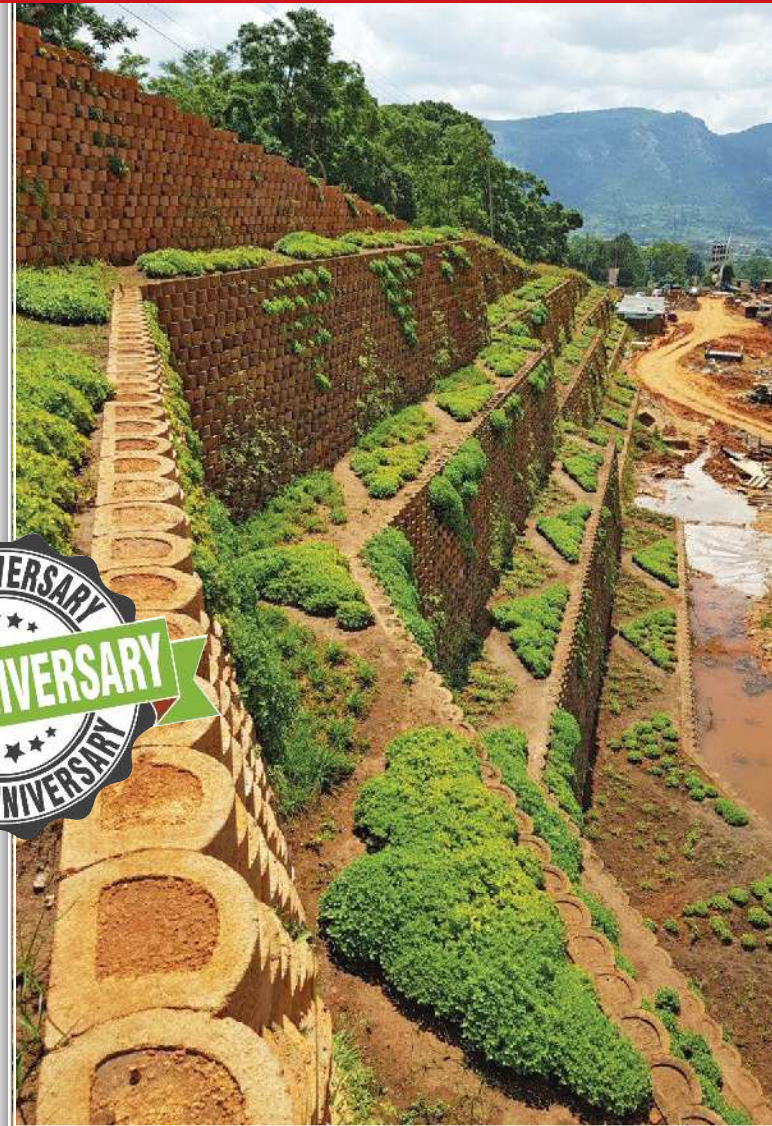
The blocks require low hardware input for manufacture, low transport costs and low inventory requirements at sales outlets. Being hollow, yet strong, they require less concrete compared to solid block systems. All Terraforce earth retaining systems are plantable and, if irrigation and maintenance are set up properly, an installed wall can be completely covered in attractive vegetation.

From the very outset, Terraforce knew that robust research, testing, and design guidelines were indispensable, not only as a service to their customers, but also to maintain their market leadership. Over the years the results of extensive laboratory testing, three design manuals and a wealth of supplementary information have been published.

Says Holger Rust, founder and member of Terraforce: "In 2004 our first design software was launched, and soon many of our clients requested the introduction of a design service. In response, Terrasafe (a professional design service exclusively for Terraforce walls) was launched in 2011 and in 2018 state-of-the-art design software, Maxiwall – another design tool for experienced professionals – was launched.

"Currently we are completing a comprehensive design course for gravity and composite retaining walls, in compliance with SANS 207, based largely on BS 8006. This necessitated the verification of some of the findings of tests conducted in 1991 and 1995 in South Africa and Canada," Rust explains.

"We commissioned Curtin University in Perth, Australia, under the guidance of Johan Joubert of Wave International, to conduct shear strength tests between closed-face Terraforce



A Terraforce project in Swaziland designed using Terrasafe software. Credit: Terraforce

blocks and geo-grids in accordance with ASTM-D6916-18. The report conclusively re-confirmed the shear strength between our blocks and the geo-grid material.

"Going forward, we plan to re-affirm our position as an ethical business by practicing fair competition, truthful representation and honest advertising. Above all, we will continue developing our knowledge base and skill to the highest level of excellence. Considering this commitment, we are also currently looking into achieving a green certification from a reputable authority," Rust concludes. ■

**More information from Terraforce, Tel: +27(0)21 4641907
email: info@terraforce.com / www.terraforce.com**

There's a story in every step – submit yours for a chance to win your share of R50 000!

Lemaitre Safety Footwear believes there's a story in every step and invites you to submit yours for the chance to win your share of R50 000.

Lemaitre Safety Footwear is made by workers for workers, with a focus on sourcing and manufacturing locally to support the South African workforce both through the products they supply and the opportunities they create.

Now Lemaitre want to celebrate those everyday working heroes who contribute to building and growing a better South Africa through the work they do while wearing safety footwear.

Do you cultivate the crops that feed the people? Or build the schools and hospitals that provide these essential services? Perhaps you mine the minerals that are so crucial to building our economy, or work through the municipalities to improve our roads and infrastructure?

Send Lemaitre your story, whether you are a manager or an intern; however small it may seem and you could stand a chance of winning your share of R50 000 in cash and prizes. If you are selected as one of the four main cash winners of R10 000 each, you may also feature in upcoming Lemaitre advertising campaigns.

All you have to do to enter is dial *120*447# and follow the prompts. Standard rates apply and all T&C's can be found on www.lemaitre.co.za.

In addition to the R50 000 in prizes for wearers, the competition also offers a R10 000 incentive of safety wear to



companies. The key requirement is registering your company, promoting the campaign internally and driving entries from your employees to stand a chance to win R10 000 worth of safety gear for your company.

So for those Procurement officers, SHEQ Managers, CEOs, etc... you can help stretch your PPE budget that much further by simply encouraging your workers to enter, because the more they enter the better your chances of winning.

To register your company to win go to www.lemaitre.co.za/win and submit your details. You will be able to download material to distribute internally to help promote entries. ■

More information from Deane Nothard,
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email: deane.nothard@bbfsafety.com
www.lemaitre.co.za/win

Light-activated wrap can fix concrete structures

Utilising tape to repair or reinforce concrete structures may seem like a joke, but that's just what fibre reinforced polymer (FRP) sheets are used for. Now, scientists say they have developed a better FRP that halves the number of people and the amount of time required for application of the material.

Ordinarily, when FRP sheets are applied to cracked or deteriorated concrete, a resin must be applied to the surface first. Singapore's Nanyang Technological University researchers say up to six workers are typically required for the job.

They have now developed 'FasRaP' – Fast Wrapping Fibre Reinforced Polymer. This a glass fibre-reinforced polymer wrap pre-coated with a

proprietary adhesive resin that hardens only when exposed to light. It can reportedly be applied by three people, in half the time required for conventional FRPs.

Additionally, because the resin is pre-applied to the wrap under controlled conditions, they claim that the quality of repairs and reinforcements should be more consistent and easier to assess.

In industry-standard lab tests, a concrete pillar wrapped with FasRaP was found to withstand an 80% higher load than a bare pillar – similar to strength figures for traditional FRPs.

"Our invention allows companies to save on manpower, increase efficiency and make structural reinforcement easier to execute," says lead scientist, Assoc. Prof. Ng Kee Woei. "This will help them meet future building standards and prolong the life of older buildings and structures as Singapore and other cities age and deteriorate."

The university is now working to commercialise the technology. ■

Source: <http://lnnk.in/p2q>



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Chryso strengthens position in screed market through Cemexa acquisition

Chryso, a world leader in manufacturing additives for concrete and cement as well as developing added-value and innovative solutions for the building industry, has announced its acquisition of Cemexa, a major player in France and internationally in the cement screed market.

The Chryso Group, which already owns the Belitex self-leveling screed technology, is now able to enlarge its product offering by acquiring both Cemexa's Cemfloor and Mobicem ranges, strengthening its overall position in the screed market in France and abroad.

Cemexa is a French family business set up in 1997. The company, one of the leaders in fluid cement screed, develops and sells – in France and worldwide – additives and processes which help improve the performance and reliability of fluid screeds.

Thierry Bernard, President and CEO of the Chryso Group, said: "We welcome with great enthusiasm the Cemexa team to our group. The synergies we expect to realise through our combined business expertise and know-how showcases our willingness to offer our customers an expanded portfolio of fluid screed solutions. We also aim to develop our international offering and reinforce our leadership in this specific market segment which ties in with the overall growth strategy pursued by the group."



Chryso's latest acquisition will strengthen the global group's position in the concrete screed market.

Christophe Ceccaldi, co-founder of Cemexa, who becomes MD of the new subsidiary, added: "We share with Chryso the spirit of innovation and the desire to offer robust solutions to screed professionals. We are happy to join a group that makes substantial and continuous investments in Research and Development to allow us to design and develop new solutions for all our customers in France and around the world."

The Chryso Group's extensive network includes 22 foreign subsidiaries and covers more than 100 countries through its wide network of distributors, licensees and agents. The Group employs over 1 250 staff worldwide. Innovation, customer service, expertise and technical know-how are the Chryso Group's cornerstones. ■

More information from Elrene Smuts
Tel: +27(0)11 306 9000 / www.chryso-group.com

CTIA gives 45 students from informal settlements building skills

Forty-five community members from the informal settlements of Freedom Farm and Malawi Camp, have graduated in Competency Based Modular Training (CBMT) in house building. The training, which started in September 2018 at a cost of R1.3 million, marks the second of its kind for Airports Company South Africa, Cape Town International Airport (CTIA).



The runway realignment plan at CTIA requires that the informal settlements of Freedom Farm, Malawi Camp and Blikkiesdorp be relocated to secure its future expansion plans and, together with the City, a formal housing development is underway. As part of its commitment to these communities, CTIA is assisting community members in providing them access to key house building skills which include bricklaying, carpentry, painting and plumbing.

"Skills training such as this immediately makes these community members more employable and will hopefully improve their access to work. We are immensely proud of the 98% percent pass rate," said Deon Cloete, GM: CTIA.

"The specific focus of upskilling community members will afford them opportunities to become entrepreneurs or to look for job opportunities as skilled artisans, bricklayers, carpenters, painters and plumbers – all skills needed for our growing economy and we are pleased that these newly skilled graduates are now ready and able to enter the job market," said Executive Mayor Dan Plato.

As a continuation of this programme, ACSA plans to provide further scholarships to students who qualify to complete the 12-month comprehensive Community House Building programme and the recognition of prior learning programmes. Through Northlink College's student support services, students eligible to continue their studies through these programmes will be assisted to apply for NSFAS bursaries.

"With our pending expansion programme at the airport, we intend sourcing skilled resources from various communities surrounding the airport for our projects, which makes these skills key," said Deon Cloete.

"These students have risen above their current circumstances and have shown tenacity in seeing the programme through. The communities see the value and are determined to complete the courses presented to them," added Cloete. ■

More information from Deirdre Davids
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www.airports.co.za

SAPMA and Corrosion Institute join forces for training

The S.A. Paint Manufacturers Association (SAPMA) and the Corrosion Institute of Southern Africa (CorriSA) recently signed a Memorandum of Understanding that will bring substantial benefits to the training offered by both industry representative bodies.

The MoU was signed recently by Deryck Spence, the executive director of SAPMA, and Hendrick Rasebopye, the executive director of CorriSA.

Spence says CorriSA will now incorporate its own training material into SAPMA's SETA-accredited paint application courses so that CorriSA – which does not hold government accreditation for its training – can offer its members the opportunity to recover funds spent on skills development training back from the government.

"The existing SAPMA paint application courses will be augmented and modified to include anti-corrosion and



Deryck Spence



Hendrick Rasebopye



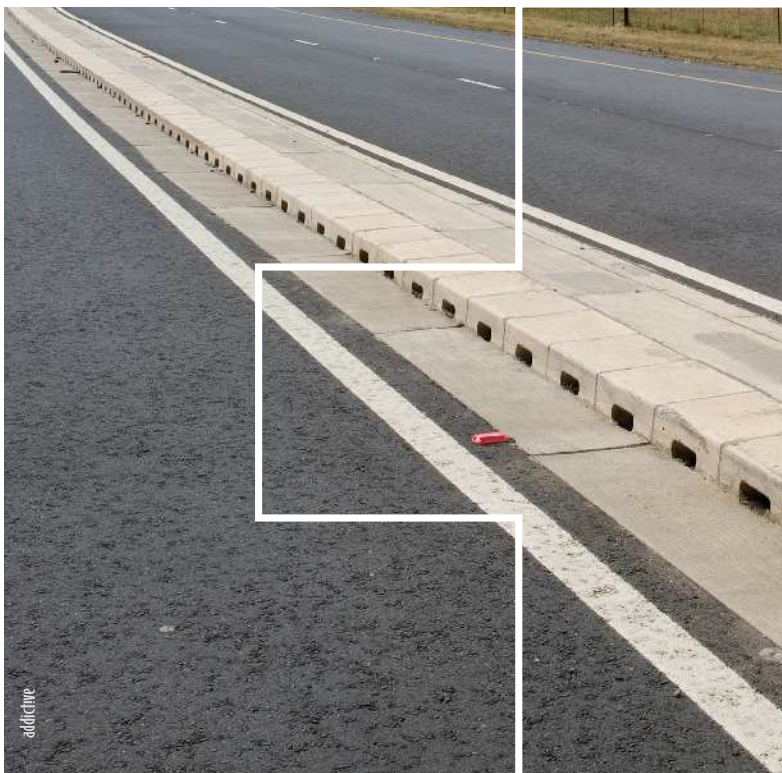
SA's official coatings and corrosion controlling industries' training has been boosted through a collaborative initiative signed recently.

spray application training for industrial projects obtained from the extensive curriculum of CorriSA training programmes. Anti-corrosion measures are not covered in depth in SAPMA courses so this broadens the scope of the SAPMA paint application tuition. CorriSA, on the other hand, benefits from now having accreditation for its training courses," Spence explains.

For SAPMA, another major benefit is that CorriSA will now allow SAPMA to carry out training at the well-equipped training and laboratory facilities operated by CorriSA. SAPMA was in urgent need for such a training venue.

"Another benefit is dual membership: SAPMA members will now also become CorriSA members, and vice versa," Spence adds. ■

More information from Deryck Spence, Cell: +27(0)82 894 6402 / www.sapma.org.za



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Aspasa questions the need for borrow pits



Nico Pienaar of Aspasa.

Surface mining association Aspasa has called into question the need for borrow pits, which have long been used by contractors and especially road builders to obtain easily accessible and cheap aggregates near to their construction sites.

The country still bears the scars of thousands of these excavations that disfigure our landscapes and degrade the land's use for future

generations. Yet, in most instances nearby formal quarries can meet the requirement of these projects from certified and licenced quarrying sites that comply with all legal, environmental and labour-related requirements.

However, some feel saving a few Rand warrants excavating illegally, or through seemingly legal channels like local governments and municipalities.

Legal maze

"However, most roadside operations are mistaken as borrow pits nowadays have stringent legislative requirements and need a mining permit from the Department of Mineral Resources (DMR), as well as water usage and other licences. Gone are the days of a letter-of-consent from the municipality or a land-owner," says Nico Pienaar, director of Aspasa.

"In these instances, all the relevant permissions need to be met and a thorough rehabilitation plan needs to be submitted and accepted by the Department of Environmental Affairs. These onerous procedures which can take months to secure should make dealing with a nearby Aspasa-accredited quarry a far better option.

"Add to the difficulty of operating a borrow pit, the labour legislation, DMR and local community liaison requirements and

a future borrow pit can become a nightmare in the making," he adds. "Today, however, the challenges more often than not lead to powerful corporations or government departments simply bulldozing applications or going ahead with illegal operations under the guise or protection of these same entities," says Pienaar.

Sustainable solution

He says in most instances economies of scale balance the cost of aggregates obtained from an accredited quarry due to the larger size of the operation and dedicated equipment and staff. By using an accredited Aspasa supplier, the user also supports sustainability of employment within the region, as well as the environment.

Perhaps most importantly, sand and aggregates produced within Aspasa-accredited facilities, are required to meet high quality standards and this necessitates either onsite laboratories or regular sampling and testing by outside authorities to ensure conformity. Members also have access to the latest practices, techniques and equipment through the combined strength of the association, which means that Aspasa members have access to the best technical skills, if required, to solve their customer's construction challenges.

Aspasa believes that the natural environment should not be disturbed unless it is absolutely necessary and if viable alternatives to borrow pits do exist within a reasonable distance from construction projects, then the use of borrow pits should not be condoned. Aspasa thus engages with Government and the Department of Mineral Resources (DMR) to discourage borrow pits unless no other alternatives are available.

Ten compelling reasons not to establish a borrow pit:

1. It causes unnecessary damage to the existing formal quarrying market
2. Legislative requirements are onerous and expensive to comply
3. Processes are open to, and may encourage corruption
4. Construction companies operating borrow pits are required to outlay capital on expensive, non-construction-related equipment
5. Borrow pits have the potential to damage the environment for future generations and rehabilitation of the site may be ongoing for decades after ceasing the operation until all environmental conditions have been met.
6. Can have a negative impact on local communities in terms of land use, as well as unsustainable employment
7. Single source materials can hamper construction in the event of a closure of the site for whatever reason, quality issues etc
8. The building of supporting infrastructure is costly, as is the maintenance of equipment
9. Can cause degradation of existing roadway infrastructure due to unplanned heavy vehicle traffic
10. Leaves an economic void within the surrounding communities upon its closure ■



A well-run quarry complies with all statutory and legislative requirements to protect the environment as well as communities and workers.

More information from Aspasa, Tel: +27(0)11 791 3327 / email: nico@aspasa.co.za / www.aspasa.co.za

Cement industry to appeal for protection against imports

The Concrete Institute (TCI) will be lodging an appeal to the International Trade Administration Commission (ITAC) of SA to impose import tariffs on cement imports to protect producers from the mass importation of cheaper cements from countries such as China and Vietnam.

Bryan Perrie, MD of The Concrete Institute – which has as funding members the major cement producers, PPC, AfriSam, Lafarge, Sephaku and Natal Portland Cement – says the approach to the International Trade Administration Commission (ITAC) of SA will plead for the imposition of import tariffs and a possible ban on imports for a limited period.

“The increase in imports of cement is affecting demand for locally produced cement to such an extent that SA manufacturers are considering mothballing plants, retrenching staff and putting expansion plans on hold. The effect of the cheap imports on SA cement producers is exacerbated by a slump of unprecedented proportions in the local construction sector with former giants in the industry already having shut or struggling for survival,” Perrie says.

Chinese and Vietnamese cement started pouring into South Africa after ITAC had – after an appeal from local cement producers – agreed that there was a need to protect the industry against the dumping of bagged Pakistani cement. ITAC therefore introduced heavy import duties of up to 77% for Pakistani cement which successfully cut dumping volumes. “However, imports from China have been rising steadily in 2016 and 2017 and last year Vietnam joined the fray, with more than a million tons of cement being imported into South Africa. These huge volumes are not required as the local cement industry already has annual spare capacity of around 5 million tons,” Perrie explains.



Bryan Perrie

As Competition Commission rulings prohibit sharing company statistical information, The Concrete Institute has had to appoint an independent team of attorneys to confidentially collate sales, production and employment data of the various producers to include in the application to ITAC to try and curb cement imports.

After the cement industry had successfully lobbied for government protection against the dumping of Pakistani cement, the volumes of the imports from that country dropped from over 1 400 000 tons in 2014 to about 400 000 tons in 2016. “The construction industry is now in a far greater slump than during that period so need protection from imported cement even more,” Perrie adds.

Rob Rein, chairman of The Concrete Institute and Group Executive Sales & Marketing of PPC, says cement is a vital industry for the country and needs government protection at this critical survival stage in the construction sector. “The



“cement, concrete and affiliated industries employ thousands of South Africans whose jobs would be on the line if the government does not step in to protect local cement production,” Rein explains. ■

More information from Bryan Perrie

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Prominent academic named **pioneer** Chairman of Ogun Chapter of NICE

On the 3rd of April, 2019, the Ogun Chapter of the Nigerian Institution of Civil Engineers (NICE) was formally inaugurated by the National Chairman, Engr. Mrs. Aishat Aliu Umar supported by National Past Chairman, Engr. James Owivry, and National Vice President, Engr. Tokunbo Ajanaku. Thereafter, the pioneer Chairman, Engr. Dr. Kolawole Adisa Olonade, was invested with the authority of the office.



Engr. Dr. K. A. Olonade receiving certificate of inauguration from the National Chairman, Engr. Mrs. Aishat Aliu Umar, FNSE, FNICE, Engr. James Owivry FNSE, FNICE, Past National Chairman (L) and Engr. Tokunbo Ajanaku, FNSE, FNICE, National Vice Chairman (R)

NICE is an umbrella body for civil engineers in Nigeria to network and strategise the development of Civil Engineering practice. It is one of the foremost and fastest-growing divisions of the Nigerian Society of Engineers (NSE).

Hailing from Ogun State, Dr. Olonade completed his primary and secondary education there and, rejecting admission to read Mathematics at the University of Agriculture, Abeokuta, he chose to study Civil Engineering at the Federal Polytechnic, Ilaro (FPI) in 1990. Here he undertook the National Diploma (ND) and Higher National Diploma (HND) in Civil Engineering in 1993 and 1996, respectively. While completing his HND, he was admitted to study Civil Engineering at the Federal University of Technology, Akure, Nigeria. He simultaneously completed his HND and his Bachelor of Engineering (BEng) in Civil Engineering about 19 years ago.

He worked briefly for the National Centre for Economic Management and Administration (NCEMA), a parastatal of the National Planning Commission under the Presidency, as a Higher Technical Officer to represent the Centre during the development of its permanent site in Sheda Abuja. With his for passion scholarship and teaching, he chose to pursue an MSc in Civil Engineering from the University of Ibadan. Thereafter, he completed a PhD degree in Civil and Environmental Engineering, specialising in Materials/Structures, at the University of Lagos.

Dr. Olonade's academic career spanned eight years with the Department of Civil Engineering of FPI. He joined the Department of Civil Engineering of Obafemi Awolowo University (OAU), Ile-Ife in 2010, again spending eight years before his move to the University of Lagos, where he is currently Senior Lecturer in the Department of Civil and Environmental Engineering.

His research has focused on utilising agricultural and industrial wastes to produce high-performance cement-based products, reducing the construction costs for affordable housing and also ensuring sustainable construction in sub-Saharan Africa. He is the first recipient of the Nigerian Academy of Engineering Postdoctoral Research Grant.

Recently, he and research partner, Dr. Wolfram Schmidt of BAM, Germany, were awarded the prestigious German-African Innovation Incentive Award sponsored by the Federal Ministry of Education and Research, Germany, for the use of cassava wastes for the production of concrete. He pioneered the use of cassava peel ash as replacement for cement.

Professionally, Dr. Olonade has Council for the Regulation of Engineering in Nigeria (COREN) certification to practice civil engineering. He is a corporate and senior member of the Nigerian Society of Engineers (NSE) and International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM), respectively. He is also a member of the Nigerian Institution of Civil Engineers, Nigerian Institution of Water Engineers and the American Concrete Institute.

He is a very active member of the RILEM Technical Committees on Sulphate Resistance Testing, Carbonation of Supplementary Cementitious Materials and Use of Agro-Based Materials as Cementitious Additions in Concrete and Cement-Based Materials. He has served as structural engineering consultant to a number of prominent private and public institutions and was a team member of the UNIDO hydropower feasibility study at Olusegun Obasanjo Presidential Library.

Dr. Olonade's first assignment as the Chairman of NICE, Ogun Chapter, was to inaugurate his nine-man executive committee, which included Engrs: Fatai Majolagbe (Vice-Chairman), Ismail Adeyemi (Programme Coordinator), Rashidat Toriola (Asst. Programme Coordinator), Gbenga Osungboye (Financial Secretary), Adejoke Odujobi (Treasurer) and Mustapha Jaji (Technical Secretary). Other members are Engrs: Femi Afinni (Asst. Technical Secretary), Oluwaseun Bajomo (Public Relation Officer) and Ismail Odejobi (Auditor).

Thereafter, he sought support from members and promised to embark on a membership drive and collaborate with government agencies and parastatals in the areas of Project Monitoring and Supervision and, more importantly, join hands with stakeholders to end quackery in the construction industry. He then concluded by acknowledging senior civil engineers in the Chapter who has contributed so greatly to making the inauguration ceremony such a success. ■

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Sika starts mortar production in Senegal

Sika is expanding production capacity in Senegal, West Africa, by opening a mortar production facility at its existing factory in Dakar. The plant will initially manufacture tile adhesives, grouts, concrete repair and waterproofing mortars and at a later stage cementitious flooring solutions.

Two years after the establishment of the new national subsidiary, and one year after opening a concrete admixtures plant, Sika is now starting to produce mortar products in Senegal. With its expansion strategy, Sika aims to further increase its market share in the booming construction market, one of the country's key economic sectors. Senegal has one of the strongest growth rates in sub-Saharan Africa. Its economy grew by 7% in the past year. Average growth of 6% is forecast for the construction market over the next few years.

Ivo Schädler, EMEA regional manager: "Our growth strategy in Africa has paid off, and we are achieving above-average growth rates. Over the last four years alone, we have increased sales on the African continent by more than 21% per year. In West Africa, Senegal is one of the fastest-growing countries with large investment projects in the areas of infrastructure, transport, energy, and oil. We want to position Sika in these major projects and bring the best products, systems, and services to our customers." ■

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 motor vehicle industry. Sika has subsidiaries in 101 countries around the world and manufactures in over 200 factories. Its more than 20,000 employees generated annual sales of CHF 7.09 billion in 2018.

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▲ Revenue from carbon tax should be constructively ploughed back into the sector to incentivise and promote changes in technology and behaviour.

◀ By focusing on the beneficial use of slagment, AfriSam significantly reduces its CO₂ footprint.

With the right collaboration, carbon tax presents opportunities for a greener concrete sector

The imminent implementation of a carbon tax in South Africa means the time for better cooperation between the concrete sector and government is now.

On 1 June this year, the long-awaited carbon tax will be implemented, based on the principle of 'polluter pays'. It is expected to have a significant impact on major energy users.

According to reports, the headline carbon tax will be levied at R120 per ton of CO₂e (carbon dioxide equivalents) emitted above the tax-free threshold. Depending on the number of tax-free allowances an emitter qualifies for, the rate could be between R6 and R48 per ton of CO₂e emitted.

Hannes Meyer, AfriSam's cementitious executive, says that companies like AfriSam have been working hard to cut their carbon footprint. Its success in applying extenders like slagment in its concrete, for instance, has led to significant progress towards reducing environmental impact. In its cement plants, it has also been a pioneer in the use of alternative fuels and resources (AFRs) such as old tyres in its cement kilns.

"This has allowed us to steadily reduce the amount of coal we burn, which contributes to lower CO₂ emissions," he says.

The carbon tax, he argues, is an important opportunity for government to take a more active role in supporting the initiatives made by industry to date.

"It will be important that government and the private sector work very closely on making the best use of the revenue stream

which is generated by this new tax," he says. "It could provide considerable sums that will be valuably invested in incentives and research for companies to evolve a greener economy."

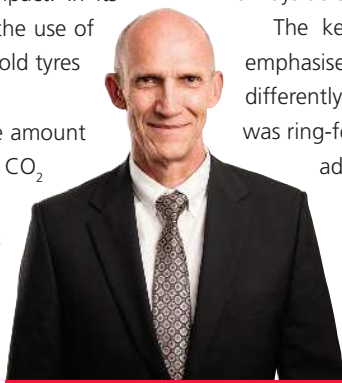
As a cement producer, lowering its carbon footprint has long been a strategic priority within AfriSam, says Meyer. The company has invested heavily in forging new technologies that ensure a more sustainable future. While the use of extenders in concrete is not new, AfriSam has been able to grow its use of slagment as both a technical and environmental solution. He emphasises that slagment, while more expensive than fly ash, has better cementitious properties.

"By focusing on the beneficial use of slagment – mainly from granulated blast furnace (GBF) slag – we reduce the amount of clinker that must be produced in our kilns," he says. "This has operational benefits for most applications, ensuring that we are always able to specify a superior product for our customers."

The key opportunity presented by the carbon tax, he emphasises, is for government to help industry to do things differently. This would be best facilitated if the tax collected was ring-fenced for the purpose of finding innovative ways to address carbon emissions.

"The idea of the tax should not be seen as punitive, in other words, to simply punish carbon emitters," he says. "Rather, the revenue should be constructively ploughed back into the sector to incentivise and promote changes in technology and behaviour."

He notes that the countrywide initiative to encourage the use of alternative fuels – in this



Hannes Meyer, AfriSam cementitious executive.

case the burning of old tyres in cement kilns – is an instructive case in point. This is a positive programme that could help industry to burn less coal while addressing the environmental challenges posed by tyres in landfill. The used tyres are recycled as fuel and are removed from the solid waste cycle.

“The move from traditional carbon fuels to this alternative fuel requires considerable early-stage capital investment before it can become sustainable,” says Meyer. “It also included a very positive labour-intensive element that was creating jobs.”

Although a number of companies were geared up for the transition and were making progress towards ongoing implementation, there was insufficient subsidy committed by government to the process, and many players found it to be financially unviable, for their companies.

“We can learn from this that a stronger partnership between the public and private sector is vital to move the economy forward towards greater environmental sustainability,” he says. “As industry we are willing to play our part in terms of developing and applying the necessary technologies. Government can contribute by directing the tax back into carefully considered incentives; these could include incentives for end-users of extended cements, for example.”

This will be particularly important for the first five years of the carbon tax, during which time the increase in the tax is set at CPI plus 2% per year. After that five-year period, there is currently no stipulated limit on the tax amount. If it is increased radically, the tax could threaten the viability of many businesses.

“During the first five years of the new tax, therefore, we should be working hard to help move every player towards compliance,” he says. “This would ensure that businesses are emitting significantly less by 2024, and are not facing any fundamental financial risk; the country simply cannot afford to lose jobs in this way.”

If the tax is simply channelled into general government expenditure, Meyer is doubtful whether it will have the impact that law-makers expect. He emphasises that the aim of any law is to achieve a certain result or outcome, not to generate revenue from those who cannot or will not comply. The ideal result in this case is a greener economy and a more sustainable future for the following generations.

“AfriSam has shown its commitment in environmental policy and practice, having established our own environmental department as early as 1992,” he says. “We went on to innovate a number of air quality management improvements. The upgrades to our cement kilns and emission filters mean that we now produce the lowest dust emissions in Africa.”

But he highlights that South Africa is one of the top ten CO₂ emitters per capita in the world, placing huge



▲ AfriSam's Ulco operation in the Northern Cape won a Clean Air Award from the National Association for Clean Air in 2013.

◀ With one of its core company values being 'Planet', AfriSam strongly believes in responsible manufacturing processes in order to protect the planet for future generations.

responsibility on all stakeholders to make real improvements. The country has already committed to reduce greenhouse gas emissions by 34% by 2020.

“As the cement manufacturing sector, it is important that we remain proactive,” says Meyer. “With the carbon tax soon upon us, it is important that the ‘stick’ approach is accompanied by the ‘carrot’ – to achieve the levels of progress the country requires.” ■

ABOUT AFRISAM

Founded in 1934, AfriSam is the leading black-controlled construction materials groups in the southern African region, with operations in South Africa, Lesotho, Swaziland and Tanzania.

We are committed to building a positive African future. It is this passion and commitment that we are most proud of, not of the products we make, but rather of what our products make possible – we create concrete possibilities.

AfriSam has an annual cement production capacity of over 5 million tons, which is produced from our seven production facilities and distributed to customers through strategically-located distribution centres.

Our readymix concrete business can produce almost any concrete mix required by customers from any one of our 40 readymix concrete plants. We also have the capacity to produce in excess of ten million tons of aggregate from our 17 quarries and aggregate operations every year.

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Connecting outlying Sekhukhune District to major urban nodes

The Roads Agency Limpopo (RAL) is forging ahead with the construction of a new road that will connect three villages in the mainly rural Sekhukhune District Municipality to two provincial roads, including the D1547 that is administered by the South African National Roads Agency Limited.

When completed in September 2019, the new 13-km single carriageway will provide the citizens of Mmotwaneng, Legonaneng and Luckau with quick access to major urban centres in Limpopo and Mpumalanga.

The many small businesses in these villages, among them emerging farmers, will also benefit from the new infrastructure by being able to expand into new markets.

Meanwhile, numerous local small businesses have already benefitted from on-the-job training provided by main contractor, Lonerock Construction, during the construction phase of the project.



Lonerock Construction completed the bulk of the complex structural work ahead of the roadworks.

This still stands out as a major highlight for both Thabiso Phetla, site manager of Lonerock Construction, and Joseph Myoya, Ubona Engineers' resident engineer on site.

"As a typical Expanded Public Works Programme project, it has been designed to be extremely labour intensive. By November 2018, there were up to 60 locals working alongside members of our team. This number will increase when we commence the ancillary works, such as the installation of the guardrails and construction of the storm-water drains, in mid-2019," Phetla says.

Four engineering student technicians were also selected by Lonerock Construction to gain practical experience while working alongside its team as part of the company's ongoing commitment to skills development in the construction industry.

Considering its many complexities that have often demanded 'out-of-the-box' thinking by the client and its professional team, this project has proved to be a very fertile training ground for these students.

Myoya says that one of the challenges was quickly adapting the original engineering design that was completed more than eight years ago to current conditions without delaying the works programme.

"While the engineering design was completed by another engineering consultancy in 2010, the construction of the road was delayed by RAL due to limited financing and other pressing responsibilities. The villages have since rapidly expanded with many properties located within the planned route. The road, therefore, had to be extensively realigned to avoid having to relocate over 200 affected properties. Our approach, which also included reducing the width of the two-metre shoulder in areas, resulted in significant cost savings for the client, while also mitigating further delays to delivering this critical infrastructure to the communities," he says.

Moreover, the original design of the bridge over the Mankgatle River had to be adapted to align with the higher level of the new realigned road.

It is one of two major and technically complex structures that were built by Lonerock Construction as part of this project.

At six metres in height, it is significantly taller than the original design and is, thus, well above 20-year floodplain.

Substantially more reinforcement steel was required for the taller concrete abutments and additional precast concrete elements were needed to build the larger 20-m-long and 11,5-m-wide superstructure.

The eight 18 precast concrete beams and 126 precast deck planks were manufactured and installed by CoreCivils, the precast concrete bridge beam and parapet arm of CoreSlab.

Representatives of Lonerock Construction and Ubona Engineers worked closely with CoreCivils to ensure that the bridge beams conformed to the clients' exacting standards.

Representatives of the company visited the factory in Polokwane on several occasions to observe the manufacturing processes deployed at the company's state-of-the-art factory.

Most importantly, they wanted to witness the tensioning processes to allay any concerns regarding potential cracking at the ends of the elements.

The benchmark for quality was confirmed after the first element had reached a compressive strength of 45 MPa and CoreSlab was instructed to proceed with manufacturing the remaining seven beams and deck planks.

"CoreSlab can be commended for its willingness to accommodate us every step of the way, starting with the design and generation of a method statement of the manufacturing process. The company was also appointed to undertake the installation of the precast beams once the bearings had been installed on the abutments. This is considering that it is also a specialised process that demands absolute precision to avoid deflections during the lifting of the beams and after they have been placed," Phetla says.

The design of the foundations of the bridge also had to be modified by Ubona Engineers considering that the terrain is overlain by rocks and large boulders.

It was decided to anchor the foundations of the abutment bases into the large boulders as opposed to removing them by drilling and blasting.

"Mass concrete was cast over the boulders and we then drilled through them to insert the dowels. This approach provided some cost savings for our client considering that up to

45 000 m³ of rock had to be removed by drilling and blasting during the earthworks stages of the construction of the road. It also mitigated any delays as we decided to first prioritise the completion of the two large structures before working on the road," Myoya says.

Some of this material was crushed and used in the layer works of sections of the roads and in the foundations of the large cast in situ three-barrel culvert.

These challenging ground conditions were compounded by the perched water table in many areas along the route.

Affected areas were excavated and then filled with crushed rock that was covered with a Bidim geotextile, before work commenced on the layer works.

The road comprises a bedding layer compacted to 93% AASHTO density; selected layers compacted to 95% AASHTO density; and a C3 base course compacted to 98% AASHTO density.



The new bridge over the Mankgatle River is one of two large structures along the route.

This road will then be primed and sealed with 13,2-mm and 6,7-mm-thick bitumen layers. Quality G6 material for the sub-base layers was sourced on site from the various cuttings and the remaining material from two borrow pits that were opened specifically for this project.

In terms of the stabilisation of the sub-base layers, the pockets of cement supplied to site by PPC were unpacked and spread by hand to ensure accuracy and to provide further work opportunities for members of the community.

Phetla and Myoya note that meticulous attention also had to be paid to the implementation of the design of the water control and drainage systems considering the high rainfall experienced in this area.

More than 20 precast concrete culverts were installed at the various crossings along the route as part of this aspect of the works programme.

They are both looking forward to handing over this quality infrastructure to the community members, who have struggled for many years with gravel roads that required extensive maintenance especially after heavy rains.

They are also already benefiting from the boreholes that were installed by the contractor with the help of the municipality to support the construction operations.

Jaco de Bruin, managing director of CoreCivils, says that he is proud of the company's involvement in a project that has already had such a profound positive impact on lives of so many people in a very impoverished area of the country. ■

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

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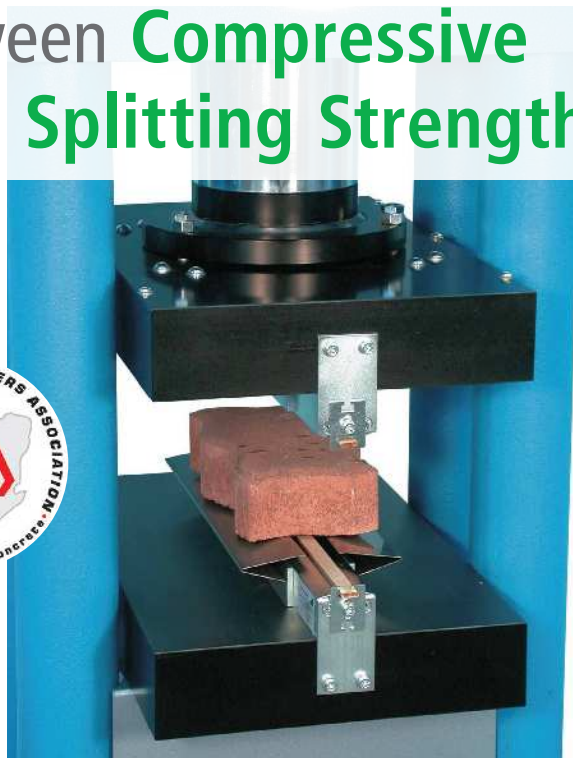


The correlation between Compressive Strength and Tensile Splitting Strength

What is the correlation between compressive strength and tensile splitting strength with reference to testing concrete paving blocks in compliance with the standard SANS 1058:2012?

One would imagine that if compressive strength of the concrete paver increased, then the tensile splitting strength would also increase. This is however not true.

There is no correlation between compressive strength and tensile splitting strength.



Tensile splitting strength testing.

What is the influence of aggregate?

It is a well-known fact that if the sand content in the concrete mix increases, the compressive strength of the unit will also increase. An increase in the sand content however influences the shear strength of the unit negatively, in other words the tensile splitting strength reduces. This can mainly be attributed to the homogeneous particle shape of sand and the way it binds with cement.

Should the stone content in a concrete paver be increased (reduced sand) the tensile splitting strength will increase. The reason for this is that the inconsistent particle shape of the stone contributes to a less favourable shear path, thus increasing tensile splitting strength.

It is general practice to increase the sand content in concrete pavers because it assists with the aesthetic appearance of the paving block. This is however a practice which manufacturers should apply with great caution.

Specifying paving units

The specification of concrete paving blocks in design, technical documents and tenders remains problematic. One would presume that the South African National Standard should and would be the ultimate specification.

However, many architects, engineers, consultants, contractors, buyers and specifiers are not familiar with the requirements of the most current specifications. For example, SANS 1058:2012 supersedes SANS 1058:2010 (edition 2) and the current version of the specification excludes compressive strength testing and only calls for tensile splitting strength.

Concrete pavers seldom crumble under pressure (compressive strength). What is much more common is to see concrete pavers which have cracked under pressure (tensile splitting strength). When specifying concrete pavers in design, technical documents and tenders it should be in compliance with the South African National Standard. This is done by stipulating the class of the concrete paver. Although the classes still refer to compressive strength, the actual indicator of importance is tensile splitting strength.

It is dangerous to specify concrete pavers only with regard to compressive strength.

A concrete paver could have a high compressive strength but would fail as soon as a point load is applied to it.

Cognisance should also be given to the two classes of concrete pavers mentioned in the standard. During testing, class

40/2.6 should perform above 90% of all testing parameters. Class 30/2.0 is not recommended for heavy traffic.

The Concrete Manufacturers Association's Producer Members manufacture precast concrete units of high quality and consistency because they all adhere to a certain level of quality management within the organisations.

Precast concrete units certified to adhere to the South African National Standard specifications can be identified by the Concrete Manufacturers Association Certification Service's mark of approval. ■



ABOUT THE CMA

The Concrete Manufacturers Association (CMA) is the primary representative of the precast concrete industry. Now in its 44th year, it initiates standards in close cooperation with StanSA and collaborates with its members in developing new products and services.

The Association's prime focus is to ensure that its members' products are applied correctly. A CMA mark serves as a guarantee of quality and the CMA takes responsibility should a problem arise.

Members are encouraged to hold accredited product certification such as the relevant SANS standard or to manufacture to specifications laid down by the CMA. Should a problem arise the CMA undertakes an investigation, and, if the product does not conform to the required standard, the member company is obliged to rectify the situation.

A range of publications is available from CMA and courses and seminars form part of its offering to members and interested parties.

**More information from CMA, Tel: +27(0)11 805 6742
email: marketing@cma.org.za / www.cma.org.za**



Precast concrete

Moving mountains with Terraforce at Somerset College

For South African educational campuses, sports facilities are always a top priority, and when Somerset College, one of the co-educational private schools in South Africa, was faced with a large, steep hill standing in the way of expanding their existing sports campus, major earth moving was unavoidable.

Faced with exposed cut and fill slopes, main contractor on site, Poplar Trading, needed a cost effective and aesthetically pleasing way to retain these – up to five metres high – embankments.

Says Keon Marais, Poplar Trading: “We needed to create space on a massive slope for two new rugby fields, two cricket ovals and a hockey field. To achieve this, we moved 80 000 m² of earth and placed 55 000 m² of drainage. Loxton Irrigation placed over 50 000 m irrigation, while Vredenburg Lawns and another company, Yokwana Contracting, installed 55 000 m² of lawn. In addition, we also installed some gabions and Terraforce 4x4 Step block seating adjacent to the hockey field”

Sub-Contractor Decorton Retaining Systems were called in as expert installers for the Terraforce walls needed on site, spe-

cifically to build a retaining wall with staircases and wheelchair ramps for student access, as well as additional space for an entry road and pavilion above the AstroTurf sport field. SP van Blerk, Decorton, says installation went according to plan: “Icos Engineering submitted a great design that specified the necessary reinforcing to match wall height, soil and surcharge conditions.”

The earth moving and walls were completed February this year, however some landscaping still needs to be completed to showcase the end result to full effect. ■

Project participants

Engineer: Icos Engineering

Quantity Surveyor: QS Bureau

Main Contractor: Poplar Trading

Sub-Contractor: Decorton Retaining Systems Pty Ltd

More information from Terraforce, Tel: +27(0)21 4641907

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Culverts: integral to water, road and mining infrastructure

The main function of culverts is to manage the flow of water from one side to the other of an 'obstruction'. This could be a road, railroad, trail or other structure constructed in either the natural or the designed flow path of the water.

Factors to be considered before design and installation are the site-specific application, environmental impact ensuring that erosion is minimised and structural damage avoided. Incorrectly placed or designed culverts can result in culverts failing, becoming dislodged and in extreme pollution cases being clogged with vegetation and sediment.

Rocla, one of South Africa's leading precast concrete product manufacturers, is a supplier of a wide range of culverts for infrastructure and other water flow related projects. Their production experience and quality controls, along with technical design expertise in project assessment and product design, have been successfully utilised for custom-designed culverts as well as many major infrastructure developments such as the Polokwane Eastern Ring Road and the rehabilitation of the D528 in George's Valley, Limpopo.

Culvert Range

Along with custom designed culverts for once-off projects, Rocla offers two distinct ranges of culverts, differentiated by the type of loading requirements, both available with associated precast base slabs.

For Heavy Loading Applications, such as to provide a waterway below railway tracks, Rocla's SATS SAR Rectangular Portal Culverts can be used. These, or custom units are also utilised in any application with excessive fill requirements with the culvert tunnel at the base of the fill zone, allowing either conveyor or vehicle access.

The standard SAR culverts are supplied in lengths of 1,22 m and are designed for up to 10 m of fill. Culverts required for loading heights greater than 10 m are handled individually and designed in-house at Rocla Head Office.

For the traditional loading applications, creating waterways below roads, trails or even drainage channels, Rocla's Standard Rectangular Portal Culverts are the preferred solution.

These standard culverts range in size from having spans of 450 mm to 3600 mm, and heights from 300 mm to 3000 mm. The strength classes for these culverts are 75S, 100S, 150S, 175S and 200.

If time constraints are a factor for any project, the precast culvert option, along with the precast base, as opposed to casting in situ, will save on project duration and provide quality assurances on final product.

Wingwall units for culverts

Rocla's Precast Wingwall units can be used at both the inlet and outlet of any channeled system making use of circular or rectangular portal culverts for stormwater applications. The natural flow path of water upstream of a construction is often wider than the culvert or pipe structure. Transition sections are then required to receive and direct the flow of this upstream water through the culvert/pipe. The same is true of the downstream end of the culvert/pipe section. The precast concrete wingwall unit is the most effective structure to use for the effective transfer of this water, eliminating erosion and creating a smoother flow of water.

Rocla manufactures a wide range of precast concrete products that are effective and cost efficient for all infrastructure and general construction projects requirements. They have representation in Namibia and Botswana in addition to their South African presence.

Rocla is part of the ISG which also includes Technicrete. ■

**More information from Malebusa Sebatane,
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Culverts are integral to water, road and mining infrastructure.

Architect-inspired paver launched in the Western Cape



Revelstone's recently introduced Plant Holed paver.

Plant Holed pavers have been launched on the local market. As it has done on numerous occasions with other pioneering landscaping product launches, CMA producer member, Revelstone has led the way, now offering plant holed paver options on its entire flagstone range.

Plant Holed pavers look like normal flagstone pavers, the only difference being that each paver can carry up to four or more holes. These can be filled with a variety of plant life such as mondo grass, penny royals and cacti, to name a few.

Revelstone founder, Andrew Cyprianos, says the rationale for launching the holed paver is twofold.

"In the first instance they add an aesthetically pleasing landscaping alternative, enabling a closer and more artistic integration between the paver and its immediate surroundings, be they flower beds, loose stones or lawn.

"Secondly, besides providing safe and durable stepping stones, holed pavers have introduced an eco-friendly dimension to the landscaped environment by allowing the ingress of water into the ground. This function ties in with Cape Town's Urban Stormwater Impacts Policy (2009) which aims to minimise the impact of rain water on conventional stormwater drainage," explains Cyprianos.

He first came across holed pavers at a DIY store in London. "Shortly after my return Jane Baldwin of Jane Baldwin & Associates (Pty) Ltd Architectural Design asked us if we could produce them. Naturally we agreed because Revelstone's reputation has always rested on creating new and innovative products based on our clients' individual requirements.

"It took us four months to develop the holed paver. Jane Baldwin was very happy with the result and we now anticipate that the concept will catch on in a big way.

"We currently offer one hole size of 75 mm with a new size of 110 mm coming soon, and landscape architects can specify the number of holes per paver as well their placement.



This gives them great scope for creativity in the layout and design of garden paths and patios," concluded Cyprianos.

Samples of the new holed paving range can be viewed at Revelstone's new showroom in Lansdowne, Cape Town. ■

More information from Alexander Cyprianos or Jeanine Pomario, Tel: 086 117 3835 / www.revelstone.co.za

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Nerissa Estate, Lansdowne, Cape Town

Lafarge meets the needs of concrete brick and block makers

Identifying closely with its brick and block customers, Lafarge South Africa's ongoing technical innovation with the formulation of Lafarge Powercrete plus cement is proving highly successful.

"In this tough competitive market, precast concrete bricks and blocks are a healthy growth sector in an otherwise economically depressed infrastructure environment," says Lafarge Industrial Sales head, Dirk Odendaal. "The market-leading reliability and cost-effectiveness of our cement is meeting the need to add value for customers."

Lafarge South Africa is the local presence of the international LafargeHolcim Group, a world leader in building materials. The Group is committed to creating innovative materials and building solutions that contribute to more durable, sustainable and beautiful environments for all. Aiming to meet the challenges of the ever-changing construction industry, innovation is at the forefront of the Group's major investment in research and development.

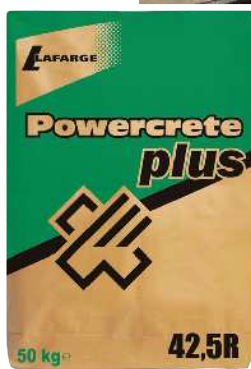
Powercrete plus is a Premium Technical CEM II 42,5R Portland-composite cement that combines high early strength performance – in fact, excellent strength at all ages – with versatility and enhanced durability benefits. It is produced exclusively at the Lafarge Lichtenburg cement works, enhancing the reliability of its quality through being derived from one source of consistent clinker.

An especially beneficial feature for brick and block customers, ranging from those manufacturing industrial type concrete bricks, blocks and pavers to those making light commercial bricks or pavers, is the incorporation of Ash Resources' (also a member of the LafargeHolcim group) renowned classified siliceous fly ash, DuraPozz® in the Powercrete plus formulation.

"This provides better workability and easier compaction in the moulds to produce denser, stronger products," says Roelof Jacobs, Lafarge's Integrated Solutions and Innovation manager. "While the fly ash contributes to cost-effectiveness, the innovative Powercrete plus can also be extended further with additional fly ash or slag to customise various end-user precast product requirements."

Powercrete plus is fully supported, as are all Lafarge products, by the unique technical and laboratory resources of the Lafarge Integrated Solutions and Innovation Centre (ISIC – until recently known as QDSA). ISIC operates one of the largest and most respected SANAS accredited Civil Engineering testing facilities in South Africa. Complying with ISO/IEC 17025, the facility has a proud record of continuous accreditation since 1996.

ISIC provides comprehensive technical support covering aspects such as formulation design optimisation, material quality testing and trouble shooting. One of ISIC's many facilities is a concrete block making unit used to test formulations and offer a training service, particularly for emerging contractors. "Innovation drives us and we continually endeavour to create the best possible outcome for our customers and end users," says Jacobs.



▲ Lafarge Powercrete plus cement meeting the need for cost-effective, high productivity brick and block making.

◀ Lafarge's Premium Technical CEM II cement – Powercrete plus

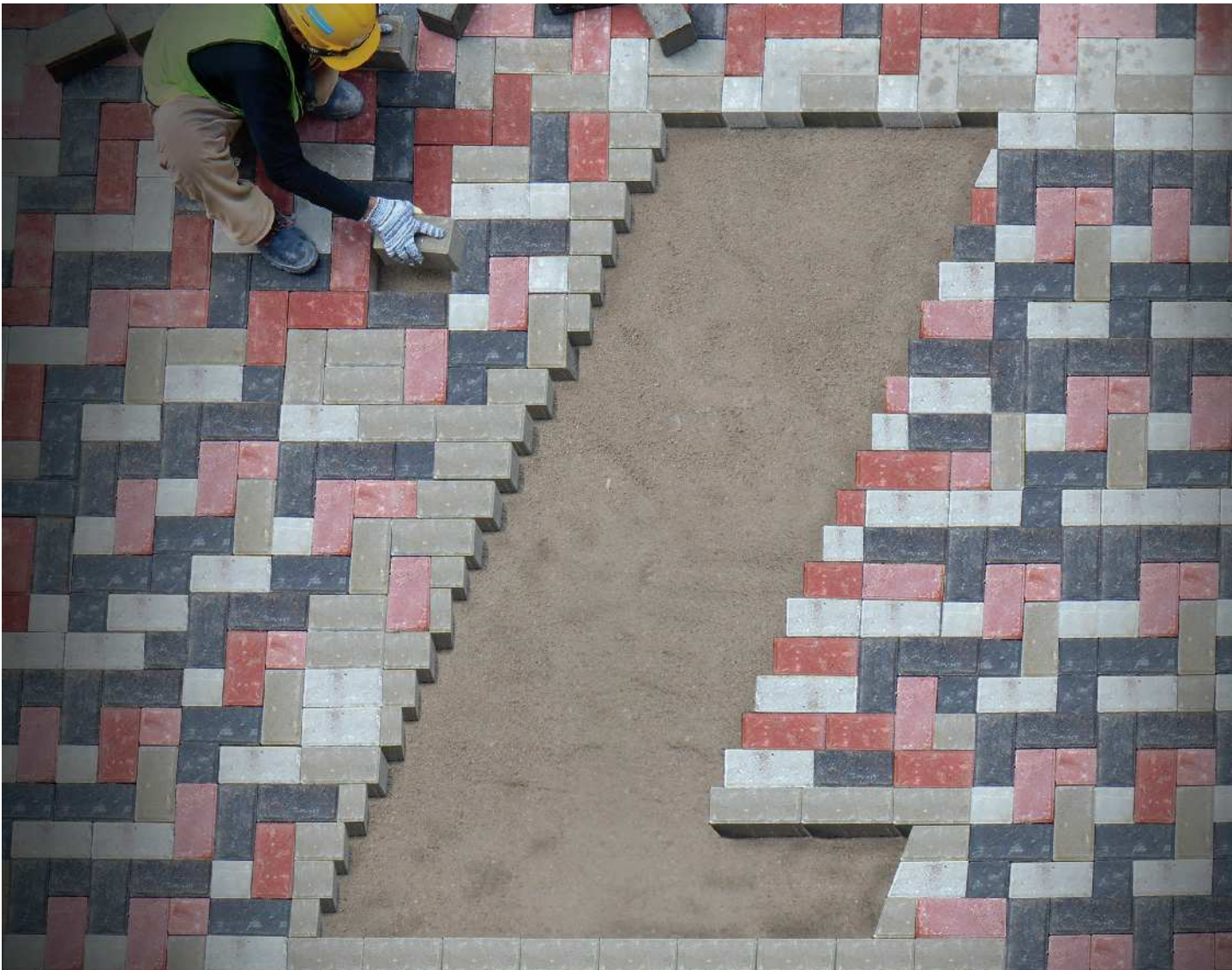
The innovative CEM II formulation of the versatile Powercrete plus retains the early strength gain characteristics of a CEM I cement, while producing concrete mixes that have better workability and higher ultimate strength. A specially developed strength enhancer is interground with the clinker to optimise strength development in cement containing fly ash and/or slag.

The formulation of Powercrete plus also typically contributes to a reduced water demand of the concrete mix by between 2% and 5% compared with a CEM I class cement. The product's potential for further 'extendability' has been demonstrated with trials using 20% up to 40% of DuraPozz® fly ash, or 30% up to 50% of slag.

In addition to being an ideal choice for sophisticated brick and block makers, the reliable quality together with the versatility of Powercrete plus enables contractors to have the scope to produce on site a range of specific, cost-effective mix formulations, which provide solutions to requirements for strength, durability and workability. The product's outstanding characteristics have also made it a leading cement choice among ready-mixed concrete producers. Specialised applications range from the manufacture of post-tensioning concrete items to custom blends for dam and reservoir construction, structural concrete and tunnel lining.

"Powercrete plus epitomises Lafarge's leadership in innovation, together with the other cements in our unique range of designed-for-purpose solutions such as Rapidcem, Fastcast, Buildcrete and Durabuild," comments Odendaal. "It is immensely rewarding to see our technical prowess helping our customers achieve better value and enhanced competitiveness." ■

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Three trends for the precast industry to keep track of in 2019

By Mats Jungar, CEO, Elematic, Oyj

Are you pondering what the year of 2019 brings to the precast industry? Or what issues should be considered during future precast production? Here's my view on some of the major trends in the precast business that have increased in importance over the past few years.

Sustainable precast

Climate change, lack of pure water, heavy storms, diminishing raw material resources are constantly all over the news, guiding us to appreciate green values and forcing companies to change the way they do business – and the precast industry is no exception.

There is a growing demand for sustainable construction from different parties; the governments, citizens and global communities. This challenges the designers, builders and the precast industry. For us, this development actually presents a good opportunity to highlight the benefits of precast construction, share the information and facts, and convince authorities that precast concrete is the future of building construction. We should explain that compared to cast in situ, precast uses less of everything – less water, less steel and less cement. Less waste is also produced in the factory production process, together with lower logistics needs. In addition, precast plants can have a closed water circulation systems, which helps to save vital clean water.

There are many ways to make precast production even more sustainable. One of the major possibilities arises from the use of materials and new and modern machinery. Why? The answer is simple – new machinery is designed to be cost-efficient, meaning that less material goes to waste.

For example, Elematic's new Plotter draws required openings accurately on hollow-core slabs, so that slabs are not wasted due to measurement or marking errors. Also, our Extruders are equipped with efficient shear compaction technology, which results in minimised cement usage and consistent high-quality production – again, fewer slabs are scrapped so materials are not wasted because of production errors. Concrete recycling is another upcoming trend that will improve raw material efficiency in precast production.

Making safety the priority

Safety should be the priority when doing business, because it not only impacts the lives of the people, but also the reputation of the company. New employees are much more likely to apply to companies that care about the safety of their people and operations.

Whenever we here at Elematic further develop existing machinery or innovate something completely new, we pay close attention to safety aspects. We want to assist in making your precast plant a safer place to work, to avoid immediate dangers, but also safeguard the lives of personnel and the factory lifecycle. Therefore, our latest machine models are equipped with various solutions to reduce occupational accidents and safety risks, for example, movement sensors, auto-stop function and tools for safe lifting. It is also crucial to limit the amount of respirable silica dust – as we know; silica dust is one of the major dangers at precast plants.

Traditionally, the precast industry has lagged behind other sectors regarding factory safety. However, now that the future of precast business looks promising, there should be a good



Mats Jungar, Elematic Oyj CEO, considers trends influencing precast concrete manufacturers in 2019.



Elematic's Extruder E9 for hollow-core slab production on show at Bauma 2019.

opportunity to dispose of old, often dangerous solutions still existing in many plants around the world. Frontrunners in the industry are investing in factory safety, which can also be seen as a competitive advantage. I believe that our industry should promote safety not only by using precast as the building construction technology, but also by using new and modern production solutions that truly make a difference.

Digitalisation as an opportunity

Digitalisation has impacted our lives on many fronts – through the introduction of smart devices, electric cars and IoT. The precast industry has not been at the forefront in adopting new digital solutions, but now we see great potential for factory digitalisation in the form of automated machinery and optimised production planning.

If you want to take a step towards digitalising your precast plant, the easiest way is to start with production planning, because it creates the basis for further digitalisation. This may mean, for example, quality control, storage yard management or truckload planning. However, before being able to implement any of these, production planning is required; to know what is produced, when it is produced and how efficiently you utilise the capacity available.

Digitalisation is impacting the precast business and offers considerable savings not only by making the production more efficient, but also by taking care of the safety of employees and in attracting skilled labor. Automated processes are also ideal for ensuring consistent quality throughout the production chain. The benefits are not limited to the precast plant, because the whole construction project can be digitalised from the original designs all the way to the construction sites, and beyond to the entire lifecycle of the building. ■

ABOUT ELEMATIC OYJ

Elematic Oyj is a world-leading manufacturer of precast concrete plants and production lines. In over 50 years of operation, we have supplied technology to more than 100 countries and to every continent. Turnover is approximately 100 million euros, of which exports generate 95%, and the company employs roughly 230 people. Elematic has subsidiaries and sales offices in the USA, Germany, China, Russia, India, Hong Kong and the United Arab Emirates, and agents in over 20 countries. The company headquarters is located in Akaa, Finland, and its production units are in Finland and India. Elematic has an ISO 9001 certified quality system and the international quality certificate Investor in People for the development of personnel.

More information from Nina Lehtonen
 email: nina.lehtonen@elematic.com / www.elematic.com



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Revaro: providing intelligent solutions and affordable innovation

Since its establishment back in 2000, Revaro has developed in many aspects that have contributed to its growing success. Staying true 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-ups 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 started as an IT company and then changed into a business management consultancy specialising in business turnarounds.

Revaro MD, Reyno van Rooyen, had been a consultant with Productivity SA where he focused on turnaround solutions for struggling companies to avoid job losses.

'Affordable innovation' enters the market: Van Rooyen's last turnaround strategy was done for a brick-making company. "Through my work on this project, 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," Van Rooyen states.

Revaro products are sourced from over 50 factories worldwide. Through relationships built, the company managed to secure the most cost-effective means to offer solutions to its clientele, without compromising on quality. Revaro is currently sourcing from 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 a one-stop shop to the concrete and construction industry. They supply complete solutions from crushing plants, aggregate batchers, concrete mixers, machines to manufacture blocks, pavers, roof tiles, kerbs, and concrete pipes. The range includes readymix concrete plants, brick production pallets, self-loading concrete mixers, front-end loaders, TLBs, 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's focus on all its customers: Revaro guides its clients from start-up phase to the established company, with full training and also 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 companies' goals.

The future: Revaro's long-term objective is to collaborate with private-equity BBEE 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 a major focus on our after-market support capabilities. As we grow, 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
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Loss of power equals loss of income

Holger Rust, founder and member of Terraforce, chatted to some of his licensees on behalf of *Concrete Trends* to establish how load shedding had affected their operations.

He found that Eskom's recent load shedding escapades had seriously affected some of the larger producers of concrete products, while a few smaller producers escaped relatively unscathed. One company suffered almost no losses, in spite of high fuel costs and managed to very nearly recover the purchase price of a second-hand 250 KVa generator bought early in 2018. Another company felt that the high price of fuel, to run a generator, made the use of it uneconomic and lost income accordingly.

Factories in the bigger centres, where demand could not easily be covered with generators or alternative electricity generation, had to unpack a whole bag of creative tricks to maintain reasonable production levels. These included flexible work shifts, overtime arrangements, and contacting clients with orders waiting to be delivered, to beg for understanding for delays.

Since phone systems were also seriously affected, communication with clients turned out to be a real problem for many. While installation on site could continue, deliveries were delayed because traffic moved at a snail's pace due to non-functioning traffic lights.

Substantial extra expenses arose from having to rely on overtime workhours, including weekend production and dealing with the logistical nightmare of arranging safe transport home for employees, often late at night. These issues were in addition to the significant cost of generation equipment and fuel. Some smaller operations were considering other energy sources but found current set-up costs prohibitive.

Rust explains how, at times like this, even small-scale wind and solar generation is a decided advantage. Terraforce offices, H.Q. and the marketing office in Cape Town are independent of the grid and their lines of communication remained mostly intact. Thus, they were able to receive and relay calls from all over South Africa from clients who could not reach the company's licensed producers. A great deal of frustration was avoided this way.

In conclusion, the consensus of the licensees was that the power outages served to accelerate the current economic downturn that is so negatively affecting the South African construction industry. ■



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Several value-adds incorporated in AfriSam's offering to the CPM market

AfriSam's offering to concrete precast manufacturers (CPMs) operating in today's highly competitive marketplace incorporates several value-adds, designed to improve the performance of their products and help to contain their costs.

Underpinning the primary products supplied to the market, Rapid Hard Cement in the 52.5R strength class and High Strength Cement (HSC) in the 42.5R strength class in the northern market and the 52.5N HSC product in the southern market, AfriSam's value-adds include on-site technical services.

These services, which are all rendered by staff from the AfriSam Centre of Product Excellence (CPE), assist customers to determine the ideal mix designs for their specific applications and propose aggregates that meet these requirements. SANAS-accredited laboratory services are used to verify and test the efficiency of the mixes, and product deliveries can be specifically scheduled around customers' individual activities.

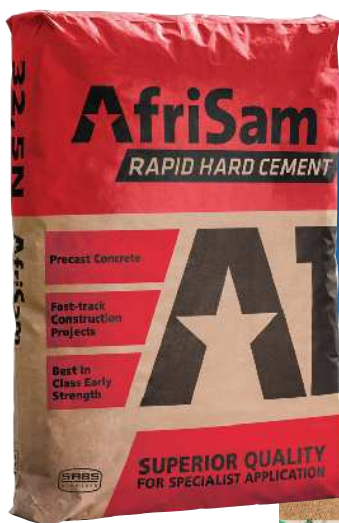
"In the CPM market we focus on assisting our customers to operate as efficiently as possible," Mike McDonald, manager of AfriSam's Centre of Product Excellence, states. "This involves evaluating their existing mix designs and helping them to reduce any unnecessarily costly mix components without compromising the quality or aesthetics of the end product. For example, certain customers have successfully switched to our SlagCem 42.5N product available from our Vanderbijlpark plant, a cost-effective alternative to High Strength Cement in this market.

"There is not a one-size-fits-all approach in the CPM market, so we draw from all the alternatives available to provide the most cost-effective solution for each customer. We value our CPMs and we're committed to building relationships that will give them a competitive edge. Our success to date reflects the quality, consistency and high performance of our products."

The "R" early strength factor in AfriSam's 52.5R CEM I Rapid Hard Cement and 42.5R CEM II High Strength Cement is proving to be a real differentiator in the CPM market. Top of the range 52.5R Rapid Hard Cement, developed for specialist concrete product manufacturers, is performing particularly well, achieving in excess of the SANS 50197 minimum of 30 MPa mortar strength at the two-day mark. This is enabling CPMs to develop a variety of new high specification products,

such as highway barriers, roof tiles, retaining wall systems, culverts and concrete pipes. AfriSam is the only company to manufacture 52.5R Rapid Hard Cement as a standard product.

Its 42.5R High Strength Cement has been specially formulated and activated to allow for further extension with additional mineral components in the production of structural concrete. The "R" rating of the HSC is supported by AfriSam's strict quality control plan and this product is achieving in excess of the SANS 50197 minimum of 20 MPa mortar strength at the two-day mark. High Strength Cement is commonly used to achieve concrete strengths of between 10 and 60 MPa, but it is also suitable for high-strength concrete, with strengths of 80 MPa and higher.



AfriSam's Rapid Hard Cement, developed for specialist concrete product manufacturers, achieves very high early strengths, in excess of 30 MPa at two days.



AfriSam is the only company that manufactures 52.5 Rapid Hard Cement, ideal for applications such as highway barriers, roof tiles, retaining wall systems, culverts and concrete pipes, as a standard product.

"We're proud to be able to offer an 'R' rating with the two products supplied to the CPMs, while retaining an extremely low carbon footprint. In effect, we've introduced technological advances that have boosted performance in terms of the strength, performance, durability and workability, without sacrificing sustainability.

"These market-leading products, together with our value-adds, are part of AfriSam's in-house Customer Value Management initiative that seeks to unlock value for our customers across the board in new and innovative ways," McDonald says. "Our CPM customers are experiencing tangible benefits and this has led to measurable growth in this market for us. Our innovative approach allows us to make a genuine contribution to optimising their operations. ■

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

Cottage Stone pavers installed at new Klerksdorp shopping centre

A new shopping and fitness centre, Williams Shopping Centre, in Klerksdorp, was looking for an inexpensive yet durable paving solution that would meet the needs of the centre's anticipated patrons of newly opened restaurant and fitness outlets.

With a continuous influx of customers to the newly developed centre, it was imperative that the paving offer good longevity while still giving an attractive finish for the shopping centre.

Technicrete was specified at the tender stage for the project to supply their Double Zig Zag (DZZ) pavers, but after the client saw the finish on the company's newly launched Cottage Stone paver at a site nearby, they too were commissioned for the project.

Wian Blom, Sales Consultant for Technicrete in the Klerksdorp area commented: "We recently launched our new Cottage Stone paver, and we have been extremely satisfied with the feedback from our customers on its quality, finish and cost effectiveness for projects such as this. We believe that

the Cottage Stone paver will soon become the preferred choice for many projects as a result of the product's durable properties and appearance."

The Williams Shopping Centre installed 750 m² of the Cottage Stone paver in a slate colour around the shopping centre in addition to the specified 3500 m² of grey 60-mm DZZ's utilised in the parking areas.

Technicrete is part of the ISG which also includes Rocla. ■



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Preparation of the substrate ensures success on site

The look and performance of a floor covering is largely dependent on what lies below. When installing floor coverings such as vinyl sheeting, LVTs, laminate flooring or large-format tiles, the underlayment system is critical to ensure the desired end result. TAL believes that careful attention must, therefore, be paid to the correct preparation of the concrete substrate to ensure a successful and long-lasting installation.

Two equally important factors should be attended to:

- The concrete substrate must be fully cured and must have attained the moisture content stipulated by the manufacturer of the floor covering. Excessive moisture in the substrate, or high moisture vapour emission rates, will most certainly result in an installation failure, for example, vinyl flooring 'bubbling' or delaminating from the substrate.
- The substrate must be integrally sound, smooth and level. Vinyl, laminates and large-format tiles will suffer from surface imperfections or a poor aesthetic appearance if the floor below is not perfectly smooth and level.

If there is no damp-proof membrane below a surface bed, or if moisture levels do not attain 75% Relative Humidity (RH) / 5% M.V.E.R. or less, a suitable moisture, or vapour barrier should be installed. This will prevent the passage of water vapour and moisture through the concrete slab into the final floor covering.

The moisture content of a concrete substrate may also fluctuate according to the season and can be affected by geographic surface run-off and structural changes around the building. It is therefore recommended that a vapour barrier be installed even if the floor appears to be dry at the time of the flooring installation.



A suitable moisture, or vapour barrier, as used at the Entabeni Life Hospital, will help prevent 'bubbling' or delaminating of vinyl sheeting from the substrate.

A compatible underlayment can then be installed, creating the perfectly level surface required to support the final floor covering. A rapid-setting cementitious levelling compound is ideal for fast-tracking the project particularly when refurbishing spaces with tight deadlines. Once the underlayment has cured, a floor level survey and moisture testing must again be carried out to verify that the surface is ready to receive the selected floor covering before installation begins. ■



A smooth and level surface reduces lipping of large format tiles as evidenced at the Pearls of Umhlanga development.

ABOUT TAL

TAL, a division of Norcros SA, has been a trusted manufacturer and supplier of the highest quality materials to the construction industry for over 40 years. Their range of tile adhesives, grout and waterproofing materials, as well as their range of specialised functional and decorative floor coatings and construction chemicals are manufactured and tested in accordance with the most stringent quality and performance standards. A commitment to exceptional customer service, encompassing pre-sales advice and after-sales support as well as a constant pursuit of excellence means that TAL is there for you at every level, creating beautiful spaces – from conception to completion.

TAL products are manufactured and tested to TAL procedures which are maintained in accordance with Quality System Standard ISO 9001:2015, Environmental Management System ISO 14001:2015 and Occupational Health and Safety Management System OHSAS 18001:2007. The TAL laboratory is an ISO 17025:2005 accredited testing facility for 1348:2007 (Tensile Adhesive Strength of Cementitious Adhesives).

More information from TAL Technical Advisory Service on 0860 000 (TAL) / email: taltech@tal.co.za www.tal.co.za.

Luxury Vinyl Tiles (LVTs), such as these installed at the Howard College student accommodation at UKZN, will suffer from surface imperfections or a poor aesthetic appearance if the floor below is not perfectly smooth and level.



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Luxury Car Wash 'Floors it' with Flowcrete

A unique car washing and leisure experience in Ballito has installed a bright and vibrant floor from Flowcrete South Africa that matches the site's energy and attention to detail.

Designed from the ground up by its owner, the Machine WashWorx is a new venue that provides petrol heads with a relaxing space in which to enjoy a quality cup of coffee while waiting for their vehicle to be washed and detailed to the most exacting standards.

Flowcrete South Africa was given the task of providing a number of flooring solutions that would convey Machine WashWorx's distinctive branding while being able to withstand the water and cleaning chemicals, the foot traffic, automotive oils, impacts and other challenges inherent to a car washing facility.

Craig Blitenthall, vice president of Flowcrete South Africa, said: "Getting Machine WashWorx's floor just right presented us with a fun and challenging project. The bespoke, high-end environment that the client wanted to create required floors that would convey their image while simultaneously supporting the site's demanding car cleaning activity.

"Our resin flooring collection was perfect, as each system has been made with the dual principles of design and durability at its core. Machine WashWorx could therefore be assured that the finish underfoot would provide a safe, clean and colourful surface to impress their high-end clients."

Machine WashWorx is no ordinary car wash, as its meticulousness sees cars roll through a custom cleaning area that not only includes a conveyor belt where the car is washed by hand but also specialist bays for vacuuming, polishing and even buffing the engine!

A total of 800 m² of the flexible and solvent free polyurethane coating system Deckshield ID was applied across the car wash and parking areas. Originally designed to provide long-lasting surfaces in large, multi-storey car parks, this was the ideal solution to cope with the onsite conditions.

The Deckshield ID was manufactured in a vivid yellow and urban light grey that exactly matched Machine WashWorx's corporate colours. This ensured that the floor mirrored the wall coatings and other key elements of the carefully considered, industrial-style interior design scheme.

To make sure that the site is safe for staff and visitors, extra slip resistance was added to the wash bay's ramps.



The Machine WashWorx floors convey the company image while meeting challenging cleaning activities.

Suede additive, a fine sand-like powder, was incorporated into the coating to enhance traction underfoot without creating an overly-rough effect.

In the adjacent coffee shop the floor also had to convey the same aesthetic while withstanding foot traffic and point loading from items such as heavy tables made from car engines. The decorative epoxy coating Peran STB was installed over 120 m² to create a glossy, light grey floor area that would be both on-brand and easy to keep clean.

In Machine WashWorx's back of house storage area, 80 m² of the extremely hard-wearing and self-smoothing epoxy system Flowshield SL, was used to provide a long-lasting and reliable floor. ■

More information on how to create an attractive and long-lasting floor that's unique to a business, contact Flowcrete South Africa's expert team on email: saweb@flowcrete.com.



Self-levelling cementitious compounds for modern floors

Careful preparation of floor surfaces is a modern-day requirement for installers to achieve high-quality finishes on a variety of floor types including tiles, vinyl, epoxies, carpets, laminates and other materials.

Omitting this step, or using inferior-quality products, can result in future problems and unhappy customers. This has led construction chemical manufacturer, Mapei South Africa to develop a new range of cementitious self-levelling compounds and other surface preparation products which make the task of correctly preparing floors simpler and faster. Ross Creasey, technical services manager of Mapei South Africa, says growing numbers of building



- ▲ Application of Mapei Ultraplan Eco self-levelling compound
- ◀ Mapecem Pronto quick drying mortar

professionals are specifying the Mapei range to guarantee quality from the onset of their projects.

"Whether a job requires exact levels for installing specialised floors, to provide a smooth surface over the top of existing flooring or as a final finish, we have the right products to do the job quickly and correctly.

"With the industry moving towards natural concrete finishes that maintain a high quality and finish, the company's self-levelling cementitious compounds are increasingly being specified. Mapei's Ultraplan Eco (29-MPa compressive strength) is sealed and left as a final finish for a smooth natural concrete look.

Mapei building line product manager, Shane Coll, says renovators are even using the same product for reinstating new systems on top of old systems. "With the use of the right primer, such as Mapei's Eco Prim Grip, self-levelling cementitious compounds enable clients to apply directly over existing tiles. New floors can simply be installed on top without removing existing tiles." ■

More information from Geoffrey Green

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The Concrete Institute discusses the six main reasons why floors fail

Concrete floors on the ground account for the majority of problems dealt with by the technical staff at The Concrete Institute, says Bryan Perrie, MD of the Institute.

Perrie says the problems encountered can be categorised into surface defects, joint defects and structural defects. Within each of these categories there are numerous different defects. An analysis of these defects to determine why they occur resulted in the identification of six primary reasons for the occurrence of these defects.

Design by structural engineers: Concrete floors on the ground are effectively concrete pavements and should be designed, detailed and constructed as such by pavement engineers. The use of structural concepts such as the use of reinforcement to increase load carrying capacity and reinforcement through construction joints results in unacceptable cracking and in some cases overstressing of the floor and structural failure. Often there is a lack of understanding of restrained drying shrinkage in floors on the ground. "Engineers are not aware that there are design guides and software available for designing concrete floors on the ground," Perrie states.

Inadequate detailing and/or specifications: Joint detailing, location and layout are all critical factors in the behaviour of concrete floors on the ground. There is a tendency to mix and match joint types and details from different design technologies which often results in poor joint performance and also joint failure. "An example of this is to use reinforcement in floor panels to control cracking when panel sizes larger than around 4 m are used – but then still using sawn contraction joints or keyed construction joints which are not capable of providing adequate load transfer due to the larger than normal opening of the joints."

To date there is no standard specification for floors on the ground. SANS 10109 Parts 1 and 2 cover the design, detailing and surface finishes and book entitled *Concrete Industrial Floors on the Ground* available from The Concrete Institute. These documents provide guidance on the detailing and specifying of floors on the ground.

Perrie says often the use of outdated tolerance specifications – such as those using straight-edge measurements – can result in not achieving the appropriate tolerances required by the client. The best specification for tolerances is contained in the British Concrete Society's Technical Report No 34 (TR34).



This often results in the need for special equipment or a specialised contractor to measure the floor to ensure compliance with the specification.

Split responsibility on site: Typical issues here include:

- The earthwork contractor's tolerances not being compatible with those for the concrete floor
- The main contractor supplying to, or purchasing inappropriate concrete for, a flooring subcontractor
- The flooring subcontractor being only responsible for placing and finishing the concrete, but not for installation of shutters, joint cutting or curing.

Lack of skills or knowledge: A lack of skills or knowledge can be on the part of the client in not knowing what he wants, the engineer in not understanding the client's requirements and being unable to design and specify accordingly, the main contractor not understanding the risks for the subcontractor working under certain conditions, main contractors doing specialised flooring contractors' work and subcontractors not understanding joint and tolerance details. "To ensure a good floor needs all the above parties to be involved at all stages of the project and to have open communications," he advises.

Inadequate knowledge of materials and their behaviour: "There is a distinct lack of knowledge among all parties about concrete materials and their effect on both plastic and hardened concrete. This includes the effect of cement type, water content, cement-water ratio on the behaviour in concrete and specifically on concrete floors which may be largely unreinforced and have a very large surface-area-to-volume ratio. These all affect the rate of moisture loss, drying and therefore the risk of cracking," Perrie observes.

Inadequate appreciation of construction techniques

The need for adequate compaction and the effect of different types of equipment on compaction, the use of incorrect terminology with respect to power floating and power trowelling, and the effect of different equipment on the finish obtained, are all due to a lack of appreciation of different construction techniques. "By far the biggest lack of appreciation is with respect to the need for adequate protection and curing of floors on the ground. This protection should start as soon as the concrete is discharged and should continue until the required finish is achieved after which effective curing measures should be implemented."

Perrie says addressing some of the above issues will result in better quality floors with fewer defects.

The Concrete Institute runs a one-day training course on the design and construction of industrial floors at which all of the above issues are covered. It also sells the publication mentioned previously in this article. ■

More information from The Concrete Institute,
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Perlite has been widely used in cementitious blends for lightweight, insulating floors since the 1940s in the northern hemisphere. It is a naturally occurring, amorphous volcanic glass formed by the rapid cooling and solidification of volcanic lava which traps crystalline water into its mass.



Perlite and cement composite lightweight concrete screeds going into the new Exxaro Head Office building in Centurion. The material was mixed with 42,5N cement on site, placed at 150 mm thick and will have a typical cured density of less than 500 kg/m³.

The highest quality raw perlite is imported and is heat processed using state-of-the-art technology. When suddenly heated to above 870°C, the siliceous perlite particles expand to between four and twenty times their original volume as the combined water in the raw rock vaporizes and creates countless tiny bubbles in the glassy material. This results in a snow-white material with excellent thermal insulation properties, exceptional lightweight and fireproof characteristics and a very low carbon footprint.

When it comes to insulating lightweight flooring, CemteQ offers a number of solutions. CemteQ's ScreedLite is perlite-



Lightweight screeds using Perlite for the new Oracle offices in Woodmead, Sandton.

based composite screed that is commonly used in under-tile heating applications to prevent downward heat loss, thereby saving significantly on energy costs. It offers approximately seven times the insulation properties with 25% of the weight of conventional screed materials. It comprises a special blend of high-quality cement and perlite aggregate. It is also used extensively for levelling suspended slabs due to its significant weight saving as well as on roof decks to provide a slope to fall. Standing water on a roof deck is destructive to roofing membranes and often results in leaks. Once placed, ScreedLite can be screeded to the required thickness and sloped towards drainage points or the roof edge.

Together with cement and designer admixtures, CemteQ also uses recycled polystyrene for its significant lightweight, acoustic and thermal properties. In this way, the company is able to incorporate a waste material, that would otherwise end up in landfills, into the building process.

CemteQ has recently introduced a new preblended and bagged lightweight concrete blend which comprises the highest grade recycled polystyrene aggregate blended with the correct ratio of cement and admixtures. Branded EnviroteQ, the composite product is specially formulated to be mixed with water and pumped on site with no yield loss for lightweight screeds and concrete. Used in a wide range of applications, EnviroteQ is a cost-effective solution for floors and roof slabs thicker than 50mm. The product is supplied in 100 litre bags with 10 bags yielding 1 m³ of concrete with a cured density of 600 kg.

According to Managing Director, Victor Bouguenon, "This new development complements our existing range. Our perlite-cement composites are relatively fragile and therefore not suited to vigorous mixing and pumping and are ideally suited to screed thicknesses up to 50 mm. EnviroteQ does not lose yield in the mixing and pumping process and is ideally suited to thicknesses from 50 mm upwards.

Using the combination of a thick lightweight EnviroteQ polystyrene-based screed together with a thinner perlite-based ScreedLite screed, high thermal resistance values can be economically and relatively simply achieved. For reroofing and reflooring applications, this combination provides permanent, cost-effective, slope-to-drain designs with high R-values over flat and often irregular substrates. ■

More information from CemteQ Building Solutions

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ScreedLite being placed on a roof deck as a lightweight screed.

Samson's technology meets the need for improved-performance concrete floors

Changing industry needs require new approaches to concrete floor surface treatment. Increased density, abrasion and chemical resistance are often needed in today's industrial world. Samson Technologies has responded to these needs by the introduction of triple blend binders, polymers and crystalline waterproofing applied as a dry-shake surface hardener without the cost of treating the entire slab on grade.

The food processing industry, for example, often requires more than the characteristics offered by untreated concrete, such as resistance to mild acid attack and chemical washing. Health regulations require inhibition of bacterial growth, which is common in untreated concrete.

Abrasion resistance is a function of surface strength. Dry-shakes will more than double the surface strength of commonly used concrete mixes in the construction industry. This is achieved without the cost of excessive strengths not required for structural engineering demands.

Dry-shake technology has been used internationally for many years. Samson's technological advantage has enabled the South African product to be favoured above international competitors. A major international furniture chain recently selected Samson MBFT Dry-Shake for the construction of its stores.

Light reflectivity of concrete can be altered by the use of dry-shakes in order to provide more effective use of available lighting. A surface treated floor is easier to clean, which is both a cost and time saver.

Samson's technology has also improved product reliability and ease of application for the overlayment of existing concrete floors. Delamination of toppings is common, and Samson has developed a systems approach which provides improved site success. Overlayments are required for differing reasons such as rain damage during construction, and in service, mechanical breakdown of floors. Samson provides a range of overlayment solutions suited to individual causes.

Access to our broad base of experience and technology is available by making contact with us. Samson products are promptly available country wide. ■



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Africa discovers the merits of concrete roads

By Jan de Beer

An increasing number of African countries are now beginning to realise that it is worth spending a little more of State funds on new concrete roads than constantly having to find funds and manpower to repair potholed asphalt roads.

Globally concrete roads have proven immensely durable: the first concrete road built in the USA, for example, is now well over 100 years old.

In South Africa, part of the major upgrade of the old Ben Schoeman N1 highway between Johannesburg and Pretoria in the late 1980s called for the rebuilding of the highway using a concrete overlay of the existing asphalt pavement. The section of N1 that links these two Gauteng metropolises is the busiest freeway in Southern Africa.

Concrete was also used during the N1's second major upgrade a few years later as part of the Gauteng Freeway Improvement Project, an initiative that also saw some concrete roads being built in several parts of the Gauteng province. Concrete roads, overlays and inlays have also proved their merit on KZN highways where this type of pavement has provided much-needed durability to carry the enormous volume of Gauteng trucks heavily loaded with exports to the Port of Durban.



Africa is starting to accept concrete roads for their long-term minimum-maintenance durability.

Perhaps the most striking South African example of concrete as a durable building material for city roads – albeit on a small scale – are sections of the busy suburban road called Cape Road in Port Elizabeth which has been in use for generations.

But despite these testimonials to the merits of concrete as a durable road-building material, South African authorities have not yet expressed strong conversion to concrete – ostensibly a costlier road option. But many African countries now seem to have seen the light.

Nigeria, for a start, now appears totally converted to concrete roads, partly because wealthy local businessman, Aliko Dangote, has helped with the supply of cement from his vast empire of business interests throughout Africa. The Dangote Group's cement production operations are based in Nigeria as well as in 14 other African countries. Dangote is, for example, the major shareholder of South Africa's Sephaku Cement.

After the Nigerian Minister of Solid Minerals Development, Kayode Fayemi, lamented the fact that 80% of the materials used for road construction in Nigeria were imported, and that the equivalent of nearly R14 billion had to be spent on asphalt road repairs in the country, the Dangote Group stepped in and concluded a deal with the Nigerian government whereby the Group would help with the supply of cement for concrete roads, mainly as part of the Group's corporate social responsibility programme, but also in exchange for certain tax concessions. The construction arm of the Group, AG Dangote Construction Company, is now handling the laying of the rigid pavements.

Aliko Dangote explained: "We are pushing for Nigeria to move to concrete roads. It is cheaper to build a concrete road that will last 50 years than be faced with the constant maintenance required by bitumen-based roads. Our Group's decision to help introduce concrete roads in Nigeria is in line with the experience of other countries worldwide. For instance, the famous Autobahn in Germany was constructed with concrete and India's popular Marine Drive in Mumbai, built in 1939, are just two examples of the durability of concrete roads."

Nigeria has the largest road network in West Africa and the second largest south of the Sahara but the country also has a high level of seasonal rainfall which every year results in rapid deterioration of asphalt roads.

Moving further south, the Zimbabwean authorities are now also bemoaning the fact that tarred roads in the country have generally failed to last more than 10 years. Zimbabwe's *The Herald* in 2017 reported that the country's urban road network was in a deplorable state with Harare as well as most other cities and towns having to cope with roads littered with potholes. "Failure to maintain the Zimbabwean road network has a huge bearing on socio-economic development," the newspaper stated calling on the government to realise that concrete roads would be the panacea for potholes.

The Zimbabwean infrastructure consultancy engineer, Billy Mukasa, agreed particularly as he felt that Zimbabwe manufac-



The construction arm of the Dangote Group is laying durable concrete roads in Nigeria.

turing sector produces more cement than the current national requirements and was even exporting the building material. Mukasa said: "Durable concrete roads have a potential lifespan of over 40 years and do not need frequent repair or patching like bitumen roads. Unlike asphalt roads, concrete roads are not damaged by leaking oils from vehicles or by extreme weather conditions."

Harare's acting town clerk, Josephine Ncube, went further and said the city would definitely be moving to concrete roads, thereby reducing the dependence on the bitumen Zimbabwe has been importing from South Africa at higher prices than the cement it could produce locally.

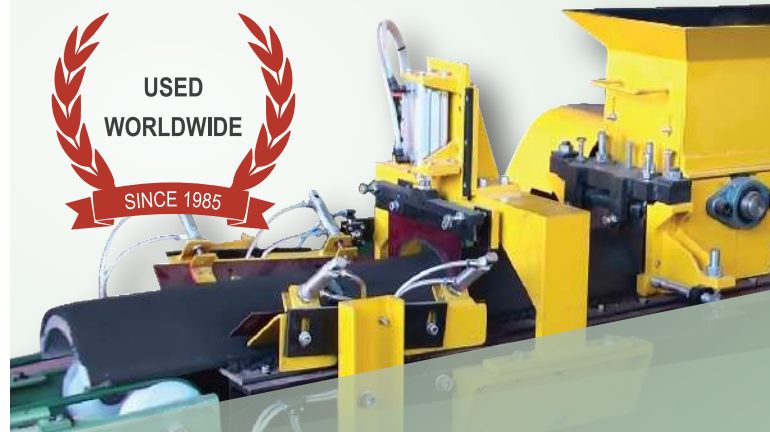
Ncube's colleague, Harare town planner, Shingai Kawadza, added that although the initial cost of concrete roads may be higher, they would be more economical in the long term given the increasing capacity of cement companies in the country. He added that many African countries, such as Nigeria, Malawi, Ethiopia and South Africa, had successfully introduced concrete roads. "Globally, a noteworthy example is the road linking Hanover and Berlin in Germany which was built during World War II and is still in good shape," Kawadza added.

Kenya, also, has become a concrete road convert after discovering that research overseas had shown that the annual cost of 'low-priced' asphalt road surfaces works out at US \$21 000 (nearly R304 000) more per kilometre than a concrete pavement. Among concrete road successes in Kenya is a street leading to English Street in Mombasa which, according to reports, remains brighter and safer than asphalt more than four decades after it was built. There are also major concrete roads in Nairobi.

In Ghana, a comparative analysis of the two types of roadways has been conducted with the government arriving at the 'definitive conclusion' that concrete roads were indeed more durable than asphalt. Ghana's vice-president, Mahamudu Bawumia, said government studies had shown that a kilometre of concrete road would cost \$3.8 million compared to \$2.8 million for a kilometre of asphalt road. "But, more importantly, we have also learnt that a concrete road will last for at least 40 years while an asphalt road for only about 10 years," he added. ■



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JG Afrika helps pave the way for the rehabilitation of strategic road network

Studies recently completed by JG Afrika, a leading South African firm of consulting engineers, have informed the design of the rehabilitation of a strategic road connecting Tin Can Island Port to major commercial centres in Lagos State, Nigeria.

The existing access road from Tin Can Island and the six-lane expressway that connects Apapa Wharf, one of Nigeria's major commercial centres, to Oworonshoki was built in the 1970s and has since fallen into a serious state of disrepair. This road currently is a flexible pavement with an asphalt base and surfacing.

This state of distress and disrepair has contributed to severe vehicle congestion comprising mainly trucks using the road between the port and Oworonshoki daily.

In addition to negatively impacting efficiencies at the port and the Nigerian government's larger trade facilitation programme, the severe traffic has adversely affected many small businesses in Apapa and road safety levels, especially during the wet season.

Rehabilitating the roads as part of a public-private partnership was first mooted by AG Dangote Construction, a subsidiary of local cement giant, Dangote Industries, and the proposal was favourably received by the Federal Ministry of Power Works and Housing.

JG Afrika proposed a continuously-reinforced concrete pavement (CRCP) design to better cope with the growing number of heavy commercial vehicles travelling between Apapa Wharf and Oworonshoki daily.

The design is similar to that deployed in constructing South Africa's Ben Schoeman highway, which remains a stellar example of CRCP design, providing the South African National Roads Agency Limited with a more cost-effective means of maintaining this heavily-trafficked route between Johannesburg and Tshwane in Gauteng.

This design replaced the initial suggested design using a conventional jointed concrete pavement (JCP) that would ultimately develop slab tilting and stepping on the extremely

soft subgrade material on sections of the existing Apapa to Oworonshoki road.

Dangote Industries can be credited with introducing concrete pavements to Nigeria. Its construction arm has invested heavily in the equipment required to construct these pavements. This includes a concrete paver to accelerate construction times and a state-of-the-art road recycler able to convert the base layers into a cement-treated base on site.

Dr Emile Horak, a well-known pavement specialist who led the JG Afrika team that undertook the pavement evaluation, previously played an instrumental role in assisting the contractor introduce in-situ recycling equipment to Nigeria.

"This technology, combined with the concrete paver, will enable the contractor to complete the extensive rehabilitation as a CRCP alternative design in a significantly shorter period than is possible when constructing a conventional asphalt pavement. This is a major advantage as the contractor will be working in an extremely built-up area. The onerous process of relocating people and structures, together with the inconvenience of prolonged construction activities, were among the chief reasons the Nigerian authorities delayed rehabilitating the road," Dr Horak says.

JG Afrika was appointed by the contractor to undertake the pavement evaluation in 2018, and these critical insights have been incorporated into the final rehabilitation design by Yolas Consulting, a Nigerian engineering consultancy working on behalf of AG Dangote Construction.

A detailed assessment of the condition of the road pavements and a geotechnical investigation of material used in the existing road were previously undertaken by Yolas as part of the project. JG Afrika could build on this investigation and also undertook an extensive investigation of all available construction materials to build the road and structures.

The studies identified high deflection on the existing asphalt road resulting from a very weak pavement structure, while very poor materials were also used in the construction of the existing road, especially for the foundation layers.

Testing undertaken on cores from the existing pavement showed that all of the properties met the specification requirements and that the grading of the aggregates was within the specification envelope for wearing course. It was therefore clear that this material could be included as good quality material for the new subbase of the planned CRCP proposal.

However, unsuitable material was identified in the samples of the existing sub-base and sub-grade layers that were collected from various locations along the road. The mixing in of the better quality recycled asphalt in the existing base and surfacing will therefore provide for good quality material for the planned new subbase comprising of the recycled surfacing, base and subbase materials as a good quality new cement treated subbase.

Meanwhile, a visual condition assessment undertaken by the team of engineers showed significant distresses and failures on most sections of the existing road infrastructure.



Port of Lagos, Apapa – the largest container terminal in Nigeria
(Global Construction Review, 2017)



Trucks blocking a section of the Oshodi-Apapa Expressway at Second Rainbow inward Mile 2, and commercial buses driving against traffic. (Bakare, T. 2018)



Catastrophic pavement failure due to unacceptable moisture conditions combined with overloading. (Looking for good in Lagos, 2011)

According to the study, it will be possible to source sufficient filling material from all of the borrow pit areas that were investigated, while suitable crushed rock aggregate for the base course can be obtained from the rock outcrops that were observed along Logos-Ibadan road.

The engineers also found the available aggregate, water and river sand to be of a suitable quality for the construction works. Should there be insufficient river sand, they have recommended supplementing supply with quarry dust.

JG Afrika also noted that adequate provision be made in the Detailed Design Report for drainage and sub-drainage improvement, especially in the swampy areas, in addition to the need to reinstate the shoulder of the entire road.

Dr. Horak says the concrete pavement design expertise of Ane' Cromhout, pavement engineer with the JG Afrika team,

formed the basis of the recommendations to use CRCP. These recommendations made by JG Afrika were well received by the contractor and he anticipates work to commence imminently on the rehabilitation of this critical road infrastructure.

“Dangote Construction deserves to be lauded for the innovative approach that it has taken to rehabilitating the many roads in the country that have fallen into a serious state of disrepair. This has added impetus to the Nigerian government’s already-heightened focus on repairing these strategic assets and building new roads to expand the national network,” he concludes. ■

More information from Charmagne Denny

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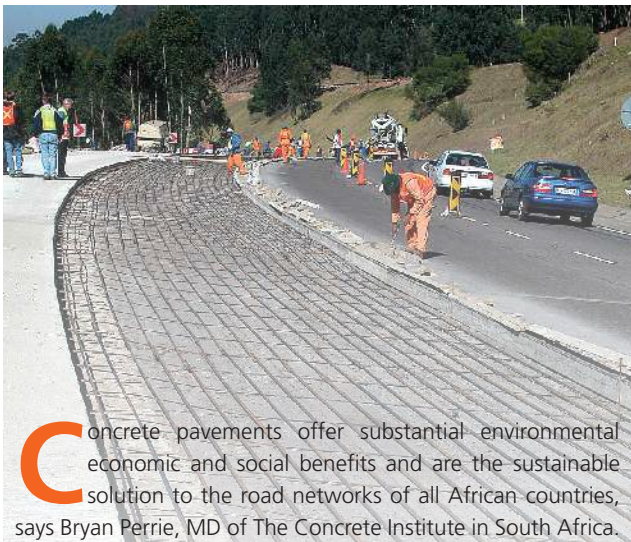
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Concrete roads offer substantial benefits and long-term savings



Concrete pavements offer substantial environmental, economic and social benefits and are the sustainable solution to the road networks of all African countries, says Bryan Perrie, MD of The Concrete Institute in South Africa.

Perrie is widely recognised as one of the world's leading authorities on concrete pavements. He has authored several internationally acclaimed books on the subject, has presented papers at conferences throughout the world and holds membership of global bodies representing the concrete pavement industry.

Perrie says concrete roads – providing they are built by skilled personnel – are the natural choice for developing countries' projects where performance, value, longevity, social responsibility and concern for the environment are paramount.

"In addition to a service life which normally exceeds 30 years, concrete pavements require relatively little maintenance and repair and result in long-term savings in raw materials, transport and energy. The reduction in traffic delays caused by road works also cuts fuel consumption and exhaust gas emissions," Perrie states.

He says among the many benefits of concrete roads are:

- **Safety:** Surface texturing of the concrete pavement can improve water run-off so that traffic on wet roads does not cause splash, spray and skidding. The light colour of concrete pavements deflects light from vehicles and street lights, improving night-time visibility while effecting energy and materials savings by requiring fewer street lights per kilometre of road.
- **Heat retention:** Concrete roads reflect sunlight which helps to mitigate the 'heat island' effect. "Research shows that black surfaces exposed to sunlight can become 21°C hotter than reflective white surfaces. This heats the air around roads, contributing to increased temperatures in surrounding buildings, necessitating greater use of air conditioning, energy consumption and electricity demand," Perrie explains.
- **Labour-intensive construction:** In countries where unemployment is a major burden to the economy, the manual aspects of concrete road construction can be undertaken by members of the local community after on-site training. Their newly-acquired skills can thereafter be utilised in other construction projects.
- **Recyclability:** The concrete used for road construction is fully recyclable at the end of the road's lifespan.

The Concrete Institute's School of Concrete Technology, in collaboration with the SA Road Federation, offers a special training course, *Concrete road design and construction*. The TCI Information Centre, which can be accessed free of charge, houses a vast amount of literature on the subject. ■

More information on training and the research data from Tel: +27(0)11 315 0300 / www.theconcreteinstitute.org.za.

Israeli firm to create electric charging road in Sweden

Billed as a world first, Israel-based Electreon Wireless has been chosen by the Swedish Transport Administration to build a dynamic electric road that charges vehicles as they drive along it.

Costing approximately \$12.5m, the 1.6-km stretch of inductively active roadway will be created on a 4.1-km route from Visby Airport on the island of Gotland to the centre of Visby city.

The public-private initiative built by Smart Road Gotland will be the first in the world to charge inductively both an electric truck and a bus while in full motion, reports The Jerusalem Post.

Previous trials of so-called 'electric highways' have involved vehicles fitted with pantographs that scrape along under overhead power cables. Electreon

will put its copper coil technology, which transfers electricity wirelessly, under the road's surface.

An electric shuttle bus and an electric lorry will test the road in different seasons to see if it can be rolled out to Sweden's highways. The Swedish government has an ambition to create 2 000 km of electric highways.

"We, the Swedish Transport Administration, believe that electric roads are an important contribution to reducing CO₂ emissions from heavy transportation," said Jan Pettersson, Swedish Transport Administration program manager.

"Demonstrating and evaluating new technical solutions for electric routes is one of our most important steps in our long-term plan for a potential roll-out of electrified routes on the heavy road network in Sweden." ■

Source: <http://lnnk.in/bnaw>



New skid steer loaders from Wacker Neuson

Wacker Neuson has developed two new wheeled skid steer loaders from the ground up, offering the power and torque needed to lift more, push more, work more and maneuver through challenging jobsite obstacles. Both machines have the comfort and convenience owners and operators expect and the durability they demand.

With a best-in-class one-year / 1000-hour bumper-to-bumper as well as a transferable engine warranty of four years or 4 000 hours, these new models are ideal for inventory management and resale.

The two new wheeled skid steers are built for performance, versatility and convenience. Class-leading hinge pin height on the vertical lift loader provides maximum loading and unloading capabilities.

An engine torque of 308 Nm provides the power needed for improved ground-engaging performance in all kinds of terrain. The Kohler diesel engine features a zero maintenance and regeneration-free exhaust emission treatment system, eliminating the impact of extreme heat as well as the need for filters. With a fuel tank capacity of 113 litres, the operator is able to spend more time in the cab and less time refueling.



Dennis Vietze MD Wacker Neuson Sub-Saharan Africa in front of the new skid steer loader.

“Versatility comes as standard with every Wacker Neuson Loader. The universal skid steer attachment plate enables attachments to be switched out easily, accomplishing more in less time. Category-leading hydraulic horsepower is standard,” says Dennis Vietze, managing director of Wacker Neuson (Pty) Ltd.

Wacker Neuson created a cab environment with operator comfort and convenience in mind. Access in and out is easy, there is no restrictive lap bar and controls are intuitively placed. Additionally, these machines offer the only one-piece pod style



Wacker Neuson is introducing a new line of medium frame skid steer loaders ideally suited for a variety of applications.

cab that fully tilts forward with the lift arms down, providing complete access to all maintenance components.

Wacker Neuson's new skid steers are available as either radial or vertical lift machines. They were designed and are being built at the construction equipment manufacturer's production plant in Menomonee Falls, USA. ■

ABOUT WACKER NEUSON

The Wacker Neuson Group is an international family of companies and a leading manufacturer of light and compact equipment with over 50 affiliates and 140 own sales and service stations. The Group offers its customers a broad portfolio of products, a wide range of services and an efficient spare parts service. The product brands Wacker Neuson, Kramer and Weidemann belong to the Wacker Neuson Group. Wacker Neuson is the partner of choice among professional users in construction, gardening, landscaping and agriculture, as well as among municipal bodies and companies in industries such as recycling, energy and rail transport. In 2017, the Group achieved revenue of EUR 1.53 billion, employing more than 5,500 people worldwide. www.wackerneusongroup.com

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The new Mercedes-Benz Arocs: reliable, robust and versatile

Earlier this year Daimler Trucks and Buses Southern Africa (DTBSA) continued its product strategy by launching the eagerly anticipated new Arocs for construction in South Africa.

During 2019, Mercedes-Benz Trucks, which is a division of DTBSA, will continue its product offensive of launching a new range of commercial vehicles in Southern Africa. The new specialist range of trucks for distribution and construction transport is following on the heels of the new Actros truck tractors for long-distance transport launched last year. From now on all rigid Mercedes-Benz trucks used for on and off-road applications in the distribution and construction sector will be known under the name, Arocs.

The all-new Arocs is Mercedes-Benz Trucks' second 'A' range vehicle, and these are vehicles that clearly deserve a 'double A' rating. The first was the new Actros for long-haul transport, followed now by the new Arocs for distribution and construction transport.

This product strategy allows Mercedes-Benz Trucks to precisely match the interests of today's customers. All-purpose vehicles are increasingly becoming a thing of the past, which

is why the new range of Mercedes-Benz trucks uses a common platform to develop custom-tailored vehicle series for specific market segments.

Arocs construction vehicles are designed to be particularly tough and robust to meet any challenge in construction transport from robust steel suspension to planetary axles for off-road variants. The basis for the robustness of the Arocs is provided by the extremely strong frame consisting of cold-worked, high-strength fine-grained steel, additionally, the modular layout of the chassis also allows for easier body mounting.

The Arocs construction range will also be setting an example with its drive system: the engine's power will be transmitted by the Mercedes PowerShift 3 automated transmission, which is fitted as a standard.

At the heart of the new Arocs, is the OM460 Euro III 12.8 litre in-line 6-cylinder engine which already does duty in the new Actros. The OM460 engine has been developed on the basis of tried and tested technology.

Fleetboard Eco Support provides effective driver support in real time by displaying tips on a consumption-reducing driving style in the instrument cluster during the journey. Fleetboard Eco Support is standard on all new Arocs models.

Flexible service intervals ensure that the maximum value is utilised out of all service components leading to less wastage and lower maintenance costs, resulting in lower maintenance rates and extended service intervals.

Mercedes-Benz Arocs offer reliability, robustness and bodybuilder friendliness.

Two Arocs for Construction vehicles have been launched initially – the Arocs 3336K/36 Tipper Chassis and the Arocs 3236B/51 8x4 Mixer Chassis. Initially only one cab variant will be available – the S-Cab ClassicSpace.



Mercedes-Benz Arocs offroad truck.



The Mercedes-Benz mixer.

The comfortable ClassicSpace S-Cab has been designed to fully meet the needs and comfort of the driver in solo operation in short-haul applications. It is designed on the basis of state-of-the-art ergonomic and safety criteria.

At present only the 265-kW (360-hp) 12,8-litre OM460 Euro 3 engine is available with further engine outputs planned for later. For the first time in a construction vehicle the engine output is transferred as standard by an automated Mercedes PowerShift 3 transmission.

Off-road drive mode offers the driving set-ups Standard, Economy, Off-road and Manual. It supports economical driving styles just as much as improved handling when pulling away or manoeuvring on building sites or when driving slowly along challenging terrain. On gravel roads or off-road, the above-mentioned drive modes offer ideal performance in the respective situations in terms of dynamism when pulling away under high loads, gearshift points and shift dynamics.

The Arocs 3236B/51 is an 8x4 concrete mixer with 35-ton Gross Vehicle Weight. It features a weight optimised hypoid rear axle, light-weight aluminium fuel tank, disc brakes and aluminium rims to reduce kerb weight and increase payload. This enables the 8x4 mixer chassis to supply 8 m³ of ready-mixed concrete on every trip.

The Arocs 3336K/36 is a versatile tipper chassis with a short rear overhang featuring robust planetary axles, a double disc clutch, robust drum brakes, optimised for off-road use

and a 16-speed Powershift 3 automated transmission with the "Off-Road Drive" programme as standard.

The application-specific mounting elements provide the body builder a friendly and fast mounting process. For all freight carriers the platform mounting brackets are standard, all mixer chassis are standard with the mixer mounting brackets and all tipper chassis come standard with the tipper mounting brackets, together with the modular bolted frame, the 50 mm chassis hole pattern and the new generation Parameterisable Special Module (PSM) the turnaround time at a bodybuilder is significantly reduced.



The versatile Mercedes-Benz Arocs tipper.

The new Arocs for Construction come standard with a one year/unlimited kilometre complete vehicle warranty and a three-year, 250 000-km, 5 000-hour standard warranty on the powertrain. ■

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Mercedes-Benz Arocs mixer in action on site.

Holistic approach needed to close mining gender gap

By Vanessa Ronald, senior brand manager at Sisi, BBF Safety Group



Vanessa Ronald

The number of women working in the mining sector has increased significantly over the past 17 years, with the numbers growing from 11 400 in 2002 to over 53 100 today. This represents about 12% of the entire mining workforce of 464 667, according to a recent report by Minerals Council South Africa.

However, an area that has lagged in facilitating women's entry into mining has been the provision of Personal Protective Equipment (PPE), designed specifically for women miners.

This can largely be attributed to a lack of awareness within the industry, with many still considering PPE for women as being little more than adding a 'feminine touch' rather than addressing the practicalities of workwear tailored to the female anatomy.

A commonly observed trend is that many companies still procure male and/or unisex safety garments without considering anatomical differences between the sexes. Comfort can have a profound effect on productivity, which means that ill-fitting PPE could seriously impact a wearer's quality of work.

Ill-fitting safety footwear and workwear will lead to discomfort and pain, lowered productivity, absenteeism due to health-related problems such as urinary infections and even a psychological barrier to the work environment. Industrial psychologist Uma Naidoo says if one is not comfortable in their attire, in which they spend about eight hours of the day, it could lead to frustration, poor concentration, increased breaks and many other debilitating effects on productivity.

The traditionally male-dominated mining industry remains a tough environment for women.

Even performing basic bodily functions still holds significantly more challenges for women miners than their male counterparts. Often, women who work underground must walk to toilets that are up to 400 metres away from a blast site (legal requirement) just to relieve themselves.

In addition, because women are making use of a men's boiler-suit, the only way to relieve themselves is to unzip the

garment and remove it entirely (from top to bottom). To do this, women further need to remove other parts of their mandatory kit, such as their hard hat, safety pack and torch battery.

Another factor affecting a woman's dignity is that the colour of their underground mining boiler suit is unbleached. Sanitary-related accidents underground therefore show up and cause embarrassment.

To address this, a range of safety wear has been designed through extensive research and consultation with women in industry. This includes a ground-breaking boiler suit for women miners, which includes innovative features such as the V-flap at the back of the boiler suit to improve the ease with which women use ablution facilities and the inclusion of navy fabric between the hip and thigh area to save her the embarrassment of a sanitary-related accident.

The design of the boiler suit is cut according to a women's anatomy with a narrower back area, and wider front area and shorter crotch to waist ratio than a man's. Also, women naturally have wider hips and a more pronounced posterior, which is accommodated in the design, allowing for the elasticated waist band to rest where a women's waist line typically is and not where a male's waist line would be.

For above-ground workers the female conti suit jackets are tailored at the back, to accommodate for a women's narrower back, but broader at the front to accommodate for her bust area. This enables a woman to move freely within her jacket without restriction when moving her arms.

Trousers are also designed to have a higher waist to prevent the exposure of the back and midriff regions when bending over or raising arms. Garments designed for men often result in trousers that sit below the belly button and place pressure on caesarean scars, and expose the upper half of a woman's posterior when she bends over.

To combat this, women have tended to wear nylon tights underneath their pants for modesty. Nylon does not absorb moisture, keeping the skin damp and becoming a breeding ground for bacterial and fungal infections. In hot, moist environments, many women contract bacterial and vaginal infections due to such undergarments.

If the mining industry is truly to close the gender gap, more must be done than simply hiring women. A holistic approach needs to be taken to address the physiological requirements of a female workforce to put women on an equal footing with their male co-workers. ■



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Controlling cannabis in the workplace now that it is 'legal'

By Rhys Evans, Managing Director at ALCO-Safe

Since the legalisation of cannabis for private use in South Africa, many organisations are struggling with how to adjust their substance control policies. A zero-tolerance approach is no longer feasible, since cannabis can now legally be consumed outside working hours. However, the Occupational Health and Safety (OHS) Act still states that no person under the influence of alcohol or drugs may be permitted in the workplace. Therefore, organisations need to adjust their policies and adopt the most appropriate testing solution to ensure the safety of their workforce.

There has been some confusion among workers who think that legalising marijuana means that they are now allowed to smoke it at work or before work. However, this is not the case. The situation is in fact similar to that of alcohol, in that while it is not illegal to partake of the substance, it remains illegal to work under its influence in terms of the OHS Act which states that employers should not allow any person who is or who appears to be under the influence of intoxicating liquor or drugs to enter or remain at a workplace.

How then to enforce the OHS Act effectively with the legalisation of cannabis? Since the metabolism of cannabis is more complex than that of alcohol, it is also difficult to pinpoint exactly when the effects of cannabis dissipate, and at what point an individual can be considered to no longer be under its influence. The duration of the effect of Tetrahydrocannabinol (THC), the active substance in cannabis, is influenced by regular use, quantity smoked, and the THC content of the drug.

On average, the effects of cannabis consumption last for three to six hours. However, different testing methods will detect THC in the system for different periods. For example, a urine test can detect metabolised THC for weeks or even months after the drug was used. However, the presence of the metabolised drug does not indicate intoxication. Urine testing is therefore not a feasible option for detecting whether a user is under the influence of cannabis.

Saliva tests produce a positive result if the subject has used the drug within the past four to six hours depending on the cut off of the test and the quantity of cannabis used. As this is the generally accepted window for the influence of THC, it will enable a better idea of whether an individual is still affected. Those testing positive on a saliva test can have further testing, such as a blood test, to determine the level of THC in the body and the likelihood of the individual still being under its intoxicating effects.

Unlike alcohol testing, it is not possible to enforce compulsory testing for use of cannabis, since the saliva swab takes about five minutes to produce a result. It is therefore necessary to conduct random testing and testing on suspicion as well as testing involved parties in the event of an accident or incident. This is in line with previous drug testing policies that may already be in place. Organisations can also specify pre-employment testing as a requirement.



As a zero-tolerance approach to cannabis cannot be followed, organisations need to be very specific with their policies. The first step is to educate the workforce on what exactly the new law means, and then to set acceptable limits and state these explicitly in their policies. It is essential to specify that employees may not enter the workplace while under the influence of cannabis, and that they may not use it in the workplace or during their working hours. Random saliva testing will enable this to be effectively enforced. ■

More information from Rhys Evans

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High-performance joint sealants keep Kempton Park reservoir watertight

A high-performance joint sealing system supplied by Sika was used in the development of a new reservoir in Kempton Park, Gauteng, as a means of supplementing the region's current water supply infrastructure as there is a continuous increase in demand. The twenty-five megalitre reservoir is just one of dozens of reservoirs supplying potable water to the people on the East Rand.

Full on-site support was undertaken by Sika technical sales consultant, Jaun Roe van Wyk, and the main contractor, WK Construction, was advised about product performance, correct application methods, and technical data.

The development of the new reservoir was approved by Ekurhuleni Metropolitan Municipality and the project scope included considerable work to the walls and columns for both construction and expansion joints, as well as strengthening of the reservoir floor joints. The internal joints of the reservoir also underwent a waterproofing exercise to prevent the unit from leaking.

Con-Solve Civils was the sub-contractor and applicator of our Combiflex System, and specified Sika's acclaimed Sikadur-Combiflex® SG Bandage System to seal the wall and floor joints in the final stages of the project. This is a high-performance joint sealing system consisting of a flexible Polyolefin waterproofing tape and Sikadur® epoxy adhesive, which was Sikadur®-31 DW in this case.

The Sikadur-Combiflex® SG bandage System is employed primarily in the construction of water-retaining structures and

reservoirs. As a highly specialised waterproofing system, it is used for expansion and connection joints, as well as for cracks. When fixed to the joint, it allows for irregular and significant movement in more than one direction, while maintaining a high-quality seal. This system is prescribed where the use of conventional sealing techniques is not possible. Additionally, the bandage system was covered with steel plates, which were laser-cut to follow the circular shape of the structure.

On-site challenges included time constraints as a result of the usual construction-related pressures in urban environments. Nonetheless, the installation went smoothly and the project was completed in September 2018. ■

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 motor vehicle industry. Sika has subsidiaries in 101 countries around the world and manufactures in over 200 factories. Its more than 20,000 employees generated annual sales of CHF 7.09 billion in 2018.

More information on Sika products and systems at <https://zaf.sika.com>



Kempton Park reservoir

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The concrete restaurant that plunged into the sea

You have to book at least six months in advance for this surreal UNDER experience, writes Jan de Beer



Under Restaurant exterior. Photograph by Tor Erik Schröder AP



Under Restaurant. Photograph by Ivar Kvaal

The Norwegian firm of architects, Snøhetta, has seen an idea that many may have scoffed at become real. The company's UNDER project – the “world's largest underwater restaurant” – which plunges from a craggy shoreline in the remote village of Båly, Norway, into the sea – has been completed and proving immensely popular since its opening in April this year.

Designed by Snøhetta to resemble a sunken periscope, the 495-m² concrete restaurant features an enormous panoramic window through which marine life can be seen swimming by – no doubt relieved that they are not UNDER's menu that day. The acrylic window, which can be seen from each level in the building, measures 11 by three metres, spanning the entire length of the restaurant wall. There is also a large vertical window in the champagne bar, extending down to the restaurant to give visitors a view of the sea level, while letting through daylight.

In an interview with architectural website, *Dezeen*, Rune Grasdøl, lead architect for UNDER said: “It's not an aquarium, it's the wildlife of the North Sea. That makes it much more interesting. It takes you directly into the wilderness.”

UNDER's main construction component is concrete: a monolithic concrete tube 34 metres long. The walls are slightly curved providing optimal resistance against the forces of waves and water pressure. The concrete has been left with an exposed, rugged texture to encourage the growth of algae and molluscs. Over the years, this will create an artificial mussel reef that helps purify the water, and attract more marine life.

The restaurant is accessed by an untreated oak-clad entrance which will eventually age into grey tones to complement the raw concrete. The oak continues inside the building,

where the interior finishes are intended to contrast with the exterior, to create a warm ambience that shuts out any feeling of claustrophobia.

UNDER has three levels including a foyer and cloakroom, champagne bar, and main restaurant on the lower floor – all joined by a giant oak staircase.

To enable visitors to observe this sea life through the acrylic windows at night, Snøhetta has combined gentle lighting on the seabed with muted interior lighting. In the main dining room, terrazzo flooring is paired with deep blue- and green-hued acoustic panels inspired by the sea.

The champagne bar above has warmer pink and orange tones to evoke shells and sand higher on the shore. Furniture throughout UNDER is also bespoke. Charred oak tables are teamed with angular chairs and ceramics designed by a local artist using sand from the seabed.

“You could easily think going five metres underneath the water can be claustrophobic, but no one feels that here,” said Grasdøl. “What is important is the warm atmosphere. You have this fabric lining, natural materials like oak, good acoustics, and lighting, so all together there's a welcoming atmosphere.”

When the restaurant is shut, the building serves as a lab for marine biologists to study fish behaviour, specifically reactions to light, whether it is possible to train wild fish with sounds, and also whether fish act differently in different seasons. The training with sounds presumably will not be hip-hop.

For diners, the experience of enjoying a meal in a restaurant below the sea is already a hit. UNDER has taken thousands of online reservations for its public opening from the beginning of April – in fact you will now have to wait around six months for a table.

As for cost of dining? The restaurant's concept offers a fixed tasting menu that shifts with the seasons. Diners will pay at least \$260 (over R3 600) per course, rising to more than \$400 (over R5 600) if wine pairings are included in a country with high alcohol taxes.

Chef Nicolai Ellitsgaard has spent the last year working on the dining concept. “Fresh ingredients and pure, natural foods are of the utmost importance to us. At the same time, we want to provide a unique dining experience that ushers our guests beyond their current comfort zone”, he says.

Chef Ellitsgaard has extensive experience from some of Scandinavia's best restaurants. He adopts the new Nordic mindset that while creativity and presentation are vital, it's quality that matters the most.

“Just on the other side of our iconic window, the ocean is bursting with fresh delicacies from the sea, so the journey from the kitchen to my UNDER plate is minimal”, he says.

He might need some help from the local fishermen, though. The fish he sees from UNDER are so near.... yet so far away. ■



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