



# TRIED AND TESTED

Testing laboratories are usually artificially lit, blisteringly hot and noisy burrow-like spaces, which makes South Africa's new Product Testing Institute – an airy, stylish and comfortable facility that has recently joined the country's elite clutch of 6 Star Green Star SA buildings – all the more impressive.

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**T**he Product Testing Institute (PTI), strategically situated in the automotive and tyre-manufacturing cluster in the Coega Industrial Development Zone (IDZ) outside Port Elizabeth, is designed to facilitate research and innovation in product life cycle and recycling, with a particular focus on the tyre industry. Not satisfied with a mere nod to its environmental sustainability mandate, the building project incorporated innovative and meticulously calculated initiatives that have earned it a Green Building Council South Africa (GBCSA) 6 Star Green Star SA rating under the Public and Education Buildings rating tool.

Millions of waste tyres lie piled or strewn around South Africa, with millions more added each year. While some make their way to recycling facilities, others are burned for scrap metal content or warmth, releasing noxious fumes and liquids in the process. The Recycling and Economic Development Initiative of South Africa's (REDISA) Integrated Industry Waste Tyre Management Plan aimed partly to drive research and development into smarter and more efficient tyre recycling processes, and it is out of this mandate that the PTI was established.

The PTI's aim is to create opportunities for resource sustainability and the circular economy by performing tyre testing to international homologation standards, critically analysing the environmental impact of tyres throughout their life cycle, and developing an environmental rating system for tyres. In addition, the PTI has partnered

with Nelson Mandela University's Centre for Rubber Science and Technology to provide training and facilities for practical research by its students.

For now the new building is quiet, with just a few full-time employees, as the PTI waits for decisions on new funding, the complex testing machinery to be procured and installed, and the facility to be readied for accreditation to ISO standards. In full thrust, it will accommodate 40 staff and have the capacity to swell to 60 with visitors.

## DESIGN PUT TO THE TEST

A double-volume storage, testing and laboratory section pairs with the brick and mortar side of the building, which incorporates offices and an auditorium/lecture space. One of the criteria for sustainable architecture is to ensure long life of a building, so lead architect Hubert Sieg, of Imbono FJA Architects, created a potential multi-purpose building that could be easily adapted for alternate uses in future, rather than just building a laboratory for testing tyres.

While its design has achieved a minimum impact in terms of energy, water and materials, occupant well-being received equal care. PTI general manager André Strydom says the building's design creates a brilliant connection to its environmental reason for being.

"The PTI is focused on improving our environment and the lives of South Africans as we establish ways for the tyre industry to go green. Some of our

### NUTSHELL

**Location:** Coega Industrial Development Zone, Nelson Mandela Bay

**GBCSA rating:** 6 Star Green Star SA – Public and Education v1

**Construction commencement date:** May 2016

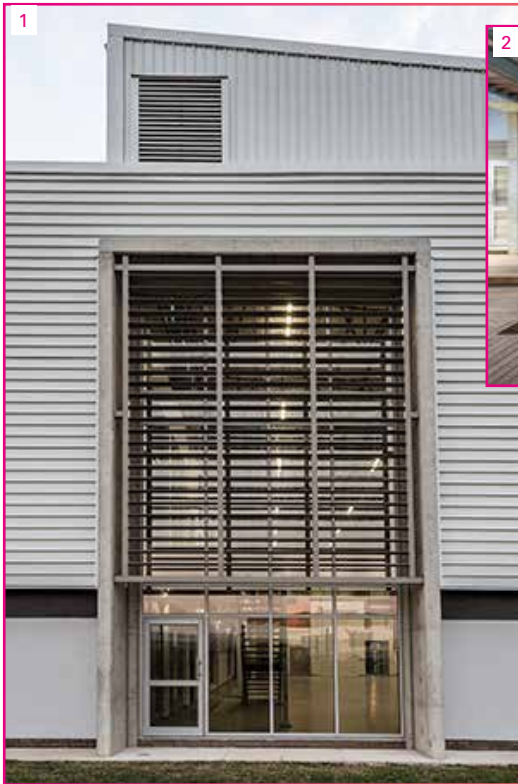
**Completion date:** April 2017

**Total gross floor area:** 4200m<sup>2</sup>

**Local content:** 30% SMME involvement

**Total value:** R75million





1. Passive interventions include shading fins on the facade to reduce unwanted heat.
2. 'Feel-good materials' like timber and raw concrete were incorporated and there is an indoor/outdoor flow.
3. Diffused natural light and fresh air flood the double volume testing areas.

specialist equipment is the only example of its kind in sub-Saharan Africa. We have the potential to make a positive impact, not only on the environment but also on the industry, the economy and the job market.

"I have worked in the tyre industry my entire career – this facility is among the world's best, something in which South Africa can take real pride. It's wonderful to work here: beautiful, calm, clean and inspiring," he says.

Occupant comfort and well-being is one of the PTI's successful point gains on the Green Star scorecard, which rated it highly in the category of Indoor Environmental Quality. Sieg says quality of working life should be a critical consideration, particularly in a green building.

"We tried to change the nature of traditional clinical laboratories and create a pleasant human space. Diffused natural light and fresh air flood both the testing areas and the office building. We have incorporated feel-good materials like timber and raw concrete where possible, and there is a clear indoor/outdoor flow."

The project scored most highly in the Green Star rating under Innovations, with creative thinking and ideas incorporated into the design. Sieg invited Eric Noir, of Design for Abundance, to be part of the team's initial creative thinking, while green building consultant Francois Retief, of Sow & Reap, provided a sounding board and managed the Green Star process.

## BUILDING STRONG

Design began in 2014, and construction was a quick-fire 11 months, starting in May 2016 and finishing in April 2017.

"For a complex laboratory building, the project went very well, although it demanded sweat equity and a tremendous team effort. One of our biggest challenges was the tight timeframe while ensuring that we never compromised on our green building rating goals. To ensure that we stayed on track, we built a penalty clause into the contract agreement. Fortunately, the contractor, Aveng Grinaker-LTA, was equally passionate and professional about the project," says Sieg.

For its Port Elizabeth-based team, this green building was a first. Paul Mason, project manager, agrees it was "a tough project", which tested the team to their maximum, but of which they are now deservedly proud.

"The tight time frame left no room to slip up and the detailing in the building is intense, with complex finishes. We put our heads together and came up with some non-traditional solutions – such as using specially designed 9m shutters and self-compacting concrete to pour concrete walls in a single pour rather than sections. This saved substantially on construction speed, while maintaining quality."

Mason says one of the biggest sustainable wins as the contractor – and one they will carry forward with other projects – was to compact and reuse the



## SUSTAINABILITY FEATURES

In all, the project scored a total of 75 Green Star SA points, especially high in the categories of innovation, water and energy.

- Renewable energy from 120kW PV solar array
- Natural ventilation to research storage area
- Energy-efficient heating and cooling systems with motion-sensor shut-off
- Energy-efficient LED lighting and lighting sensor controls
- Solar hot water generation
- Passive interventions include vertical shading fins on the east/west facade to reduce unwanted heat (saving electrical cooling), while still allowing in daylight
- Fully integrated building management system
- Retained natural vegetation for landscaping mitigates the need for irrigation
- Rainwater harvesting from the roofs is stored in tanks and utilised in toilets, urinals, showers, and the courtyard water feature
- Xeriscaped roof garden helps to stabilise indoor temperatures
- Occupant comfort and well-being prioritised through indoor environment quality
- Natural, diffused daylight achieved through balance of glazing and shading. Auto-sensor blinds avoid glare in office and lab areas
- High percentage of glass offers sweeping external views
- Fresh air (in excess of 12.5ℓ/s/person) is provided to all occupied areas
- Low levels of toxic solvents were ensured in paints, flooring, adhesives and joinery
- High acoustic quality afforded to all spaces, reducing noise from external and building services, and minimising reverberation in the auditorium
- Dedicated printing exhausts are provided in the printing room to remove any toxins created
- Prioritised parking and recharge points for electric cars
- Bicycle storage, lockers and showers

builders' rubble in non-structural elements wherever possible. This saved the cost, the time and the extra carbon count of having to cart it away to landfill.

Approximately 70% of the works material is local content, which Mason said was easily sourced, with the exception of the structural steel. There are no steel mills in the Eastern Cape, so this had to come from the Northern Cape. Local small, medium and micro-enterprise (SMME) involvement tallied to about 30%.

### LOCAL GREENING

One of the dangers with the Coega IDZ and the nature of the buildings that are built there is their potential to strip the natural vegetation. To mitigate that, new builds are required to do a search and rescue operation of the natural habitat before construction starts. Endangered plant species are removed to a nursery at Coega and made available for reuse in landscaping.

"In addition, we undertook two of our own initiatives," Sieg explains. "Rather than creating one large concrete hardstand, we mapped out the delivery trucks' route and only built there, so the facility now includes two green lungs in the hardstand area. Secondly, we combined the need for fencing, which damages vegetation, with our need for a retention pond, creating a rectangular pond along the fence line, which also contributed towards our GBCSA points."

The office building was designed around a green courtyard, which offers protection from the region's infamous wind as well as adding to the positive working environment. "We created winter and summer gardens in this space, with cool shade under the wooden pergola, puddles of winter sunshine under the acacia trees and a water feature to mask intrusive noise," says Sieg.

Landscaping in the courtyard includes stones harvested from the building site. All landscaping is xeriscaped, including the earth mound roof garden leading out from the boardroom, which further insulates and moderates temperatures in the auditorium beneath it due to its thermal mass. By fortunate coincidence, the PTI site is next to Aldo Scribante Race Circuit, which can be viewed from the roof garden. Additional Green Star points were scored by the creation of a yard at the racetrack with a local community monthly contract for tyre removal to the recycling plant.

Sieg says extensive calculations went into the building's water usage, with potential savings reinforcing the business case for rainwater harvesting. There are four 6000litre tanks underground, plus another four Jojo tanks with a 10 000ℓ capacity above ground.

### LETTING IN THE LIGHT

Natural lighting and fresh air is maximised in all the circulation spaces, while the habitable spaces (boardroom and offices) optimise their use of air



The walkways around the courtyard edge include plenty of glass and natural ventilation. The tranquil gurgle of the courtyard water feature dampens noise from the N2 highway and the testing laboratories.

conditioning and natural light through clerestory lighting. The walkways around the courtyard edge include plenty of glass and natural ventilation. To facilitate the natural flow of air, ceilings are angled to direct hot air through penetrations in the floor slab and ceilings into a dedicated natural ventilation extraction system which exhausts through four lobster cowl in the four corners of the courtyard space.

Effort also went into the acoustics, with acoustic dampening control throughout as well as the tranquil gurgle of the courtyard water feature to dampen noise from the N2 highway and the testing laboratories. The harvested rainwater for this is fed from one of the underground tanks and the renewable electricity generated by the photovoltaic solar array on the roofs – which the architects claim is arguably the biggest in the city. “We squeezed in the maximum number of panels that could physically fit on to the roof,” Sieg explains. They are arranged in four solar arrays, each connected to its own grid-tied inverter, providing a total of 120kW. “The cost of electricity in the Coega IDZ is punitive so it was a cost-saving exercise as well as a green consideration.”

The saw tooth roof is angled northwards to maximise exposure. On the south side, it is glassed to allow a flood of natural light into the warehouse and vastly minimise the costs of artificial lighting. The offices have automated blinds, which engage when there is glare. Throughout, an intelligent

building management system optimises these features and functionality.

### A GREEN VISION

“During construction, we extended green building lessons, not only to the labourers on-site but also to the neighbouring community. They were given talks on sustainability and we arranged for artists to run workshops along this theme, at which people created artworks on small panels of leftover pallet wood reflecting what they had learned,” says Sieg.

These works now feature in an art installation in the office area, thereby maintaining the connection with the community and reminding PTI employees and visitors of its greater greening purpose. ☉

### SOURCEBOOK

**Client:** The Product Testing Institute, André Strydom, general manager, 083 661 5741

**Architect:** Imbono FJA Architects, Hubert Sieg, lead architect, hubert@imbonofja.co.za, 041 365 3691, 082 878 9883

**Main contractor:** AVENG Grinaker-LTA, Paul Mason, www.grinaker-lta.com, 041 365 4565

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**Green building consultants:** Sow & Reap Consulting, Francois Retief, info@sowandreap.co.za, 074 272 2911; Design for Abundance, Eric Noir, eric@abundanceafrica.com, 083 473 3629

**Health and safety/environmental consultants:** CLC Consulting, Chris Castle, ccastle@internext.co.za, 083 321 2430