

sustainable **Construction** **WORLD**

2016

Dealing with AFRICA'S RAPID
URBANISATION

mm central square

The misconceptions about
SUSTAINABLE BUILDING:
CONCRETE

VANCOUVER leapfrogs
ENERGY EFFICIENCY to
ZERO EMISSIONS by 2030

MENLYN MAINE
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Dealing with **SPIRALLING URBANISATION**

At a time when a city such as Vancouver is preparing to have zero emissions by 2030, Africa's soon-to-be megacities are still trying to cope with how their infrastructures will provide transport, safety, water and housing to the massive influx of people over the next few decades – let alone sustainability targets.

Arup, a multi-disciplinary engineering consultancy held the first in a series of workshops on African cities at their Johannesburg offices recently. It chose five African cities, each representative of an issue that face African urbanisation – ranging from inadequate housing to transport infrastructure to lack of access to safe water. From the research conducted, it created engagement cards, which are designed to start conversations around key issues.

At this, and subsequent workshops, the research done by the cities group at Arup (which was the first phase) aims to spark solutions-focused conversations. Arup hopes to start a conversation through these workshops: it does not aim to suggest solutions to problems, merely to steer thinking in a direction and, in the process, start putting urbanisation on the agenda.

The reason for this is simply because there is very little information on African cities that can shape any urbanisation plan. African cities currently contribute USD700-billion to the gross domestic product, and are expected to more than double this contribution to USD1,7-trillion by 2030. This gives an idea of the rapidly increasing rate of urbanisation in Africa.

Arup maintains that infrastructure to support a city the size of London needs to be built in Africa each year till 2050. It aims to ultimately contribute ideas to further the African Union's Sustainable Goal II – which focuses on making cities inclusive, safe, and sustainable (or as Arup prefers – resilient).

The reality is that African cities do not have the luxury of going through a process of industrialisation – they are leapfrogging being large cities and becoming megacities ... while still being faced with the same pressures brought on by rampant urbanisation.

Wilhelm du Plessis

Editor



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Solar-energy system INSTALLER shines



Randolph Wenhold, electrical engineer at Solareff.

Stainless steel band-and-buckle from Banding & Identification (ID) Solutions Africa has found its way into the renewable energy sector, with solar-energy system installer Solareff of Roodepoort in Gauteng using Band-It for cable bundling on its projects.

Solareff is a specialist South African-based renewable energy solutions company, with a proven track record of installing medium to large-scale rooftop and ground-mounted solar photovoltaic (PV) projects.

“Flexibility in design has enabled us to successfully deliver more than 6 MW of high-quality solutions across the commercial, agricultural and industrial markets,” electrical engineer Randolph Wenhold explains.

“Solareff is committed to providing guaranteed, top-quality, sustainable solar PV solutions designed to meet our client’s unique electricity consumption requirements. Our in-house team of qualified engineers deliver full turnkey solutions, including engineering design, procurement, construction, monitoring and maintenance,” Wenhold highlights.

The company has the necessary expertise and capacity, through its team of professional project managers, to ensure that all of its projects are managed and executed effectively, while keeping its clients updated throughout the installation process.

Its solutions are designed to comply with, and exceed, all regulatory requirements. The company’s established track record with regard to multiple solutions installed for customers across a spectrum of industries is testament to its commitment to service excellence, innovation and cost competitiveness.

10 facts about alternative energy

1. Romans were the first to use geothermal energy to heat houses.
2. Scientists reckon that if it were harnessed properly, all the sunlight that falls on the planet in just one hour could power the world’s energy demands for an entire year.
3. New developments mean that power from the sun’s rays can now be stored in a special salt and used at night.
4. The first ever commercial offshore wind turbine (located out to sea) was made by Siemens 30 years ago.
5. Companies such as Google, Apple and Facebook are helping to meet this demand by funding and developing massive solar farms, producing millions of clean kilowatts every year.
6. A world record was set in 1990 when a solar-powered airplane flew across the United States in stages, using no fuel at all.
7. Albert Einstein is well known for his work on relativity and gravity, but in 1921 he was awarded the Nobel Prize in Physics for his discovery of the photoelectric effect – which we have to thank for solar panels nowadays.
8. The renewable energy industry was worth USD257-billion in global investments last year.
9. The Itaipu Dam in Paraguay, for example, provides 90% of the country’s electricity, while 100% of Iceland’s energy is supplied by geothermal and hydropower sources.
10. According to the WWF, the whole world could get all the power it needs from renewable resources by 2050.

Banding & ID Solutions Africa supplies Solareff with 10 mm Band-It stainless steel strapping and buckles, in addition to a Band-It BAC001 tensioning tool to cut the strapping to the required length, and tension the strapping before locking the buckles. “We order rolls of the Band-It strapping at a time. It is a product that is both simple to use and easy to install,” Wenhold points out.

“Our typical installation areas are on roofs that receive both sunlight and rain. Being made from stainless steel, the Band-It stainless steel band-and-buckle does not result in galvanic corrosion,” Wenhold highlights.

Band-It has the added impact of boosting the quality and aesthetic value of Solareff’s projects. “Using stainless steel to finish off a project looks neater than plastic. Stainless steel band-and-buckle is also stronger than traditional plastic cable ties.

“Even UV stabilised plastic cable ties do not hold a candle to the durability of Band-It,” Wenhold elaborates. An added advantage of using Band-It is that cables are secured tightly enough so as to prevent tampering or accidental damage, which is especially critical when deploying high-voltage cables.

Banding & ID Solutions Africa sales representative, Matthew Campbell comments that Solareff is another example of an established client relationship that has given the company a foothold into a different market sector. “We are not so much a product supplier as a total solutions vendor, with the capability and flexibility to be able to respond to the specific needs of diverse customer requirements,” Campbell concludes. ∞



Solareff uses 10 mm Band-It stainless steel band-and-buckle and a C001 tensioning and clamping tool for cable bundling on solar panels.



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LARGEST WIND FARM

of its kind in sub-Saharan Africa

WorleyParsons RSA is powering ahead on the Lake Turkana Wind Power Project in Marsabit County in northern Kenya, with an average of one wind turbine erected per day and critical infrastructure such as access roads and the housing and recreational village already operational.



The global project delivery company is providing complete project management services to the Lake Turkana Wind Power Project on behalf of Lake Turkana Wind Power Limited, and has steadily steered the project to 45% completion to date, slightly ahead of the estimated schedule.

WorleyParsons RSA is now more than half-way through this 32-month project that will establish the largest wind farm of its kind in sub-Saharan Africa, and is on schedule for completion in mid-2017. Lake Turkana Wind Power is one of Kenya's top three capex projects, ultimately aiming to supply 310 MW of reliable, low-cost wind turbine generator capacity to the Kenyan national power grid.

Tim Gaskell, power business unit manager for WorleyParsons RSA, says that the Lake Turkana Wind Power Project spans an area of 160 km² and the scope includes 365 wind turbines of 850 kW each, an electric grid collection system and a high voltage substation, upgrades to 210 km of existing road, an internal site road network and a 160-man self-contained permanent village. WorleyParsons RSA's project management services include overseeing the total schedule, cost and quality of work as well as supervising and coordinating the five main contractors on the project. Although each contractor is taking responsibility for its own logistics, WorleyParsons is overseeing the process in terms of facility inspections, quality checks and testing, and delivery schedules.

Upgrading of roads

Gaskell says that major delivery milestones achieved to date include the upgrading of the 210 km access road, with the road maintenance regime fully implemented and running effectively, while the internal road infrastructure providing access to the wind turbines is approximately 90% complete. Upfront works on the housing village have also reached completion with the village providing bank, shops, medical and recreational facilities, and accommodation.

Logistical complications were anticipated as being one of the biggest challenges to the project owing to the high volume of components requiring transportation from the Port of Mombasa to the project site, approximately 1 200 km away.

"We are pleased to report that no major logistical challenges have arisen regarding transportation, so delivery of the turbines is running on schedule. Construction of the high voltage substation is also well underway and proceeding according to schedule," says Gaskell.

"Manufacturing is on schedule across all activities relating to the production of the turbines and ocean freight is also within schedule with 153 turbine sets having arrived in Mombasa by

the end of June," says Gaskell. "A total of 92 turbines have been completely installed as at 12 July 2016 and the third large crane has arrived on site and is currently in operation," he adds.

There are four cranes being used for the various stages of the wind turbine erection, with lifting capacities of 90, 200, 250 and 350 tonnes. The skill of the crane operators is key to the safe erection of the wind turbines in the naturally windy conditions on site. Operations have to be assessed and/or suspended when the wind speed exceeds 8 ms⁻¹.

WorleyParsons RSA says targets to reach a Ready for Energisation (RFE) status were recently reconfirmed with contractors to ensure 120 turbines and supporting systems are available the last quarter of 2016.

The Kenyan government has undertaken to finance and construct a 428 km transmission line to the Lake Turkana Wind Power Farm that will link into the national grid at Nairobi. The project is part of the Kenyan government's drive to generate 5 000 MW for the country by 2017.

The Lake Turkana Wind Power Project is located within the Loyangalani District, Marsabit West County, in northern Kenya. WorleyParsons' project management team, led by Stefan van Niekerk, comprises a core group of project leaders, supplemented by professional personnel sourced locally in Kenya as part of the company's localisation philosophy.

The team is split between WorleyParsons' Nairobi project office and the Turkana site office, which is located at a distance of 12 hours by road in a 4x4 from Nairobi, or 1,5 hours by chartered flight. This remote, desert-like environment is inhabited by about 10 nomadic tribes, with the closest village 40 km away, and was selected as the project site following an extensive survey of the region that focused on environmental, social and sustainability, technology and commercial considerations.

"We have a positive overall working relationship with WorleyParsons and thus far their performance on this project has been good," says Phylip Leferink, general manager of Lake Turkana Wind Power. "The project is on time and on budget while having a minimal claim and variation order situation. This is outright satisfactory (even though we're not completed yet). Another aspect we're pleased with is WorleyParsons' forward looking ability of the team on site and their support team in Nairobi. This behaviour pre-empts challenges which, if unnoticed until they transpire, would have been sizable and difficult to overcome. WorleyParsons has also proven to display a professional judgement that is kept at a high standard at all times, and the team's focus is always on delivering a result and taking a practical view (while not losing sight of potential contractual impacts). We, as LTWP, like this attitude as this is the way we wish to operate ourselves," concludes Leferink. ∞

Thin film solar power solutions launched

Barloworld recently announced the launch of a new, high performance photovoltaic (PV) solar energy solution targeted at Southern Africa's commercial and industrial (C&I) power segment.

The Cat® Thin Film PV solar energy system features Cat-branded PV module technology, manufactured by First Solar, that can deliver up to 4,3% more energy in South Africa than conventional crystalline silicon panels.

The solution is the result of a strategic alliance between Caterpillar and First Solar, launched in 2015. First Solar, which has over 13 gigawatts of global experience, manufactures the solar panels and associated components, which are Cat branded, and sold and supported through Caterpillar's dealer network alongside its other power generation offerings.

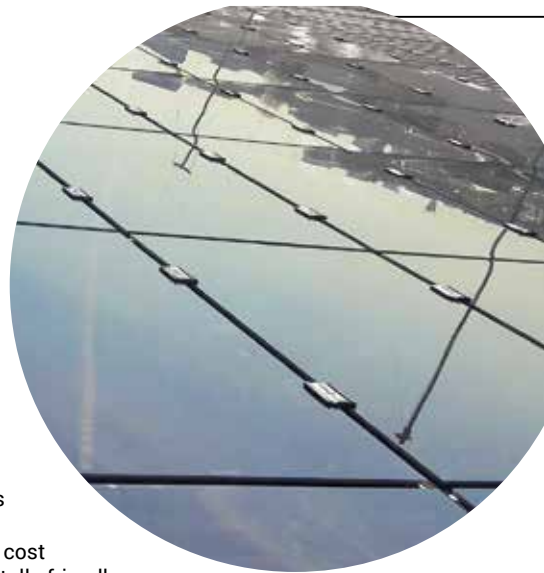
"This solution offers our customers the opportunity to invest in reliable, affordable, high performance PV modules backed by multiple gigawatts of First Solar's expertise, combined with the familiarity and trust that comes with the Cat brand," says Grant Kirchmann, business development manager, solar at Barloworld Power.

"The technology is best suited to installation on rooftops or carports for businesses wishing to reduce their energy costs and improve their 'green' credentials. It is not only cost efficient and environmentally-friendly but can also be fully integrated with other Cat power technologies renowned for their superior engineering and reliability."

The PV systems are available exclusively through Barloworld Power – Cat power systems dealer for southern Africa – for the C&I segment in Southern Africa with sizes ranging from 25 kilowatts (kW) to 5 megawatts (MW). Barloworld Power provides installation, commissioning and after sales support for all deployed systems. The company is currently installing a 300 kW test site at sister company Barloworld Equipment's Isando campus, which is expected to save about R500 000 per year on energy costs.

"From our own experience, we've seen that thin film is the right technology for the C&I segment in Southern Africa. As we focus our efforts on utility-scale solar in the country, we are confident that Barloworld Power, with its extensive technical capabilities and sales and support infrastructure, is the right company to drive continued growth for thin film in the C&I segment," says John Eccles, First Solar's director for business development in Africa.

First Solar, which established a presence in South Africa in 2012, will continue to independently pursue utility-scale opportunities of 5 MW and above in Southern Africa.



Noupoort Wind Farm operational

Noupoort Wind Farm has been officially declared operational by Mzwandile Toto, district mayor of Umsobumvo Municipality, in a proud moment for the town of Noupoort.

The event was attended by dignitaries and representatives of the Department of Energy's IPP office, shareholders, officials and members of the local community.

In brief:

- Construction of the wind turbine generator foundations started in May 2015.
- All 35 turbine foundations were completed 20 November 2015.
- First turbine lifting completed in December 2015.
- All 35 wind turbines erected by 30 March 2016.
- Energised the substation on 12 February 2016.
- Energised the first turbines on 23 February 2016.



Loeriesfontein wind farm lifts first wind turbine

Loeriesfontein Wind Farm has completed the lifting of the first of its 61 wind turbines. This is a pivotal point in the construction of the wind farm, with the next major construction milestone being the arrival of the main transformer and the energisation of the substation.



This R3,5-billion Wind Farm is expected to start supplying electricity to the national grid by end-2017, as part of the third round of the Renewable Energy Independent Power Producer Procurement Programme.

The wind turbines, which are 100 m tall to allow for optimum energy production, take a single day to erect, assuming the weather is favourable and the first two sections of towers have been erected. The three 53 m blades,

made from fibreglass reinforced epoxy, are connected to the rotor at ground level before being lifted to the top of the turbine tower. This is a complicated lifting exercise, in which one crane raises the assembled rotor while another smaller crane and taglines guide the rotor into the correct position. The heaviest component is the nacelle, which contains the generator and gearbox; and weighs 82,5 tonnes. "The process of constructing the turbines requires two cranes to work simultaneously; the lifting of the massive 108 metre diameter rotor requires great skill and is a really impressive manoeuvre to watch," says Leo Quinn, project manager of Loeriesfontein Wind Farm.

Siemens Wind Power, along with their subcontractors, Fairwind and BMS, are responsible for the installation of the wind turbine generators. The same teams will move onto the turbine lifting for the adjacent, Khobab Wind Farm, next year. "We are pleased to be working with an experienced crew, who fairly recently managed the lifting for Noupooort Wind Farm and will later move onto our sister wind farm," added Quinn.

The site was chosen because of its excellent wind resource, its proximity to national roads for wind turbine transportation, the favourable construction conditions, municipality and local stakeholder support, the straightforward electrical connection into Eskom's Helios substation approximately 11 km south of the site, and studies showed that there would be minimal environmental impact.

When operating at full capacity, the Loeriesfontein Wind Farm will generate approximately 563 500 MWh of clean renewable energy per year; this is expected to supply electricity to power up to 120 000 South African homes. ∞

Loeriesfontein Wind Farm is owned by a consortium dedicated to providing clean, renewable energy to the people of South Africa:

Lekela Power: Lekela Power is a pan-African renewable energy platform, which has in excess of 1 300 MW of wind and solar power projects in its portfolio. It is a 60:40 joint venture between Actis, the global pan-emerging market private equity firm, and Mainstream Renewable Power, the global wind and solar company.

Loeriesfontein Community Trust: Established by the project company with the objective of carrying out public benefit activities to benefit the local community in the areas of enterprise development, education and health.

Thebe Investment Corporation; one of South Africa's most established broad based BEE Investment management companies and leading investor in the Energy & Resources sector (advised by Bridge Capital).

The IDEAS Managed Fund, is managed by Old Mutual Alternative Investments, a subsidiary of Old Mutual Investment Group one of Africa's largest independent investment managers.

Futuregrowth Asset Management, a pathfinder in fixed interest and developmental investing.

Genesis Eco-Energy in partnership with **Lereko Metier Sustainable Capital.** Genesis Eco Energy is a pioneering South African renewable energy developer which has been active in South Africa since 2001.

Lereko Metier Sustainable Capital is a resource efficiency private equity fund that has garnered additional support of two of its investors DEG (The German Development Bank) and FMO (The Dutch Development Bank) in the investment across the Mainstream portfolio.



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MENLYN MAINE – **green city** mega-development

South Africa has a new architectural landmark. The iconic Central Square at Menlyn Maine opened in Pretoria on 21 September 2016, introducing a distinctive design attraction and a unique shopping and leisure experience.



Henk Boogertman, architectural director of Menlyn Maine Investment Holdings.

In the weeks leading up to the September opening, Central Square of Menlyn Maine was a hive of activity.



The 65 000 m² R1,8-billion mixed-use Central Square is designed to be the heart of Menlyn Maine, a groundbreaking 315 000 m² decentralised green city mega-development.

Central Square is co-owned by joint investors Menlyn Maine Investment Holdings and the Government Employees Pension Fund (GEPF) represented by the PIC.

It will offer 30 000 m² of exceptional boutique-styled mall development with over 50 hand-picked retailers, restaurants, and entertainment experiences. It is a powerful proposition for daily convenience shopping with anchor retailers Spar, Pick n Pay, and Woolworths and a Clicks pharmacy, and includes the capital's first and only Virgin Classic gym and Bounce trampoline park.

Green city

Commenting on the design of the new Central Square, Henk Boogertman, architectural director of Menlyn Maine Investment Holdings says: "As the city centre of Menlyn Maine, Central Square is a uniquely crafted to be ideal for convenient daily shopping yet, at the same time, provides a compelling design experience perfect for leisure and packed with major attractions."

He adds: "Central Square has many differentiating aspects, which makes it unique. It is designed to be the unrivalled and vibrant hub of South Africa's only green city and it is so much more than yet another mall. At Central Square you'll also find a mix of features such as a piazza, public park, hotel, apartments, conferencing, offices, hospital, sporting facilities and, of course, specially selected retail and restaurants."



An aerial view of Menlyn Maine during construction.

The Central Square development is design-driven, with the overall architecture of the building being contemporary and timeless – unique in appearance, shape and form.

Boogertman explains the shopping centre has been imagined as a ‘high street’, in the fashion of pedestrianised shopping streets in leading cities around the world.

Outside, it is defined by distinctive finishes in black face brick, beige-coloured limestone cladding and charcoal-tinted Reinzink. Inside, a granite-paved mall is accompanied by a combination of oak wood and stucco plastered bulkheads. It is crowned with a glass roof, accentuated with acoustically-treated intermediate ceiling panels, allowing glorious natural light to gently spill into the mall.

Each shop at Central Square has an exclusive, bespoke shopfront made of steel, aluminium, and wood, all in shades of charcoal black.

“The finishes enhance the exclusive quality of the retail environment and the materials used strengthen the human-friendly scale and ambience of the building,” notes Boogertman.

Open-air dining is a major feature of Central Square, with Pretoria having one of the best climates in the world.

Boogertman reports: “For Central Square, we’ve taken a fundamental approach to place making in the heart of Menlyn Maine.

“This takes cognisance of the fact that most great city centre spaces worldwide have centrally located piazzas where people can mingle, meet, trade from markets and enjoy exhibitions, functions, festivals and the like. We’ve giving Menlyn Maine such a space with the Central Square piazza as the heart of the precinct.”

Activating the piazza are the restaurants, coffee shops, pubs and hotel that are all set around it, as well as big trees, water features, and public artworks. The centre’s two internal courts both open, through sliding glass, onto the trees and cafes outdoors.

Surrounding area

Central Square also provides a lush green park that runs in a strip through the whole precinct, starting with a private park for its residential quarter, then going through the buildings and alongside Central Square, and culminating in a major park and piazza feature in front of the spectacular Sun International Time Square casino, 5-star hotel and 8 000-seater multi-purpose arena development planned for Menlyn Maine.

“This provides a softer space for people to walk and relax. This park will be activated with public amenities, from play areas to art,” explains Boogertman.

Ultimately, Central Square is designed to meet so much more than the day-to-day requirements of its immediate high-end shoppers and beyond. “The design of Central Square articulates the Menlyn Maine vision to create a modern, new urban city precinct, where everything is right on one’s doorstep and people can live full, balanced, responsible and exciting lives in a well-secured environment,” says Boogertman. ∞

Menlyn Maine is South Africa’s first green, mixed-use city precinct. As a partner of the Clinton Climate Initiative, Menlyn Maine is one of 16 green cities being built in various countries, and the only one in Africa. In line with Menlyn Maine’s exceptional sustainability benchmarks, all buildings in the precinct are set to be rated 4 Green Star SA or higher by the Green Building Council of South Africa. It is also targeting a LEED ND certification for the precinct. *See next story for a detailed account of the development’s sustainability*

INDUSTRY FIRST

custom Green Star certification

WSP | Parsons Brinckerhoff in Africa, one of the largest multi-disciplinary engineering consultancies on the continent, has achieved a Green Star SA Custom Mixed Use rating for Menlyn Maine Central Square. It is an industry first in South Africa that a project has been certified using a custom tool – and a testament that the company is leading developments in the Green Building space.



According to Alison Groves, HOD: sustainability consultant, WSP | Parsons Brinckerhoff in Africa: “This is an exciting and important move for the industry towards having one overarching tool that can be customised and used to accredit all types of building models.”

Uptake of green buildings in South Africa continues to grow, driven largely by continuous and growing pressure on the ‘built’

space to consider and address inadequate energy resources, carbon reduction targets and revised building energy efficiency standards. The Green Star rating and accreditation system has provided excellent guiding principles. However, existing Green Star tools only allow certification of single building types – i.e. commercial office, retail, multi-unit residential, and public and educational buildings.

“Where before it may have been difficult to entrench sustainability into projects that did not fit into the Green Star rating criteria, this progression to having a customisable tool that enables mixed-use developments to use the Green Star rating accreditation will allow robust sustainability in the built space to be applied across the board,” adds Groves.

Achieving the rating

To achieve the Custom Mixed Use rating for Menlyn Maine Central Square, WSP | Parsons Brinckerhoff’s Green by Design team assessed all the current available ratings tools before deciding to make use of the Public and Education (P&E) Buildings Design Rating tool – as its structure offered the greatest semblance for what was required. The P&E tool offered added flexibility for adapting certain criteria to focus on different morphologies – and define how credit should be allocated for the Green Star rating that would more accurately reflect the building.

In addition to adapting the necessary criteria, the custom tool also allowed the company to incorporate aspects such as green leases to ensure that tenants can be held responsible for their own energy use – and particularly where this may be outside of the landlord’s control or influence. Groves says, “Green leases are growing in importance as the first step in changing mind-sets towards sustainability and getting buy-in from tenants for retail, commercial or residential use, alike.

“Green building design or building for sustainability has become integral in the design and construction of buildings – regardless of their use – and especially with the global design movement towards *new urbanism* or *green urbanism*,” she continues.

“This progression towards having a custom tool will create so many more possibilities for different building models to be rated and accredited in the future, including things like: health facilities, hotels and/or conference venues, etc. which up until now – using existing tools – was thought impossible.”





360° view

For a 360° view of the Menlyn Maine Central Square development, please see the below included links to YouTube. For a 360° viewing experience, use your mouse cursor by dragging it across the YouTube screen to move the images around and see the model/construction of the development from different angles.

- Menlyn Maine Central Square Model – <https://youtu.be/K6cuy7DNOj4>
- Fountain view at Menlyn Maine Central Square – <https://youtu.be/LuSwyPIYyng>

Each time the Green Building Council of South Africa (GBCSA) reviews the rating tools and identifies attributes that previously haven't been rated, and look to incorporate these, the criteria becomes harder.

"This also means that the industry is adapting and moving forward as it learns more. As such, I expect that the GBCSA will continue to review all the existing tools and available information to explore what is truly meaningful in the context of building for sustainability. In the next few years, it is likely the council will look to launch one custom tool that to be used across the board for different building models, different morphologies and different ratings. We are very proud to have lead the groundwork for the development of such a custom tool," concludes Groves. ∞



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LSF TRAINING COURSES

making their mark

The series of CPD-accredited training courses arranged by the Southern African Light Steel Frame Building Association (Sasfa) have made their mark in 2016.



This is according to Sasfa director, John Barnard. "We are seeing a growing interest in these courses in line with the excellent growth in popularity of LSF in South Africa," Barnard says adding that the RSA market for LSF is estimated to already be worth about R1-billion per annum.

The first course deals with SANS 517 Light Steel Frame Building and is aimed at all architects, engineers, quantity surveyors, developers and other LSF practitioners, who should all have a working knowledge of the building code.

The second is a course on Cold-formed steel and LSF design to SANS 10162:2 and is aimed specifically at design engineers.

SANS 517

The SANS 517 1-day course consists of an introduction to LSF, as well as an overview of the development of this building method and industry in Southern Africa. The advantages of LSF are discussed and explained – ranging from speed of construction, enhanced insulation and the resulting energy efficiency, low mass and the corresponding logistical cost advantages, through to accuracy, ease of installation of services and durability. "The steel frame will last several 100 years if installed correctly," Barnard says.

The correct terminology is dealt with, the major LSF elements described and the properties of the major materials used in LSF are presented. Apart from the high-strength galvanised steel sheet used to manufacture the cold-formed sections for the light steel frame components (wall frames, roof trusses or floor beams), LSF makes use of:

- fibre cement cladding (exterior),
- gypsum board lining for walls and ceilings (interior),

- insulation (thermal and acoustic)
- vapour permeable membrane (external walls), and
- fasteners – screws, rivets and anchor bolts or screws.

The main components of a LSF structure are described: foundations with cost saving potential compared with masonry building, the steel structure, walls, floors, ceilings, insulation and the installation of services.

This is followed by spelling out the requirements for these components to comply with SANS 10400 – structural stability, weather resistance, durability, energy efficiency, acoustic insulation, fire resistance and fire rating and prevention of air infiltration and robustness. "These are also the criteria tested by Agrément SA when assessing new building methods," Barnard says.

Cold-formed steel for design engineers

The second 1-day course, Cold-formed steel and LSF design to SANS 10162:2, is aimed specifically at design engineers who have to check LSF structures for structural adequacy. "SASFA has been fortunate to obtain support from the University of Stellenbosch in presenting the theoretical and academic part of this course," Barnard says.

The course begins with the fundamentals of plate buckling theory, and contextualises this with thin-walled structural elements as encountered in LSF. Three buckling mechanisms are generally considered: member buckling, local buckling and distortional buckling.

Until recently the LSF designer has had to use the effective width (of the plates making up the cold-formed section) method to calculate the capacity of the member in each of the

failure modes. This is an iterative and time-consuming method. The latest design method, referred to as the 'direct strength method', which simplifies the design calculations considerably, does away with the need to do iterative calculations.

Design examples are discussed using both analysis methods to illustrate the application of the theory.

The second half of this course is more practical in nature, covering the design intent when dealing with LSF structures, and highlights the design criteria provided in SANS 517.

The design of floor systems is covered using an Excel-based design tool for joists. To prevent excessive vibrations especially in longer floor spans, the designer can use a simplified approach by calculating the deflection of the floor under a static 1 kN load, or doing a dynamic analysis to calculate the response frequency.

Conclusion

Sasfa ensures the highest levels of professionalism for the courses including some of the most experienced LSF experts in the country. This year, presenters for the SANS 517 course included Mike Hull of Hull Consulting and Barnard; and for the Cold-formed steel course Hull, Barnard and Etienne van der Klashorst of the University of Stellenbosch presented.

"As is required by the professional institutes, the attendees are requested to evaluate and rate the courses, from suitability of the venue, presentations by the lecturers, course material and handouts. The aspects of the 2016 courses have consistently been rated between 'very good' and 'excellent'. We look forward to presenting these courses again in 2017," Barnard concludes. ∞



Concrete roads can reduce fuel consumption by heavy trucks, The Concrete Institute states.

Environmental benefits of concrete roads

Modern concrete roads are a far cry from the concrete pavements of old which are still in existence today but were designed long ago to very different design criteria to those employed today, says Bryan Perrie, managing director of The Concrete Institute.

Perrie says early concrete roads were laid using what are now regarded as obsolete techniques and equipment. Modernised designs, new construction methods, better surface finishing and sophisticated machinery mean that it is nowadays possible to produce high-quality concrete pavement surfaces that satisfy the needs and objectives of road users, neighbouring communities, and road managers.

“There is no doubt that concrete pavements offer substantial environmental economic and social benefits. Concrete roads should be more widely regarded as the sustainable solution to South Africa’s road network. They are the natural choice for projects where performance, value, longevity, social responsibility and concern for the environment are paramount.”

Concrete pavements, furthermore, offer a long service life which normally exceeds 30 years. In addition, concrete pavements require relatively little maintenance and repair and produce long term savings in raw materials, transport and energy. The reduction in traffic delays caused by road works on concrete pavements also cuts fuel consumption and exhaust gas emissions. Perrie, in fact, believes that an important advantage of concrete roads which is not always apparent is the fuel saving such pavements offer for cars and goods vehicles.

Studies abroad

“The National Research Council of Canada carried out a series of investigations which focused on various types of pavements and vehicles in different seasons of the year. Reduced fuel consumption by heavy trucks was observed in all phases for concrete roads when compared to asphalt pavements. The studies found that fuel saving on concrete pavements for empty

and full tractor-trailer units ranged from 0,8% to 3,9% in four to five periods in the year, based on 95% reliable survey results. On this assumption, you are looking at an average fuel saving of 2,35% which is certainly not negligible and would represent an immense difference in overall fuel consumption as well as emissions of Greenhouse Gas over the lifetime of a busy freeway,” Perrie commented.

The Transport Research Laboratories in Great Britain carried out research to determine the effect of the rigidity of the pavements on fuel consumption. Here the reduced reflection of concrete roads resulted in a 5,7% reduction in rolling resistance, also providing fuel savings.

“Similar fuel economy results have been obtained from extensive research done in Sweden, Japan, and the American states of Texas and Massachusetts. Apart from the type of pavement, the evenness and surface texture of the road surfaces are important factors influencing fuel consumption. That is why the quality of the finished concrete surface plays such a crucial role: a good quality and evenly-laid concrete pavement retains these qualities for decades whereas a concrete pavement with undulations or uneven patches will require difficult and expensive remedial treatment to obtain and maintain the desired ride quality.”

Entire life cycle

Perrie says sustainable concrete pavements make efficient use of natural resources and respect the environment during their entire life cycle. They provide services to society in terms of mobility, safety and comfort by means of judicious choices when it comes to design, construction, maintenance and demolition.

“The cement industry – so often criticised for carbon dioxide emissions emanating from its production processes – is extremely active in reducing energy consumption and in reducing the amount of non-renewable fossil fuels through the introduction of modern technology and equipment and using alternative fuels and co-combustion materials. “The use of industrial waste products such as tyres, solvents, waste oil, waste water treatment sludge and paint residues as alternative fuels in cement kilns can make a valuable contribution to reducing overall carbon dioxide emissions,” he added.

Vancouver leapfrogs ENERGY EFFICIENCY

by Julian Spector

The city of Vancouver in Canada sent a message to the green building sector this summer. Efficient isn't good enough. The move puts the city at the forefront of the green building movement. How much that will cost is still up in the air.



The dense coastal city will require zero emissions from any new buildings by 2030, based on a policy approved 13 July. That means the building sector will have to roll up its collective sleeves and figure out how to heat, cool and power every new construction without any net greenhouse gas emissions. If that sounds daunting, the authors of the policy agree.

"This is a plan to fundamentally shift building practice in Vancouver in just under 10 years," the document states.

The city government is leading by example here: all new city-owned and Vancouver Affordable Housing Agency projects must meet that high standard starting now. That's key for testing out the building techniques that will later be codified into the building standards, says Sean Pander, the head of the city's green buildings programme. The next phase will require all rezoned residential developments to comply by 2025, with other new buildings following suit by 2030.

The city council will also fund a non-governmental Zero Emissions Building Centre of Excellence to help gather and spread the knowledge needed to complete zero-emission buildings.

At forefront

The ambitious targets and deadlines place Vancouver at the forefront of the sustainable building movement, and their policy will likely serve as a model for more cities to come. What makes the plan revolutionary is that the city is ditching the standard long used by green building codes – energy efficiency – and instead benchmarking on absolute emissions.

Focusing on the emissions drives improvements to the thermal efficiency of the building, because heating sucks up the most fossil fuels in this temperate northern metropolis. The fixes to the insulation and sealing of the buildings, though, create benefits well beyond the climate change goals. "It's a zero-emissions outcome from a policy perspective, but what it really is is fundamentally changing the quality of the construction," Pander said.

Laying the groundwork

Vancouver bills itself as 'the first major city in North America' to enact such a policy. This bold step followed on the heels of a dream-team lineup of sustainability initiatives.

The province of British Columbia has a carbon tax; living in a zero-emissions house means no tax on the gas you might use to heat your home. Since 2004, Vancouver required civic buildings attain the LEED Gold efficiency standard, with rezoning developments similarly compelled starting in 2010.

The Winter Olympics that year spurred the development of a new athletes' village downtown, and Vancouver used that as a showcase for ultra-high-efficiency building

techniques (more on that later). In 2011, it adopted a 'Greenest City' goal for 2020, and last year it approved a strategy to achieve 100% renewable energy use by 2050.

In this town, though, buildings generate a whopping 56% of emissions, which exceeds the contributions of transportation and waste combined. Any serious plan for sustainable urban design has to start there.

Hence the quick ramp-up: it's a lot more expensive to clean up a building after the fact than it is to just build it right in the first place. That's the same logic that drove San Francisco's law requiring solar panels on all new developments.

Emissions, not energy

Building standards like ASHRAE and the LEED rating system have driven significant decreases in the waste and consumption of new buildings, but they share a structural impediment to ultimately eliminating greenhouse gas emissions: They don't measure them. These standards track energy efficiency as expressed in the cost of powering a building. In many cases, spending less on heating and cooling will yield fewer greenhouse gases, but not always.

A family could heat their home with natural gas or electricity. In some markets, it will be cheaper to use gas, but, depending on the source of electricity, that could generate many more climate-altering emissions. The problem is compounded in Vancouver, where gas is cheap relative to electricity, but the electricity is almost entirely clean, thanks to ample local hydropower.

All about the envelope

Such an ambitious policy could rely on expensive technological fixes, but Pander said they chose a different tack: using available techniques to reduce the thermal needs of new buildings. Part of this was practical.

The city planners went back to the drawing board in search of a way to minimise operational difficulty and expense, while still eliminating emissions. Those criteria led them to the model set by the passive house movement: if you put in more effort upfront to seal off what architects call the building envelope, you can drastically cut back on the main building energy sinks – space heating, air intake and water heating.

Tightening up the envelope means installing high-performance windows that minimise heat transfer, but it also requires breaking up thermal bridges, which are building materials that transmit heat. In the case of Vancouver's glass and concrete high rises, the concrete slab that extends from the floor to form a balcony also conducts heat. The new paradigm will require installing insulation to break that thermal flow.

High-rise buildings mechanically pull fresh air in from the roof to maintain healthy circulation inside, but



the energy use there can be highly inefficient. The city government did a study on an existing building, Pander said, and found that, of the heat generated to get the replacement air to the right temperature, 15% circulated into common areas and only 8% actually penetrated residential units. That means three-quarters of all that energy used to heat the outside air wasn't serving its intended purpose.

A tight building seal, though, allows the architect to deploy heat recovery ventilators, which passively exchange heat between incoming and outgoing air. If it's cold outside, the fresh air drawn into the building gets heated up by the stale air heading out. That leaves air that needs a fraction of the energy to get it to a comfortable temperature.

This level of precision exceeds that which is required by any building code so far. That means developers will need to create new approaches to construction, and find contractors who know how to do this kind of work.

But for the additional complexity and cost up front, the long term payoff is that not only will it shrink a building's carbon footprint, it'll do that to the costs of heating and cooling, too.

Keeping it local

An increase in demand for high-end building components and the labour needed to install them will change the economic landscape of Vancouver's building industry. The city contends it will do so by adding more jobs in the region that can't be shipped overseas.

There's some solid logic here. The more sophisticated detail work has to be done locally, of course. Beyond that, the types of materials the high-performance buildings will need, like windows and insulation, are not the kind of thing that developers like to import from far away.

That bodes better for the region than an approach that relied on fancy equipment imported from Europe or Asia. The local workforce will need to grow and adapt, though. That's why the city wants to set up the centre to exchange practical knowledge about actually doing this kind of work.

Best-laid plans

Even if the tightly sealed buildings cost less to operate in the long term, the developer has to absorb the higher cost for the more sophisticated production upfront.

The Vancouver-based industry group Urban Development Institute supports the principle of the zero-emissions policy but wants to continue working closely with the city to ensure it doesn't add costs in practice, said UDI President and CEO Anne McMullin. It will be important to see what kind of efficiency savings materialise in practice, she noted. On the cost side, expenses could arise from adopting new materials and building up the supply chains for them.

There are also questions about livability, like how the

tougher standard will affect the amount of glass and natural lighting in a new high rise.

For the city's builders, bitter memories linger from the 2010 Olympics, when the city's desire for a sustainable showhorse left the Olympic Village developer saddled with debts that the property itself couldn't support; the city had to step in and subsidise it for years after the games ended.

Local developer Rob McDonald wrote in an email that he does not want to see building and operating costs spike like that.

The new insulation standards are already making construction more expensive, and that's in a market where new construction is too expensive for most people, said architect Jonathan Katz.

That said, Katz thinks zero-emissions building is the right way forward. "It certainly makes it more challenging to design a house, and to some extent, design will be driven by the science of zero-emission buildings, which will produce a more contemporary type building (certainly my preference), and move away from the character-type houses that are synonymous with Vancouver's single-family housing market," he wrote in an email.

Green city vanguard

The success of Vancouver's effort will be decided on the ground over the next 15 years, and lessons from that experience will guide any other cities that attempt such a feat. Certain factors may limit the transferability of the programme, though.

For one thing, Vancouver is blessed with super clean electricity thanks to its abundant hydropower resources. That simplifies emissions reductions through electrification, but that won't be the case everywhere.

Vancouver also has a strong history of demanding public investments from developers as a barrier to entry into the market. That principle exists in the US, where many jurisdictions require investment in affordable housing or public spaces in the course of redeveloping choice urban lots, but American developers generally expect to keep more of their profits than their counterparts in Vancouver.

Then there's the climate. Net zero is easier to achieve in northern regions, like Canada or Europe, where you have a greater need for heating than cooling, said Mark MacCracken, former chair of the board of directors at the US Green Building Council, which oversees LEED certification. People and appliances generate heat, which passive houses harness to stay warm.

Zero-emissions building will spread slowly, with initial adoption in the most favourable locations laying the groundwork for other jurisdictions to follow suit.

"You need stakes in the ground, and you need people doing it," MacCracken said. "The more people are doing it, the easier it's going to get." ∞



Addis Ababa in Ethiopia.



The recently formed Cities group at Arup Southern Africa, is led by Nico Venter.

In search of a new African urbanism

African cities and specifically Africa's new urban agenda have become a hot topic amongst businesses and institutions seeking to understand, influence and explore opportunities arising from Africa's rapid rate of urbanisation.

At the same time, lack of reliable data and long term analysis of urban issues specific to Africa, has led to a largely experimental practice in the design and conceptualisation of African cities – with unpredictable and serious consequences for affected communities.

Arup as a multidisciplinary built-environment consultancy has developed an ethos based on deep contextual embeddedness and practical research in the built environment – undertaking more than 1 000 self-funded research projects in any single business year. Over the last few years, a large portion of that research has focused on urbanisation and cities, and resulted in a collective body of work that informs our approach to the growth and development of urban areas.

The recently formed Cities group at Arup Southern Africa, led by Nico Venter, realised the need to localise this research to illustrate relevance and critical understanding of African city contexts; where overall city expansion and urban rates of change outstrip developed world norms. "The African city research programme was started and is a long term commitment to building our knowledge and skills in working in African cities," says Venter.

The research process is engagement focused and iterative and aims to capture local knowledge to both enrich the research product and direct its development. The first phase of the African cities research focused on understanding the challenges and development contexts of five rapidly changing and growing African cities; taking into account cultural, economic and geospatial differences and creating realistic engagement goals for the subsequent phases.

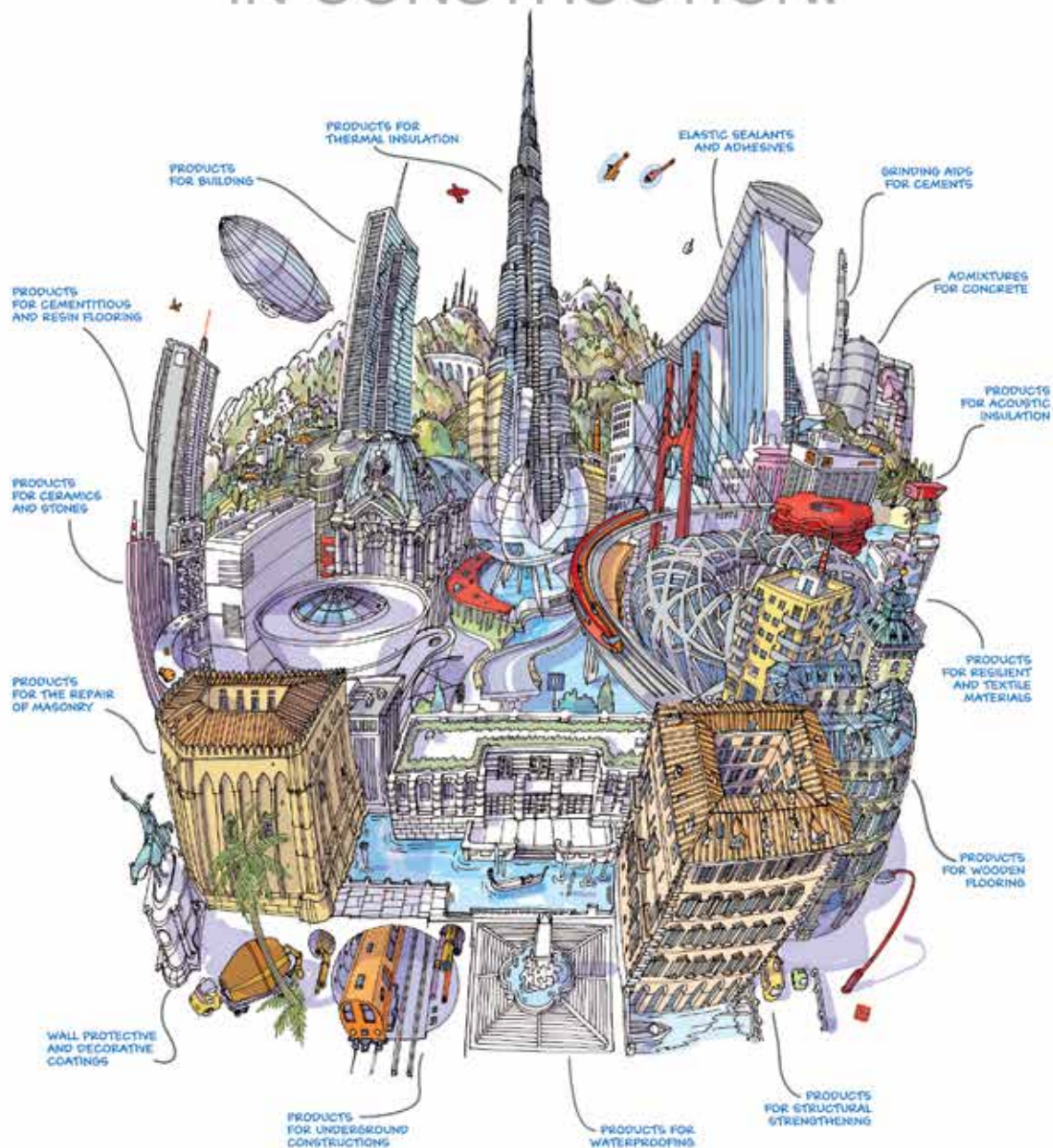
The five cities were Johannesburg, Addis Ababa, Dar-es-Salaam, Accra and Nairobi. Venter explains, "The outcome of the first phase of the research is a set of city specific engagement cards, designed to start conversations around key issues. It was clear early on in the research that three dominant issues were common to all five cities; access to adequate housing, clean water and integrated transport.

These have translated into themes reflected in the cards, which are intended as a participatory tool that encourages people to see things differently and collectively foster fresh ideas on city transformation".

The first public workshop was on 25 August in Johannesburg, and brought together city stakeholders; including local government departments, research institutions, developers, funders and built-environment practitioners in a quest to uncover new ideas for the city. "Further workshops are to take place in other cities, culminating in a published work that will greatly enhance our understanding of African urbanism – assisting us to appropriately meet the present and future needs of citizens in their daily interaction with their city," concludes Venter. ∞

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Innovative and sustainable

Following a record number of entries, the final qualifying entries for the 2015/2016 AfriSam-SAIA Award for Sustainable Architecture + Innovation have been announced. After an intensive inspection process at each location (in-loco), 22 projects out of 47 entries have been identified by the adjudication panel.

The qualifying projects span all four categories of the Award – Sustainable Architecture and Research in Sustainability, as well as the two new categories, Sustainable Products and Technology and Sustainable Social Programmes. These reflect a growing national engagement with design, innovation and sustainability, with representation from many different regions of South and southern Africa. Within the scope of *Sustainable Construction World*, we will only focus on the sustainable architecture category here.

“The award assessed by the project responds to the criteria of Harmonisation, People Upliftment, Evolutionary Paradigm and Placemaking Performance,” comments Richard Stretton, member of the adjudication team.

“The qualifying entries really show a track record of being designed for the humans and communities who will inhabit and use them,” added AfriSam’s Sebasti Badenhorst.

“It has also been particularly gratifying to observe the drive to target net-zero energy and water use and to limit sanitation outflow, emissions and to protect biodiversity.”

“Awarded projects combine all the criteria through the design process into a harmonised solution, that clearly demonstrates how the principals of sustainability are represented in the design,” concludes Stretton. “This solution goes beyond the basic function and aesthetic resolution of the architecture to provide greater service to people and the environment.”

AFRICAN SCHOOL FOR EXCELLENCE – Local Studio

The design of the school borrows from industrial warehouse typologies in the East Rand. With the notion of ‘school as megastructure’ in mind, a series of 6 U-shaped classroom clusters are arranged around a vast central hall space. Each of these classroom clusters (termed ‘learning communities’) are designed around the school’s education model which rotates learners between spaces for instructional

learning, peer-based learning, and self-study throughout a school day. The hall space is imagined as a large courtyard, with a lightweight sculptural roof, floating above the classroom buildings. An urban intervention for the entrance portico was designed to welcome the community and scholars into the building. The scale of the building allows the school to be seen from afar and acts as visually prominent structure in the community.

BARN HOUSE – Strey Architects

The Barn House is an experimental personal home project. The project’s creative, all-in-one father/architect/contractor plays with forms, materials, building methods, passive heating and cooling and sustainable (‘green’ and ‘eco’) concepts. Sustainability within the building incorporates elements which initially cost extra (in energy use, financially and footprint-wise) – but these also act to reduce the amount of energy used by the building in its lifetime, as well as impact the recycling of the building at the end of its use. In addition, these elements reduce the running and maintenance cost of the building and reduce the short and long-term effect on the earth’s available resources through reuse, upcycling and recycling – as well as increasing the comfort of the occupants of the building. The Barn House accommodates an impressive array of green technologies.

BMW HEAD OFFICE BUILDING – Boogertman + Partners Architects

The design of the building conceptually focuses on the regeneration of an iconic



African School for Excellence.



BMW head office building.

structure – maintaining the spirit of the original building while infusing the envelope with the life of a new entity which is simple in aesthetic intent, whilst attempting to be energy efficient.

Minimum intervention to the outer façade of this circular building retains its elegant, modern, dark brick appeal. The only addition is the lightweight mechanical horizontal louvres, which are strategically installed to reduce the glare of the direct western sun, however optimising the internal building envelope with the notion of transparency, further complementing the design of the adaptive interior spaces.

Green principles were imperative to address the building's thermal comfort and energy efficiency and so achieve a holistic solution to the working environment.

The building's lighting, ventilation, and hot water generation systems were completely reinvented, with a satellite Energy Centre, with more suitable equipment for the generation of energy and backup of the three systems, as well as the installation of a photovoltaic system. The result of these energy efficiency technologies saw the building awarded with a 5 Green Star rating.

DEA BUILDING – Boogertman + Partners Architects

The Department of Environmental Affairs in the City of Tshwane, wanted a structure reflecting the Department's culture, function and objectives. The project achieved a 6 star green office v1 design rating. The design responds to an environmentally sensitive and sustainable architecture that equally is respected by international dignitaries, visitors, and tourists but is, above all, a home for the DEA to be proud of and to remain memorable and beautiful, inspiring generations to come.

The land parcel shape, orientation, and topography provided the opportunity to string a series of large effective office wings along a North - South central spine that enabled the building to centralise the support services along the spine and to keep the floor plates as open and multifunctional as possible.

The orientation of the wings allowed for green spaces between the wings as well as allowing enough sunlight into the wings. The building hosts an array of sustainable technologies from rainwater and greywater

harvesting and recycling, to double glazed windows, evaporative cooling methods for air conditioning, photovoltaic cells, and solar hot water heating on the rooftop, east/west orientation as well as highly developed building envelope insulation design.

GORGEOUS GREEN HOUSE – Sagnelli Associate Architects

A client driven green research project, the Gorgeous Green House encapsulates all green and eco gadgetry there is within the market. This project shows just how strong the client's voice was with decision-making on a sustainable level.

Special thought, consideration and research by the client allowed the design of the house to incorporate many sustainable features, from roof top gardens, green walls, evaporative cooling ponds, water harvesting, storage and recycling, and solar energy to name a few. The house also features different sustainable and environmentally friendly materials, from bamboo, recycled carpets and kitchen countertops, as well as boasting an incredibly integrated eco-system of bee hives, kitchens, veggie garden and natural swimming pool with fish, all which attract over 40 species of birds, insects and wildlife to the property. Gorgeous Green House is the 'poster-child' for a sustainable green living.

GOVERNMENT HOUSE PIETERMARITZBURG – Robert JW Brusse Architect

A heritage restoration project of the Government House from 1845 for UNISA Pietermaritzburg. Restoration of this beautiful Edwardian styled house began several years ago with special detail and consideration taken into making sure all the original materials and aesthetics of the building were maintained and restored to their former glory. Specialised craftsmen from around the country gave their expertise in meticulously piecing back together this historic building. The building currently holds an administrative office with plans to extend primary uses to all other spaces within the building.

ICAT ECO FACTORY – Earthworld Architects

Sustainable design begins long before the first foundation is cast, or brick is laid. It begins in the symbiosis between the visions of the client and the architect. This was the case for the iCat Eco Factory.

The project was focused on housing both the administrative and the production functions of the company, merging corporate headquarters with warehouse space and allowing for an environmentally sustainable structure.



iCat Eco Factory.



Maboneng Precinct.

This served to further minimise travel distance, as well as duplication of costs, buildings, footprints, staff as well as other assets created through running multiple buildings simultaneously. The design was greatly influenced by seasonal changes in lighting and climate, meaning every façade of the building responded accordingly. An equilibrium was struck between natural and artificial light, through minimising the latter.

The site lent itself well to this approach, allowing the massing of the warehouse to shade the offices from the direct western sun, a southern courtyard to serve as a social activation space, and the northern facade to allow for lighting into the offices and warehouse, as well as heating during winter months. From the roof, much of the building's water and energy requirements are provided for through rainwater and solar energy harvesting, in the form of a PV Panel Array, along with a 40 000 l water harvesting tank buried below the courtyard. These systems were implemented to make a difference ecologically and economically.

LIV VILLAGE – Designworkshop

There are over 5 million orphaned and vulnerable children in South Africa, mostly due to HIV/AIDS and poverty, with 12 000 added every month.

Liv Village exists to raise the next generation of leaders in South Africa. The village places orphaned and vulnerable children into a family environment with a trained foster mother to provide them with love as well as ensuring their education and physical needs are met.

Liv Village accommodates a community clinic, open-air hall, educational facilities as well as accommodation with nurturing foster mothers who are the backbone to the discipline and caring of each child. Located in-between the surrounding local community, Liv Village provides production and training facilities which extend the integration into the local economic and social networks to provide skills and employment which aim to provide increasingly independent economic sustainability for the Village.

MABONENG PRECINCT – Daffonchio & Associate Architects

The Maboneng Precinct (meaning 'place of light' in Sotho) is an open, mixed-use neighbourhood – and a unique case of vast urban regeneration produced by one Developer and one Architect. This historic district in Johannesburg is a complex of developments that collectively underpin the city centre's exciting regeneration resulting from both global inspiration and local innovation.

These include studios, art galleries and a range of shops, restaurants and coffee bars that are fueling an inner-city lifestyle, with entrepreneurship and creativity at its core. The broad spectrum of different sized spaces attempts to create a precinct that is inclusionary whilst maximising the financial viability of the development as a whole.

NEW BUSINESS SCHOOL FOR NMMU – The Workplace Architects with GAP

The Nelson Mandela Metropolitan University (NMMU) Business School, with the severity exterior, uses a minimalist simple brick while the interior and courtyard are spatially more diverse, with a variety of volumes with a multitude of light sources. The finishing of the building also reflects this design intention – the exterior is of a single face brick with flush jointed, tinted mortar to match the brick, where the interior is more varied with a range of lighter neutral colours and textures.

QUEBOSCH CAMP KOGELBERG – Architecture Coop

Kogelberg is tucked away in the mountains above Betty's Bay, within a protected wilderness area in the Kogelberg Biosphere, a UNESCO World Heritage Site.

This breathtaking biodiversity hotspot is of extremely high conservation value and is known as the 'Heart of the Fynbos'. A rugged and ancient landscape, it is a wilderness of jagged, folded mountain peaks which cradle streams, rivers, seeps, and wetlands that criss-cross the faulted landscape, creating myriad habitats for the

1650 fynbos species. In creating the camp, a careful path to crafting a sustainable, environmentally responsive and low impact strategy for settlement evolved.

Nurtured by a think tank, the multi-disciplinary team mined and mapped, unravelled, uncovered and unpicked the secrets of the site ecology. Thus begun 'hands on' iterative journey to build a vision and grow the buildings from the seeds of understanding the site. The buildings are modestly scaled, lightweight, stilted, basket-like, with roofs planted, and set on banded stone bases. These simple structured shelters reflect the natural qualities of landscape. Hovering decks, terraced ground, large slide away openings allow spaces to grasp and touch the mountainscape lightly. The palette of natural, local, renewable, low embodied energy, non-toxic materials and components develops the low impact sustainable qualities of the project. Low tech simple passive design principles underpin crafting of the building envelope which is shaped for the shifting seasons. Open structures breath crisp mountain air and bask in natural light.

OUTREACH FOUNDATION COMMUNITY CENTRE – Local Studio

The Outreach Foundation Community Centre is one of the first new inner-city social infrastructure projects to be built in Hillbrow since the 1970s. The building site is situated on the rooftop of the unfinished community hall of what was the 1970s German Consulate.

The building houses three primary functions: a computer centre, dance studio, offices and meeting areas. These functions are collected within an angular volume draped over the two levels of the site.

The simple form of the community centre is entirely governed by the programmes that are housed, the choice of white 'Chromadek' corrugated steel and clear corrugated polycarbonate as cladding materials abstract the buildings image and clearly establish the building as a new addition to this part of the city. The building is elevated almost two stories above the street level which create strategies around public placemaking.



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FOR MORE INFORMATION ON ANY ASPECT RELATED TO TREATED TIMBER PRODUCTS AND THE CORRECT USE OF TREATED TIMBER, OR WHERE TO CONTACT SAWPA MEMBERS, PLEASE CONTACT:

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WWF SA Braamfontein.



WITS RURAL FACILITY – Kate Otten Architects

The Wits Rural Campus is a 350 hectare environmentally protected and ecologically sensitive area of indigenous bush bordering the Kruger National Park. Originally used for botanical and animal research, it has now developed into a satellite campus for the university to use as a base for rural research and training programmes, acting as a world-class rural knowledge hub. The rural facility is nestled in between the existing vegetation of the landscape, maximising the use of the site. Programmatically the buildings, with their different uses, are linked together by a network of covered walkways which create visual corridors that sporadically open to various courtyards within the bushveld.

WWF SA BRAAMFONTEIN – Alive Architecture

The WWF building in Braamfontein, the first 6-Star GBCSA Design Rating on a brownfields site in South Africa, was a restorative project in a heritage building that dated back to 1905. The primary focus of the design of the building was centered on the maximisation of the site parameters whilst recycling most

of the existing materials within the site and showcasing the raw aspects of the original building by leaving certain walls unfinished in the original brickwork. The building, which enforces the WWF sustainable ethos, has a serious implementation of green technologies - features of the building include a wastewater treatment plant, water harvesting, natural ventilation to all offices areas with additional forced air changes (no air-conditioning is done), double glazed fenestration, automated blinds and LED lighting linked to a building management system, solar geyser for the shower and kitchen areas, reclaimed/re-used materials for building and furniture items, the inclusion of bicycle racks, the exposure of base materials to allow for building thermal activation and the use of recycled materials for the construction of the concrete slabs within the building. ∞

Five questions to Alive Architecture

When did the project start?

Conceptually the project started back in October 2012, but as there were in-house issues based on approvals as well as the exploration of changes to the original design and manipulation of budget, the actual construction only started in November 2013.

How many people, from your side, were directly involved in this project?

Alive Architecture consists of its two principal partners, Pieter-Ernst Maré and Simon Cretney – there are no other employees and every part of the project from concept design through submissions and approvals to working drawings to site administration were performed by both partners.

Was creating a sustainable project part of the brief from the outset?

The creation of a sustainable building was not a direct instruction or requirement from the client but was more of an implied idea at the very beginning. By the time the project had evolved to the building it currently is and we were ready to kick off with tenders and the full production of drawings, the implied sustainability had become a project criteria.

How much more challenging is creating a sustainable project compared to a standard project?

It was challenging but by no means was it to the point where it was frustrating the required design outcomes. On review of the total project from beginning to end, it was highly rewarding to be faced with investigating and creating sustainable aspects to the building and it has probably been the most fun we have had since our practice inception.

What do you understand the concept 'sustainable architecture' to be?

Sustainable architecture is a difficult concept to grasp and it is sometimes extremely difficult to achieve within site parameters, client's acceptance of design requirements and budget constraints. We would probably class the term 'sustainable architecture' as architecture that is able to mould and fit its site restrictions and budget and at the same time have a minimal impact on its environment, making use of all available greening aspects to it.

Why did you enter the project for the AfriSam-SAIA Awards?

We felt that as the first building in South Africa to obtain a 6-star design rating with the GBCSA within the 'brownfields' (the use of an existing building as opposed to a new building) category, that it needed to be showcased as a building which adapted to its site environments and incorporated as many green aspects that were available to it, all packaged into a tight budget ... being sustainable need not cost the earth and many aspects of our design principals and building applications are available to projects with limited budgets, it just takes a little more effort than usual.



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CONSERVING energy, PRESERVING the environment and SAVING money

By Clay Nesler, VP of Global Energy and Sustainability, and Neil Cameron, area general manager, Africa for the Building Efficiency business of Johnson Controls

There is a global shift towards energy efficiency, environmental sustainability and green buildings. South Africa's recent signing of the Paris Agreements, coupled with increasing demand on the power grid is driving many businesses to invest in energy efficiency and alternative energy sources.

Global interest and investments in energy efficiency and renewable energy are at an all-time high. At the same time, case studies for the 'greening' of existing buildings, are proving that such investments can not only save energy, but also provide an attractive financial return for building owners.

For example, in 2009, the Empire State Building in the United States embarked on a project to reduce costs, increase real estate value and protect the environment. In 2011, the building beat its first year energy-efficiency target by 5%, saving USD2,4-million. The following three years saw the program generate a total of approximately USD7,5- million in energy savings at the landmark building.

The multimillion dollar investment in 'greening' the building is projected to save 38% in energy consumption; saving money for the building's owners, and the building's tenants who agreed to build out their office space to high performance standards.

The next big trend in the evolution of green buildings is to use on-site renewable energy generation to deliver more energy to the electric grid than it consumes from the grid over the course of a year. These buildings, called 'nett zero' or 'nett positive', are a key global strategy for delivering on the Paris COP21 commitments.

The 2016 Johnson Controls Energy Efficiency Indicator (EEI) survey of more than 1 200 facility and energy management executives in the United States, Brazil, China, Germany and India indicates that as many as 72% of the organisations surveyed anticipate increased investments in energy efficiency and renewable energy over the next 12 months. It also pointed to lack of funding, insufficient payback, uncertain savings and a lack of technical expertise as the most significant barriers to investment.

Similarly, there is a perception in South Africa that investing in green buildings is prohibitively expensive. While it can be costly, the cost savings will usually more than make up for the expenditure over time and subsequent to the payback period, the savings add directly to the bottom line. Over and above the cost saving and contribution towards a more sustainable environment, there are multiple additional benefits to energy efficient buildings, such as the positive effect on a business' brand and reputation with investors, customers and employees. There is a 'feel-good' factor to



Clay Nesler, VP of Global Energy and Sustainability.



Neil Cameron, area general manager, Africa for the Building Efficiency business of Johnson Controls.

knowing that a business is concerned with the environment.

There are a number of ways that companies can begin investing in energy efficiency and they don't all involve the investment of massive amounts of money into complete building retrofits. Building owners can start with little things, like properly insulating their building to reduce the cooling load, thus reducing the size and costs of the air-conditioning system.

Using sensor technology to automatically detect people's presence in a conference room or office and adjusting the lighting, cooling and ventilation accordingly also makes a big impact, as equipment is not in use unnecessarily. Building owners with multiple tenants can also promote energy efficiency by including energy efficiency provisions in leases to incentivise high performance. They can also educate tenants and promote healthy competition between tenants to see who can reduce energy the most over a given time period.

Businesses looking to 'go green' adopt a phased approach, ensuring that the right steps are taken in the right order. The iconic building in the U.S. example shows us that having a knowledgeable team of experts on board and following a proper, well thought out master plan can ensure that benefit is maximised with minimum investment.

With such a strong business case for energy efficiency and renewable energy, South African companies should have no excuse for not investing in greener buildings. With the global trend evidencing a move towards a more sustainable future, South African companies need to act now to take full advantage of the significant financial benefits while helping to preserve the environment and drive economic growth and job creation in our communities. ∞

Many misconceptions about sustainable building

Concrete has a low embodied energy which is an important factor for 'green building', says Bryan Perrie, managing director of The Concrete Institute.

Perrie says embodied energy is the energy consumed for the raw material extraction, transportation, manufacture, assembly, installation, disassembly and demolition of a product system over the duration of the product's life. In the case of concrete, the embodied energy as a result of these processes is low and the total energy - when full life-cycle analysis is assessed - also low.

"The current average worldwide consumption of concrete is about one ton per year for every living human being which, cumulatively, is massive. It should, right at the outset, be remembered that buildings are not constructed out of cement but rather from concrete, of which cement is but one ingredient. While the embodied energy of a pure cement is very high at around 900 kg/ton, when used in concrete with secondary materials, the embodied energy of concrete can be as low as 90 kg/ton.

"In any event, the concern about cement's environmental footprint also stems from ignorance. Despite the extensive use of concrete in the world, worldwide, the cement industry only accounts for about 5% of man-made carbon dioxide emissions: about 40% of this comes from burning coal and 60% from the calcination of limestone," Perrie states.

He says there are generally many

misconceptions - and inadequate assessment ratings in place - when it comes to establishing true sustainability in the built environment.

"The Green Star system of the Green Building Council in South Africa and the LEED system in the USA, for example, award points for various sustainability initiatives during the design and life of the building. Unfortunately, this incentive often leads to chasing points for a particular rating rather than concentrating on real sustainability."

Perrie says aiming for zero levels in primary energy consumption, carbon emissions during construction, waste and water consumption, coupled with the total elimination of unsustainable building materials, would be more appropriate sustainability measures.

"This has now become the quest of a few major corporations globally and, to me, is a far more pragmatic approach as it focuses on sustainable issues by setting targets rather than just scoring points. The 'zero' target may not be easy to achieve but it is a worthwhile target to strive for."

The Concrete Institute also believes that not enough attention is being paid to the "use phase" of a building or structure, which stretches from the initial extraction/production/construction phase right through to the end of life of the structure.

"Research has shown that the long-term, cumulative benefits of considering the whole life cycle of structures are staggering. This is a factor that simply cannot be ignored when it comes to assessing true sustainability in building," Perrie adds.

Concrete's low embodied energy contributes to sustainable building, says The Concrete Institute.



Jaco Kemp, sustainable buildings specialist at Arup.

Established Green Star award winner

Jaco Kemp, sustainable buildings specialist at Arup, has won the 2016 Established Green Star Award by the Green Buildings Council of South Africa (GBCSA) for his continued contribution to the green building economy.

Kemp has been involved in the design of a variety of projects that have included hospitals, residential apartments, hotels, airport developments, industrial facilities, office and retail developments - not only in South Africa but also in Ireland and Australia.

"It is always an honour to be recognised for one's contribution to building sustainability in South Africa, and I am especially proud to have been awarded the Established Green Star Award by the GBCSA. I have an absolute passion for sustainable design and development and the Silo district project at the V & A Waterfront in Cape Town is a leading example of sustainability on a district scale. Not only is each of the buildings designed, built and operated on sustainability principles, they also share common services that enhance efficiency, and it is project that we at Arup are extremely proud of having collaborated on," says Kemp.

RENOVATION OF AN EXISTING STRUCTURE IS A CORE PRINCIPLE OF SUSTAINABLE BUILDING.

Cape dame gets **FACELIFT**

Building refurbishment projects are always a challenge. Unlike new builds, contractors are usually confronted by a host of ‘unknowns’ that require careful planning and, just as importantly, the ability to adapt quickly to keep these projects on their critical paths.

Leading building contractor, Murray & Roberts Western Cape, is demonstrating all these traits in a current project that involves converting Triangle House (previously Safmarine House) in the Cape Town central business district into a Radisson Blu Hotel on behalf of Stonehill Property Fund.

While the division of Murray & Roberts Construction is operating on the basement to 11th floors of the structure, another contractor is converting the 12th to 23rd floors into luxury apartments. This arrangement is just one of the many challenges that Jacobus Malan, contracts manager at Murray & Roberts Western Cape, and his team have encountered on the site, over-and-above contending with a host of ‘unknowns’ that continue to emerge during the construction programme.

Co-habitation meetings

He says co-habitation meetings have been key to the success of this project, especially ahead of the occupation of the first tenants of the apartments anticipated to be sometime in October 2016. Occupation certificates are reliant to a large extent on Murray & Roberts Western Cape successfully completing certain aspects of its component of the build ahead of this project milestone. “There has been a lot of interface between the two contractors, especially in terms of the services which are all connected and lead into our section of the build,” says Malan.

Drainage was critical and Murray & Roberts Western Cape’s work in this regard had to be completed well ahead of those of its counterparts working above. This was also the case with the fire system, although the task at hand only involved reconfiguring the existing system on the various floors, while the main rises on each floor for the existing heating, ventilation and air-conditioning also had to be modified.

Logistics has been especially challenging, considering that all the other contractor’s workers and materials have to move through Murray & Roberts Western Cape’s site. In addition, both contractors have had to share the use of the existing elevators from the reception level requiring careful planning to avoid

bottlenecks.

Murray & Roberts Western Cape’s project will peak in the next few months when more than 450 people will access the site on a daily basis. Work on the apartments peaked earlier with about 200 workers moving in and out of the site.

These workers access the structure via eight elevators inside the structure. Three of these elevators service the hotel and four lifts, one of which is being replaced, provide access to the apartments.

Congested site

To ease the flow of materials, Murray & Roberts Western Cape has erected a materials hoist to alleviate some of the pressure on the existing building elevators. Murray & Roberts Western Cape now uses the hoist for the majority of its materials handling requirements which has allowed the existing elevators to be more effectively utilised, significantly easing material movement on the site. Malan says that space constraints and an extremely congested site require multiple handling of materials. In most instances, materials are delivered to site by truck and off-loaded and transported to the hoisting levels by smaller vehicles, before being hoisted to the various work faces of the project.

Extreme care has to be taken to regularly clear the parkade levels of unwanted material to avoid further congestion on site, especially in the areas which house the contractor’s offices and storage areas. Within the parking structure Murray & Roberts Western Cape has installed new water storage tanks and standby power generators that will service the entire building.

The first and second levels of the structure are also being extended to become a pool bar and dining terrace, but more complex work was undertaken inside. Malan is proud of the impeccable safety track record achieved on this site, especially considering the intricate nature of the contract that sees Murray & Roberts Western Cape only assume a management role on its build with all works let out to numerous subcontractors.

The project was recently placed second in the Master Builders Association Western Cape Regional Health and Safety competition. “We have had to ensure that all our subcontractors agreed with and adhere to our stringent health and safety policies at all times. Due to the close interface between the two sites, the other contractor also had to understand our safety systems and vice versa,” says Malan.

The company’s intense focus on safety on all its construction sites is mirrored by the proactive approach it took right from the outset when discovering that many of the window hinges of the façade of the building had been compromised and



Materials are delivered to the various sites by a hoist that was installed by Murray & Roberts Western Cape.



Murray & Roberts Western Cape has subcontracted all works related to the project, and has been tasked with managing these.



Murray & Roberts Western Cape is converting the first 11 storeys of the structure into a luxury hotel.

“We have had to ensure that all our subcontractors agreed with and adhere to our stringent health and safety policies at all times. Due to the close interface between the two sites, the other contractor also had understand our safety systems and vice versa.”

façade of the building had been compromised and posed a severe risk to the public below.

Immediate action was taken by clearly marking all the faulty fenestration and these windows were secured in placed works, curtailing any risk well ahead of the main construction works.

Malan describes this project as a ‘very tight job’, with costs having to be closely managed. However, Murray & Roberts Western Cape is proving again exactly why it continues to dominate the leisure property development space in Cape Town, a South African tourism hotspot. ∞

‘Sleep cities’ no longer an option

The creation of ‘sleep cities’, far away from work opportunities, is no longer sustainable in terms of urban development. New cities have to integrate all facets of life (live, work, play) in close proximity so as to enhance quality of life for inhabitants.

Urban development in general has important links with all forms of infrastructure, from the provision of bulk services such as water, electricity and sewage treatment, to mobility issues such as road, rail and air links to connect development nodes.

An integrated approach is essential to create sustainable developments. However, the importance of economic infrastructure should not be neglected, as this forms a vital part of urban developments. Sustainability is a critical element of urban development in general.

“In the process of creating living spaces for our communities, it is essential to ensure that developments are sustainable, and that they cater for all the needs of their inhabitants, from social and educational to economic,” argues Marius Kannenberg, functional GM, urban development, SMEC South Africa.

The company has expertise in the provision of integrated services for major urban development projects, ranging from high-value single and mixed-use developments to affordable and sustainable housing for both public and private sector clients.

It focuses on the delivery of municipal infrastructure services, building structure design, mechanical services for buildings, prefeasibility and feasibility studies, field investigation, urban design, planning approvals, computer modelling, preparation of tender and contract documents, tender evaluation, contract management, construction supervision, quality assurance and overall project management.

Within urban development, SMEC South Africa’s capabilities extend through all project stages, from conception to completion. “Our team consists of talented and experienced individuals dedicated to ensuring that each client receives only the best service,” stresses Kannenberg.

An example of a current project that the company is involved with is the Cornubia Precinct north of Durban, a flagship development in KwaZulu-Natal. This is an ongoing project where 1 300 ha of existing farmland is being developed into a variety of



*Marius Kannenberg,
functional GM,
urban development,
SMEC South Africa.*



The Cornubia Precinct near Durban is a flagship mixed-use development.

land uses such as industrial, commercial, mixed-use and housing.

“Various projects covering the whole spectrum from bottling plants to shopping centres and housing projects have been completed successfully over the whole of South Africa in the recent past,” Kannenberg concludes.

Fire Protect range

Den Braven FireProtect® is a complete range of fully certified and approved passive fire products, for application in expansion and connection joints, openings and surface penetrations, between fire compartments.

Passive fire protection products are the primary materials included in the construction of a building. By correctly applying these products, the fundamental and legal requirements of compartmentalisation can be met. Additionally, they contribute to the structural stability of a building and provide time to safely evacuate or clear it. Passive fire protection limits the spread of flames and smoke, which also limits the transfer and spreading of fire between fire compartments.

The Den Braven Fire Protect range consists of an FP Acrylic sealant, FP Silicone sealant, FP Hybrid sealant and FP PU foam filler. Each of these specialised products can have fire retardancy of up to four hours and international fire certifications.



Den Braven is known as one of the leading developers and manufacturers of sealants, adhesives and PU expansion foams and is considered to be an authority in the field of dedicated solutions – locally and internationally.

For further technical specifications and fire certifications please see the technical data sheets available on the Den Braven website or call the Den Braven sales team for technical assistance.

Den Braven Wet on Wet

Den Braven has launched the unique Wet on Wet. Time saving Wet on Wet has been developed to be over painted shortly after application, while still wet, with water based and alkyd paints. It saves a huge amount of time, normally taken up by waiting for the sealant to dry prior to painting. It is a high quality emulsion based sealant which does not discolour the paint layer, prevents cracking and still remains flexible after curing.

Wet on Wet's compatibility with paint is ensured by Den Braven's proven UCA Technology (Unique Compatibility Additives). It was developed by selecting specialised additives and raw materials through dedicated research and development and put through stringent technical testing at Den Braven's Centre of Excellence in Holland.

Wet on Wet is ideal for connecting joints which require quick over painting such as between internal stairs, walls, ceilings, cornices, skirting boards, windowsills and wooden window frames.



Special coating for manufacture of mild-steel products

Kansai Plascon has launched a special coating that streamlines the manufacture of mild-steel products by doing away with the traditional two-product primer and topcoat system.

The coating is a direct-to-metal application, and can be applied as a conventional spray as well as by brush or roller, Kansai Plascon Industrial and Protective Coatings brand manager Mareta le Roux explains.

She adds that the coating has the major benefit of 'built-in' primer properties, such as adhesion promotion to the substrate, in addition to corrosion protection. It can also be used as a topcoat over most primers if long-term guarantees are required.

The latest development from Kansai Plascon with regard to this special coating is that it will be available as a tint-base system in future. "This means it can be supplied to Original Equipment Manufacturers (OEMs) in hundreds of colours through our distributor network," le Roux highlights. Another development has been the addition of anti-electrostatic properties.

The coating has been developed specifically by Kansai Plascon at its Mobeni laboratory in Durban to address a market need for a cost-effective, high-quality direct-to-metal product. This laboratory for industrial and protective coatings is supplemented by the Kansai Plascon Research Laboratory in Stellenbosch.

As a value-added service, a trained technical sales consultant can pay a visit to an OEM to inspect the manufacturing set-up. Following this, a detailed recommendation will be made as to the correct implementation of the special coating in that particular OEM's manufacturing process.



Mareta le Roux, Kansai Plascon Industrial and Protective Coatings brand manager .

This special coating was aimed initially at mild-steel products such as Liquid Petroleum Gas (LPG) gas canisters, but has since branched out into many different industries and applications. "We have even supplied this special coating to mining-equipment manufacturers, where a quick turnaround and high production volume are critical," le Roux concludes.



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