

# The FNB Stadium (Soccer City) in Johannesburg

The biggest sport facility in South Africa was renovated and extended with Mapei products

The First National Bank Stadium in Johannesburg, the economic capital and most populated city in South Africa – better known as the FNB Stadium and currently referred to as Soccer City – is the structure which hosted the opening match between South Africa and Mexico and the final between Spain and Holland during the 2010 World Cup, which took place from the 11<sup>th</sup> of June to the 11<sup>th</sup> of July. Built in 1986, it is one of the main stadiums of the South African Football Association.

The stadium was renovated and its capacity was increased for the occasion from 80,000 to 94,700 spectators divided into three levels, making it the largest stadium in Africa.

**Photo 1.** An external view of the Soccer City (FNB Stadium) with its characteristic “calabash” form, the multi-purpose pot typical of the African continent.

When the 2010 FIFA World Cup was awarded to South Africa, an enormous amount of work had to be carried out to modernise the stadiums and bring them up to the standards required by FIFA.

Ten stadiums were selected from around the country to hold the various matches, two of which are in Johannesburg: the Ellis Park Stadium and the FNB Stadium.

The FNB Stadium is in the suburb of Soweto, and the South African design studio Boogertman Urban Edge + Partners in collaboration with Populous designers were chosen to upgrade it to the required standards.

The designers came up with a plan to partially demolish the stadium and add various structural features, such as extending the struc-

ture’s upper tier and increasing the stadium’s capacity.

Also, the stadium now has a restaurant for 300 diners, two VIP suites, eight television studios, an underground car-park with a capacity of more than 4,000 vehicles, 32 turnstiles, 71 kiosks for beverages and souvenirs and a football museum.

Apart from the covered stand, the modernisation work included the construction of new offices and changing rooms and the installation of state-of-the-art electronic instrumentation. Not only was the capacity of the stadium increased, every spectator now has a better view of the action on the field, even those seated furthest away, while maintaining the correct maximum distance from the pitch.

1





2

The characteristic of the stadium is the shell around the stand and playing field area, the idea of the designer being to create a structure which was similar in form and colour to a "calabash", the multi-purpose pot typical of the African continent. The structure is composed of reinforced concrete profiles which support the two levels of terraces and the gallery, connected together by steps. The external "shell" is characterised by a sinuous mosaic of cement with reinforced glass fibre panels in a range of eight different colours and two different textures. These are

**Photo 2.** An internal view of the stadium with its new covered stand.

**Photo 3.** A phase of the installation of the covering on the external structure. The "shell" is characterised by a sinuous mosaic of cement with reinforced glass fibre panels in a range of eight different colours and two different textures.

interspersed at irregular intervals by glass cut outs. A truss-supported roof surrounds the whole stadium.

Karrena Africa, a specialised contracting company, has been responsible for a considerable portion of the repair and enhancement work. Mapei products contributed to the works in and around the suites of the old stadium which over the years were subject to weather and water erosion. Areas which required strengthening were repaired with steel brackets using Mapei's ADESILEX PG1 and ADESILEX PG2 thixotropic epoxy adhesives for structural bonding. ADESILEX PG1 provides exceptional mechanical strength and



3

bonding capacity and hardens into a shrinkage-free compounds within a few hours. On the other hand, ADESILEX PG2 features extended workability which makes it especially recommended for applications at temperatures above +20°C.

Concrete sections where corrosion and deterioration occurred were scoured out and cleaned with high pressure water. If any reinforcing steel was exposed as a result of this process, it was treated with MAPEFER 1K, a one-component anti-corrosion cementitious mortar applied with a brush. Thereafter MAPEGROUT FAST-SET (RAPIDO) shrinkage-compensated fibre-reinforced mortar was applied in

## IN THE SPOTLIGHT

### MAPEFLEX PU45

It is a single component, thixotropic, easy-to-apply polyurethane-based sealant and adhesive with a high modulus of elasticity, meeting the requirements of **ISO 11600** class **F20 HM**. MAPEFLEX

PU45 has been specially developed for sealing expansion and distribution joints in horizontal and vertical surfaces, including those which are subject to occasional chemical attack provoked by hydrocarbons. It is also recommended for

flexible bonds between similar and different materials and as a replacement or to integrate mechanical fasteners. Solvent-free, odourless with a low impact on the environment, MAPEFLEX PU45 is certified as **EC1 R** by **GEV** as a product with extremely low emission levels of VOC (volatile organic compounds).

### ADESILEX PG1

It is a two-component product based on epoxy resins, selected fine-grain aggregates and special additives, used for structural repair, bonding and reinforcement of concrete elements, natural stone, mortar

and brick.

It is especially suitable for applications in temperatures between +5° C and +23°C. ADESILEX PG1 meets the requirements defined by **EN 1504-9** ("Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - General principles for the use of products") and the minimum requirements claimed by **EN 1504-4** ("Structural bonding").





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layers ranging from 25 mm to 30 mm. Some damaged areas also required the use of MAPEGROUT HI-FLOW (COLABILE) shrinkage-compensated fibre-reinforced grout.

Blow holes in concrete surfaces were filled with PLANITOP 100 light grey and fine skimming mortar, which was applied in layers up to 3 mm. Some of the vertical and horizontal joints were sealed with MAPEFLEX PU45 one component, thixotropic, rapid-hardening polyurethane sealant and adhesive with high modulus of elasticity.

MAPEBAND TPE tape was also used for flexible sealing and waterproofing of expansion joints and fissures in between sections of the stadium precast panels. The tape was bonded with ADESILEX PG4 two-component, thixotropic, epoxy adhesive.

EPOJET, super fluid epoxy resin, and EPOJET LV, low-viscosity

**Photo 4.** The adhesives ADESILEX PG1 and ADESILEX PG2 were used to bond and seal the steel brackets.

**Photo 5.** MAPEGROUT FAST-SET fibre-reinforced mortar was used to repair the concrete surfaces.

**Photo 6.** PLANITOP 100 mortar was applied to fill blow holes in the damaged concrete.

epoxy resin, were used for injection of cracks.

EPORIP wet-to-dry- epoxy adhesive was used to bond old and new concrete areas together.

PLANITOP 430, thixotropic, fibre-reinforced, controlled-shrinkage, medium strength mortar, was used to repair and level surfaces outside of the suites.

Paul Niemandt, a site agent of Karrena Africa, said he was impressed with Mapei's wide product range: "the products offer exceptional quality and our workers like using them because they are easy to apply. Moreover, Mapei technicians provides us with excellent assistance on the building site".

## TECHNICAL DATA

**Soccer City (FNB Stadium), Johannesburg (South Africa)**

**Period of Construction:** 1986-1989; renovation and new construction: 2007-2010

**Period of Intervention:** 2008-2010

**Intervention by Mapei:** supplying products for protecting the reinforcing rods, repairing internal and external damaged concrete surfaces, bonding metal structural strengthening elements, and sealing joints.

**Designers:** Boogertman Urban Edge + Partners, Populous

**Client:** City of Johannesburg

**Works Director:** Chris van Jaarsveldt

**Contractors:** Grinaker-LTA/Interbeton, Karrena Africa

**Mapei Co-ordinator:** Pieter Aucamp, Mapei South Africa (Pty) Ltd

## MAPEI PRODUCTS

The products mentioned in this article belong to the "Building Speciality Line" range. The technical data sheets are available at the web site: [www.mapei.com](http://www.mapei.com).

Mapei levelling and smoothing compounds and pre-blended mortars for screeds conform to EN 13813 standard and have been awarded the CE mark in compliance with annex ZA, standard EN 13813. Mapei products for the protection and repair of concrete surfaces and structures have been awarded the CE mark in compliance with EN 1504. Mapei sealants conform to ISO 11600 standard.

**Adesilex PG1 (CE EN 1504-4):** two-component thixotropic epoxy adhesive for structural bonding.

**Adesilex PG2 (CE EN 1504-4):** two-component thixotropic epoxy adhesive with extended open time for structural bonding.

**Epojet (CE EN 1504-5):** two-component superfluid epoxy resin for injection.

**Epojet LV (CE EN 1504-5):** two component very low viscosity epoxy resin for injection in micro cracks.

**Eporip (CE EN 1504-5):** two-component, solvent-free epoxy resin based adhesive for cold joints and monolithic sealing of cracks in screeds.

**Mapeband TPE:** tape for flexible sealing and waterproofing of expansion joints and fissures subject to movement up to 5 or 10 mm wide.

**Mapefer 1K (CE EN 1504-7):** one-component corrosion-inhibiting cementitious mortar for the protection of reinforcing rods.

**Mapeflex PU45 (EC1 R, ISO 11600, class F20 HM):** one component, thixotropic, rapid-hardening polyurethane sealant and adhesive with high modulus of elasticity.

**Mapegrout Hi-Flow (CE EN 1504-3, class R4):** shrinkage-compensated fibre-reinforced grout for concrete repair.

**Mapegrout Fast-Set (CE EN 1504-3, class R3):** shrinkage-compensated fibre-reinforced mortar, with rapid setting and hardening for the repair of concrete

**Planitop 100 (CE EN 1504-2, coating (c) principles MC-IR):** light grey, rapid setting, fine mortar for repairing and smoothing concrete and renders.

**Planitop 430:** thixotropic, fibre-reinforced, controlled-shrinkage, medium strength mortar that was used to repair and level surfaces outside of the suites.