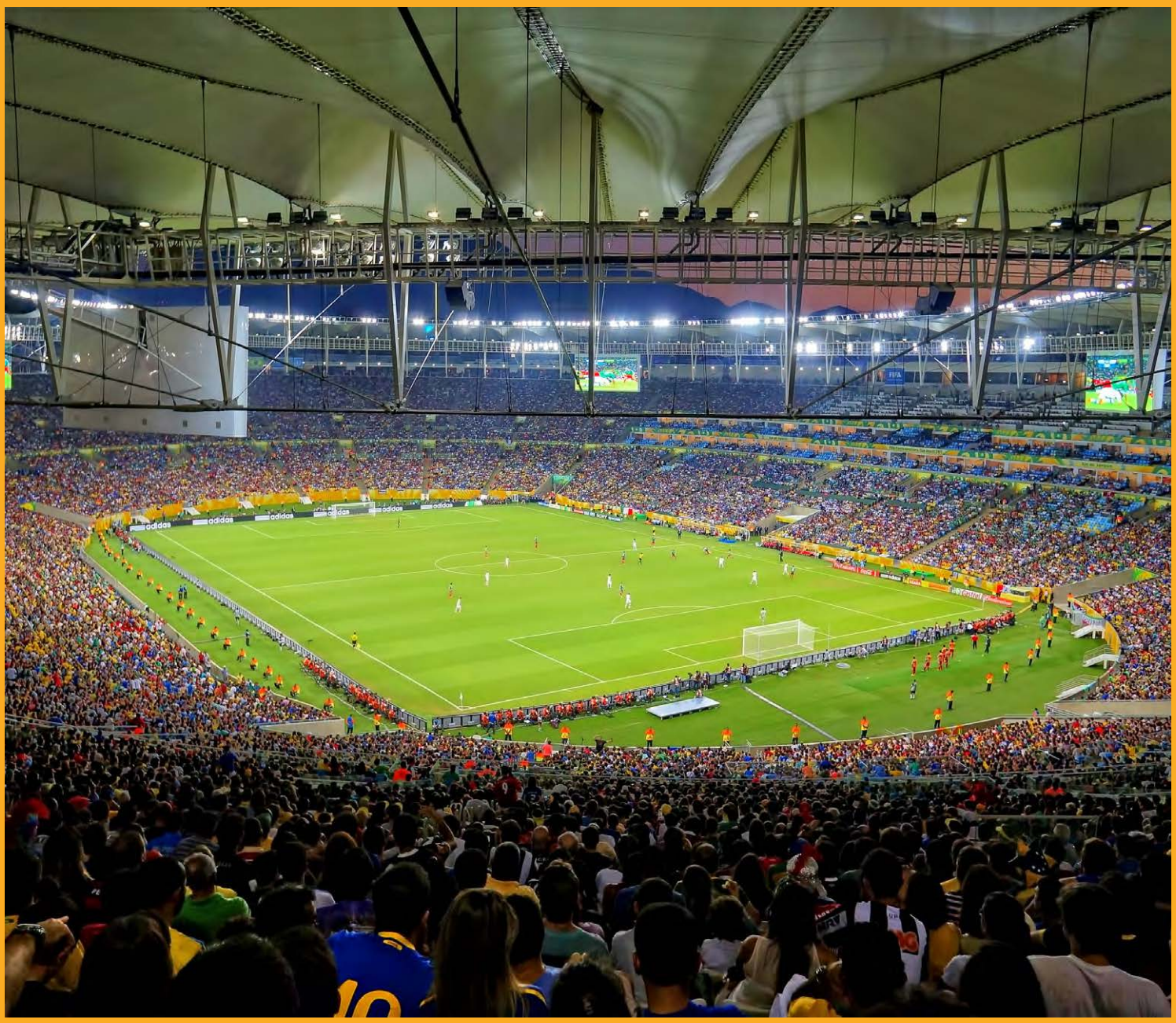


Maracanã, Rio de Janeiro, Photo: Leandro Neumann Ciuffo

SIKA AT WORK
STADIUMS FOR 2014 WORLD FOOTBALL GAMES IN BRAZIL

TOTAL 11 STADIUMS WITH SIKA'S CONTRIBUTION OF CONSTRUCTION MATERIALS IN THE BUILDING AND REFURBISHMENT, FROM BASEMENT TO ROOF!

BUILDING TRUST

CORINTHIANS ARENA SÃO PAULO

PROJECT DESCRIPTION

Of the three biggest clubs and one of the first in the City of São Paulo, the Sport Club Corinthians Paulista was the only football team without a stadium of sufficient size and infrastructure to host their regular games, despite them having the largest number of supporters of all.

But this has now come together, with the 2014 football games resulting in the construction of the São Paulo Arena in the Itaquera neighbourhood, a traditional Corhinthians stronghold. With a normal seating capacity of over 48'000, during the 2014 football games an additional 19'800 seats have been added. The stadium construction project was also designed to kick-start the redevelopment of the eastern zone of the capital and home to almost 4 million people. In total, almost 6,000 people have been directly and indirectly employed in during the construction project.

The São Paulo Arena was chosen as a fitting stage to host five games, including the opening game of the 2014 football games that was seen by many millions of people all around the world.

Arena Corinthians, São Paulo, Photo: Portal da Copa; Copagov Flickr

PROJECT REQUIREMENTS

The combination of insitu and precast construction used for the reinforced concrete grandstand structures and decks required high workability to be maintained and frequently for extended periods, in the concrete mixes that were used for most of these works, and throughout the construction period. This was required in order to achieve the high standards of production, finish and strengths that all had to be consistent and maintained in all temperature and humidity conditions.

SIKA SOLUTIONS

Sika Viscocrete® Technology was evaluated in extensive trials, then selected and used throughout the whole construction project as the ideal solution to provide high-performance, super plasticisers for the different applications and requirements of the concrete. This was especially for concrete that had to maintain its workability, including over an extended period to facilitate placing or larger pour sizes for example, and then harden quickly and uniformly to the desired high standards of finish and strength specifications.

Arena Corinthians, São Paulo, Photo: Portal da Copa; Copagov Flickr

MARACANÃ
RIO DE JANEIRO

PROJECT DESCRIPTION
Originally built in Rio de Janeiro for the football event in 1950 and immortalised for the unforgettable final between Brazil and Uruguay, the recently refurbished and 'New-Look' Maracanã stadium is still the largest in Brazil and is now an all-seated venue with a capacity of more than 79,000. It hosted seven matches in the 2014 competition, including the final on 13th of July.

The Maracanã is owned by the state of Rio de Janeiro, and has grown to become the regular home of local premier league clubs Flamengo and Fluminense, plus other Rio clubs such as Botafogo and Vasco da Gama also occasionally use the stadium for high-profile matches.

The renovation converted the Maracana into a multi-purpose arena complete with bars, restaurants and shops, with a new roof to cover the entire public area added on top of the five-storey structure. To improve access and security, four additional entry / exit ramps were added to the existing two, which are also being retained as part of the original facade. This upgrade allows for a full evacuation of the stadium to take place within just eight minutes if ever required. The roof has more than 1,500 photovoltaic panels in array to produce enough solar energy to power the whole arena.

A new hospitality wing and media centre was constructed on the west side including the latest press and broadcast facilities, plus an auditorium and meeting rooms.

Maracanã, Rio de Janeiro, Photo: Portal da Copa; Copagov Flickr

PROJECT REQUIREMENTS

In keeping with the original design, the renovation project included that the original blue façade, which is protected by the Institute of National Historical and Artistic Heritage, had to remain intact. The complete demolition of the lower stands allowed construction of new grandstands and seating areas with much better visibility, also maximising the visual impact of the preserved original ramps, plus the installation of a new roof that also captures rainwater for reuse throughout the facility.

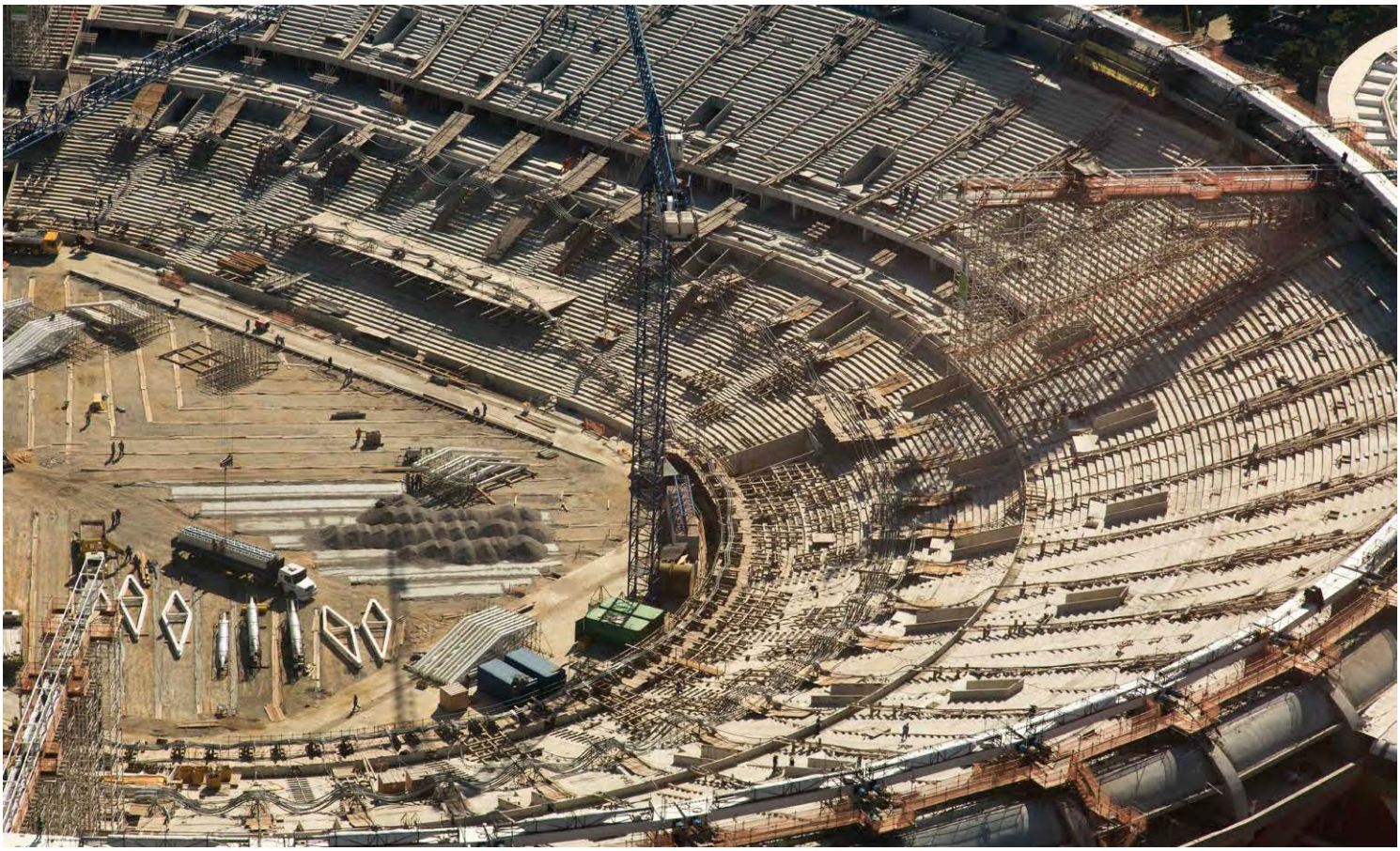
Once again in addition to the requirements of durability and sustainability, this project is another example of a combination of new construction and refurbishment in a single project, with demands on the materials used to be adaptable and tolerant of high temperatures and high humidities together with simultaneous drying winds and high UV light exposure.

SIKA SOLUTIONS

The Maracanã is well known to Sika Brazil, as they had supplied the concrete repair and structural strengthening products for the previous refurbishment and upgrading works in 1976.

For this major refurbishment and modernisation project between 2010 and 2013 in time for the stadium to reopen for the Confederations Cup, Sika again provided the solutions for the concrete refurbishment and structural strengthening in many areas including to the supporting columns and beams throughout the structure with Sika Anchorfix® resin anchors and Sikadur® structural epoxy adhesives.

The movement and construction joints in the grandstands and other horizontal areas were also made watertight with the tough elastic, polyurethane sealing system with Sikaflex® Pro-3. For the joints in the facades, a Sikaflex® low modulus elastomeric sealant with high resistance to extreme weathering and UV light was selected.



Maracanã, Rio de Janeiro, Photo: Portal da Copa; Copagov Flickr

ESTÁDIO NACIONAL BRASÍLIA

PROJECT DESCRIPTION
The Estádio Nacional de Brasília in the Federal Capital of the country is one of the most impressive and the second biggest stadium, with a seated capacity of up to 68,009 spectators, of the 12 that are hosting the 2014 football games in Brazil.

The old Mané Garrincha stadium on the site was almost totally demolished and replaced in 2013 with a new multi-purpose arena as part of the Ayrton Senna Multisport Complex. The project included the construction of new grandstands and a lowered pitch to allow a full view of the game from every angle, plus a completely new façade and a lightweight metal roof structure.

The Estádio Nacional de Brasília was used to host games for the Confederations Cup in 2013, and has been used to host seven games of the 2014 football games, including one of the quarter-finals.

Estádio Nacional, Brasília, Photo: Portal da Copa; Copagov Flickr

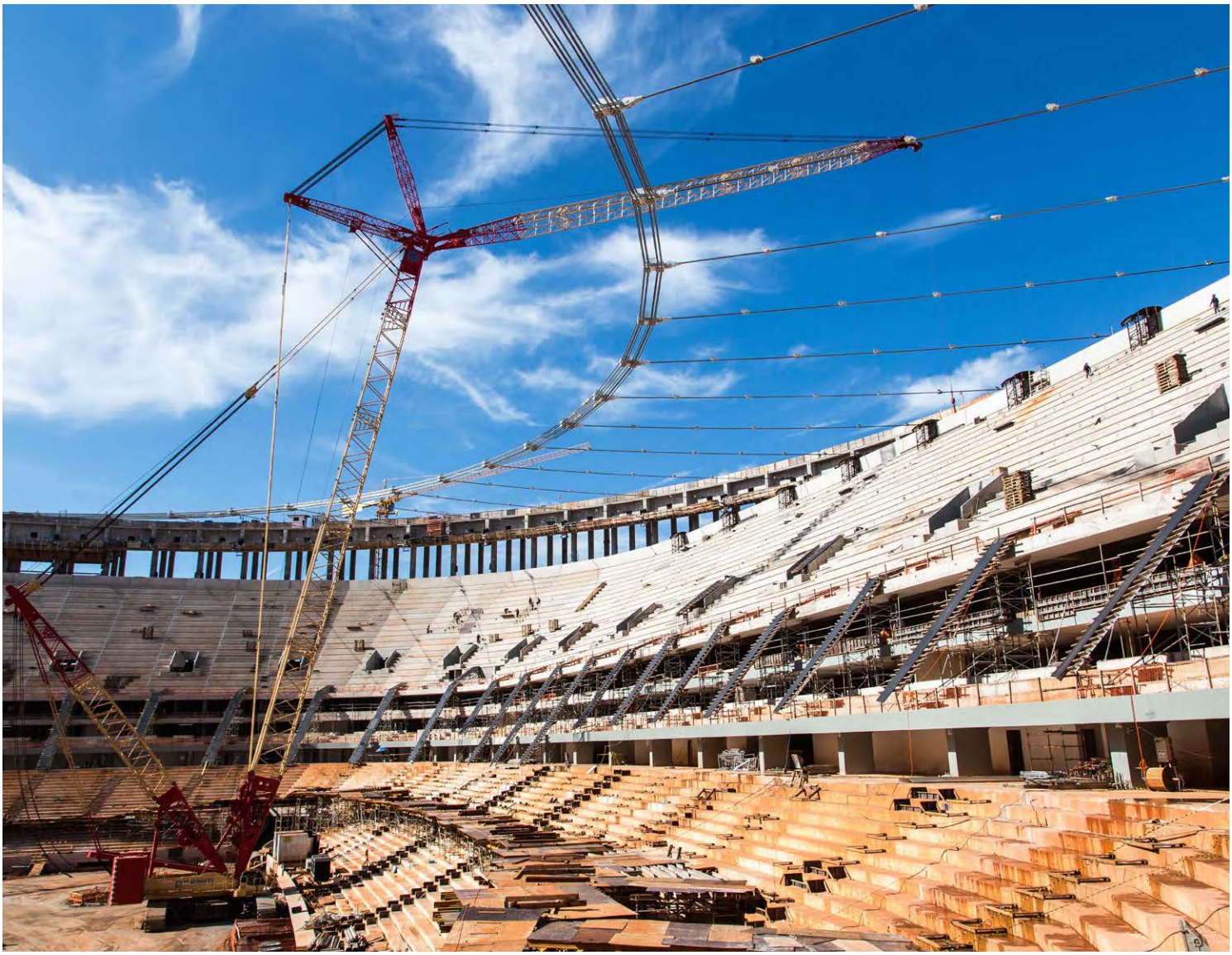
PROJECT REQUIREMENTS

This prestige project was defined as an environmentally correct construction project, aiming for zero carbon emissions, recycling and total access via public transport, this was to consolidate the reputation of the Brazilian capital as a world reference point in sustainable planning, and leaving a significant legacy for other sectors of the local economy.

The main specialist construction requirements for the Estádio Nacional de Brasília were waterproofing above and below ground, refurbishing and protecting exposed concrete surfaces and the watertight sealing of all types of joints.

SIKA SOLUTIONS

Sika Igolflex® bitumen waterproofing systems were used for waterproofing the foundations and water tanks; SikaGrout® systems were used to fill voids and repair the concrete structures, together with Sikadur® epoxy resin based structural adhesives for bonding structural elements. Plus Sikaflex® Pro-3, a polyurethane based, tough elastic sealant was used for sealing and waterproofing all of the horizontal joints in and between the grandstands.



Estádio Nacional, Brasília, Photo: Portal da Copa; Copagov Flickr

AMAZÔNIA ARENA MANAUS

PROJECT DESCRIPTION
The Amazônia Arena, previously known as the Estádio Vivaldão Stadium, was never a traditional setting for Brazilian football, but it has certainly attracted a large amount of attention due to its location in the heart of the most extensive area of continuous rainforest in the world.

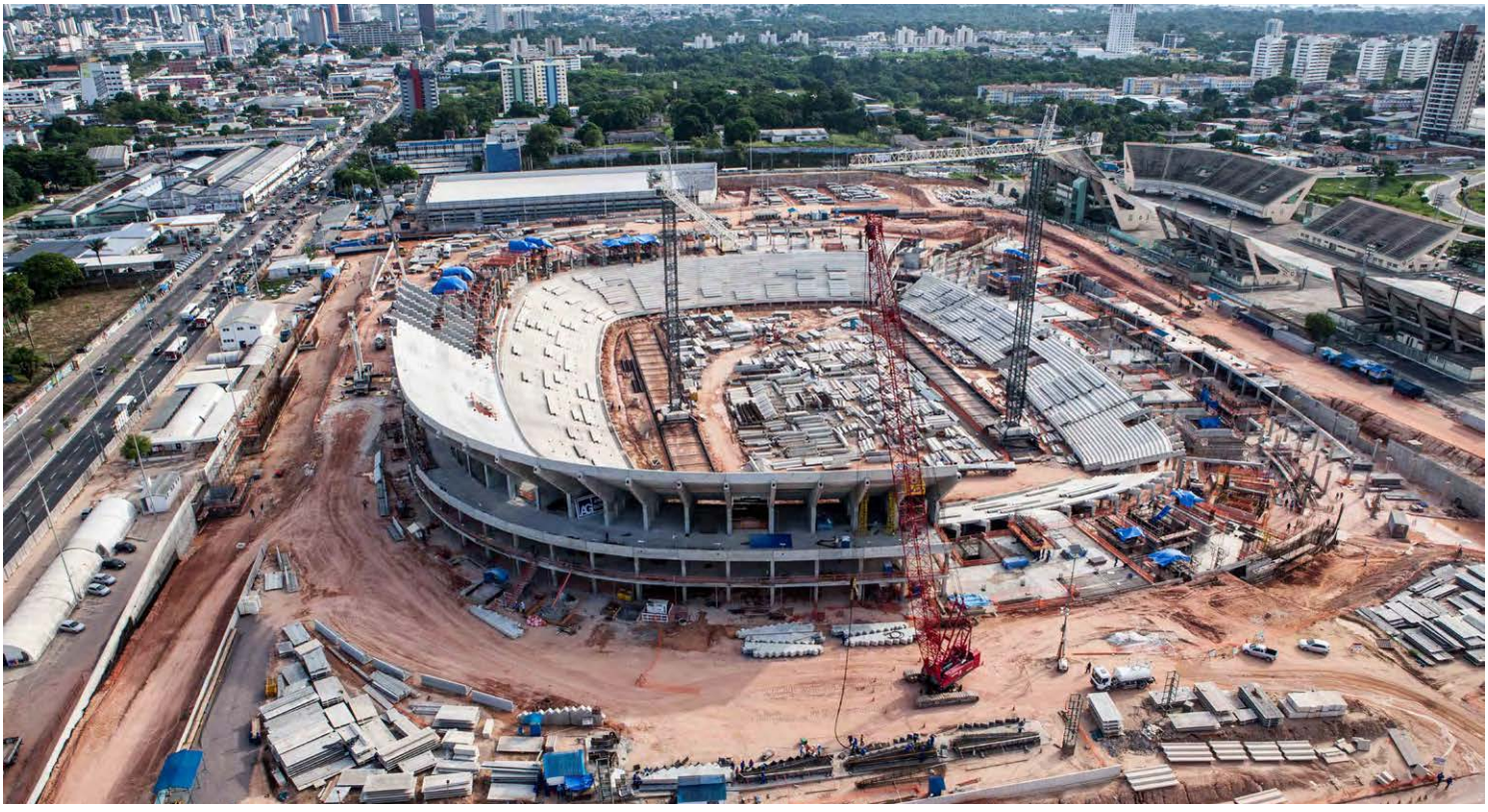
The stadium design includes a metal structure looking similar to a type of traditional woven basket typical of the region, which protects the external areas of the grandstands.
The Amazônia Arena can accommodate 42,377 spectators; it has several restaurants, underground parking and access via a special corridor for buses and the new monorail. The stadium hosted four games in the first round of the 2014 football games and will then serve as a centre for the region hosting many other shows and events.

PROJECT REQUIREMENTS
A key requirement of the main construction works was concrete with extended workability and excellent flow characteristics, which could also achieve high early strengths, typically in conditions of high temperatures and high humidity, which are normal for much of the time in this region.

Another important requirement was to reinforce areas of the concrete surface on the structural supporting columns and piers with a protective finishing layer to increase resistance to damage in surface. In other areas a standard concrete surface finishing system was required for filling and sealing any surface defects or imperfections and to ensure a uniform overall finish.

SIKA SOLUTIONS
Sikament® superplasticisers were used in the concrete throughout the project to achieve all of the contractor and sub-contractors placing and performance requirements.

Sikadur® Epoxy adhesive filler was used to reinforce areas of the vertical surfaces and to fix some components due to its high adhesion and thixotropic nature, even in damp environments for the application, followed by the high mechanical and chemical resistance achieved when cured. In other areas damaged concrete surfaces were easily finished and made good with cement based SikaGrout® and SikaTop® slurry mortars.



Arena da Amazônia, Manaus, Photo: Portal da Copa; Copagov Flickr

ARENA CASTELÃO FORTALEZA

PROJECT DESCRIPTION

The Arena Castelão was originally built in 1973 and known as the Governador Plácido Castelo Stadium in Fortaleza the 5th largest City in Brazil. It has since been upgraded and now expanded and almost completely refurbished to the latest standards to comfortably seat a crowd of up to 58,704 people for the 2014 football games, when it hosts 6 matches including one quarter final. It has a new roof that protects all of the seating even close to the pitch, new changing rooms and player facilities, plus the arena gained a large covered car park and a complex providing new VIP boxes and a press enclosure.

It is the home of Sporting Club Fortaleza, one of the biggest and well known in this North East region of Brazil.

PROJECT REQUIREMENTS

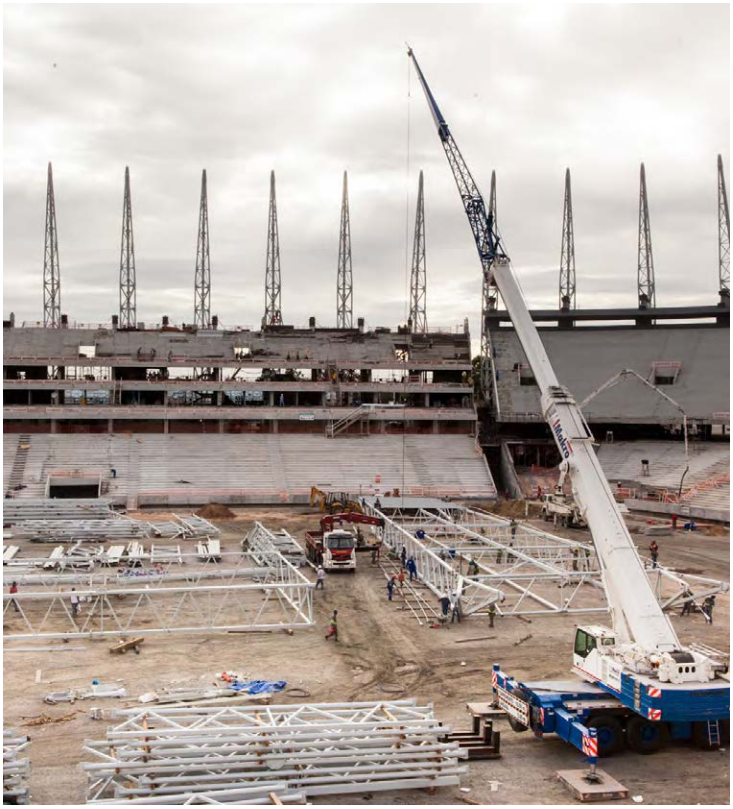
Fortaleza has a typically tropical climate, with high temperatures and high relative humidity throughout the year, but for most people these conditions are relieved by pleasant winds blowing from the ocean. However, this combination of weather and influences can cause many problems for the application and durability of many different construction materials, from the first concrete to the final paint coatings.

Accommodating this environment and these conditions was therefore the main criteria for all of the products to be used on the project. As specific examples new structural components had to be bonded and special tactile metal and wooden flooring was required in many areas, all of which required adhesives that could tolerate the potentially damp surfaces and high humidity, yet still cure quickly and in a controlled manner to provide the high bond strengths and flexibility required for long term durability, particularly in areas with frequent heavy foot traffic.

SIKA SOLUTIONS

Sika provided several innovative technologies in some of the many solutions supplied to this major refurbishment project from the basement to the roof. Of specific note here was the Sikadur® range of epoxy resin based adhesives and fixings that were used extensively, plus the tough elastic and highly flexible flooring systems adhesive SikaBond® T52, which was used in many areas also, including the tactile floors and their inserts used in the areas immediately outside and surrounding the arena.

Arena Castelão, Fortaleza, Photo: Portal da Copa; Copagov Flickr



Arena Castelão, Fortaleza, Photo: Fabio Lima/Monitoramento - Ministério do Esporte; Copagov Flickr

ESTÁDIO DAS DUNAS NATAL

PROJECT DESCRIPTION

The Estádio Das Dunas or 'Stadium of the Dunes' was built in Natal for the 2014 football games and to replace the well-known Machadão Stadium, once home to many great Brazilian football players in the capital of Rio Grande do Norte state, which was demolished together with the Machadinho Gym that stood beside it, because a better and more modern structure was needed.

The result is the Estádio das Dunas, which normally had a seating capacity of 33,000, increase to 45,000 for the 2014 tournament. The name refers to one of the most impressive natural attractions of the Natal region, and is also reflected in the undulating outline of the Stadium that imitates the shape of the sand dunes. The upper tier and roof are in the shape of petals and the space between the petals allows the on-shore sea breeze to flow into the stadium whilst the roof shields the fans from the sun or the rain.

The area around the stadium is also being developed as part of the overall regional improvement project to include a shopping mall, hotels, commercial offices and an artificial lake, all within a parkland setting.

PROJECT REQUIREMENTS

Natal has a tropical climate being located close to the equator and from February to July it is also humid because of the heavy rainfall up to 25cm (10inces) a month. This climate is not generally uncomfortable for people, because of the seemingly continuous onshore winds. However these conditions can make construction works, and in particular concreting works, somewhat challenging.

SIKA SOLUTIONS

Due to the prevailing climatic conditions and the modern method of predominantly prefabricated construction selected, the Engineers for the Estádio das Dunas decided to use the latest concrete technology to ensure the concrete works would be consistently to specification and with a high standard of finish. A self-compacting concrete mix design with a controlled workability time of approximately 60 minutes in these specific environmental conditions was developed and used for all of the precast elements that were produced to create most of the stadium structure, floors and facades. This consistent stability and resulting high strengths were achieved by the use of Sika Viscocrete® Technology.
Many other Sika products were also used throughout the construction of the stadium including Sika Igolflex® bitumen based waterproofing for the foundations, SikaTop® polymer modified renders for lining the project drinking water tanks and the drainage channels, plus SikaGrout® systems for the column bases and other similar bedding and void filling operations.

Arena das Dunas, Natal, Photo: Jobson Galdino; Portal da Copa; ME

ESTÁDIO MINEIRÃO BELO HORIZONTE

PROJECT DESCRIPTION

Since its original completion in 1965, the Estadio Mineirao, officially known as Estádio Governador Magalhães Pinto, has been a key focal point for the city of Belo Horizonte ("Beautiful Horizon"), which is the capital City of the State of Minas Gerais, located in the South East of the country. When it opened, it was the second-largest stadium in the country behind the Maracana in Rio. The stadium is used by several local clubs including premier league Cruzeiro, also known as O Galo, and Atletico Mineiro. For the 2014 football games this stadium hosted six games of the tournament, including one of the semi-finals.

This is one of the traditional homes of Brazilian football and had a capacity crowd of more than 76,000. However for the 2014 football games this has been reduced to an all seated capacity of 58,000, as part of a major refurbishment and upgrading project. This also included lowering the pitch, a new roof and improving access, plus new shops and the Brazilian football museum.

PROJECT REQUIREMENTS

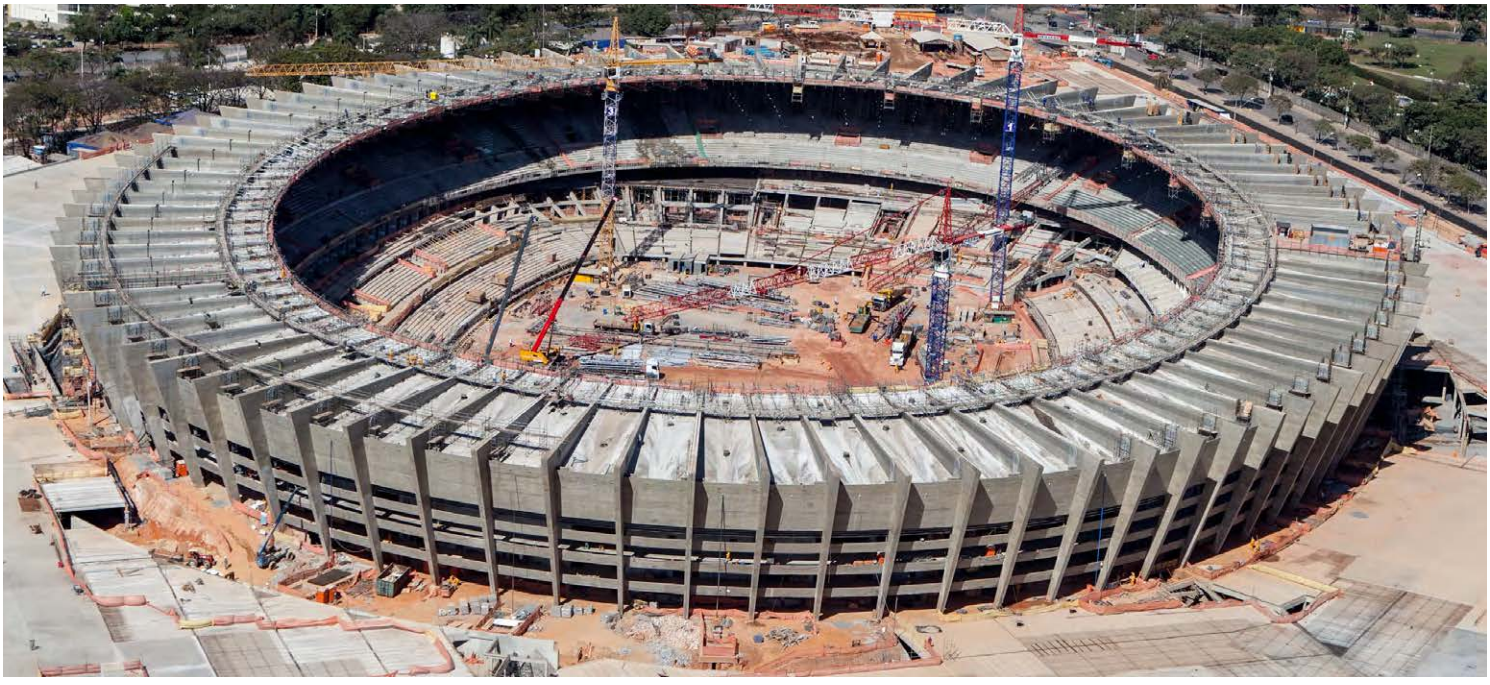
The Mineirão is one of the biggest and best-looking stadiums in Brazil and the refurbishment and modernisation works have all been guided by the principles of sustainability, for example: adding facilities for the storage and reuse of up to 6,270,000 litres of rainwater.

As a result of these requirements this project has effectively been a combination of new construction and repair and protection projects, with materials required to protect and enhance the existing structure and surfaces that would remain for the long term, together with the new elements and services that also had to be durable for the future.

SIKA SOLUTIONS

Sika is uniquely positioned as the ideal partner for the Engineers and Contractors involved in this project, because of our complete range of specialist products and systems developed for use in both new construction and refurbishment projects. These range from Sikament® concrete admixtures to SikaTop® waterproofing renders, from SikaGrout® column base and bolt fixings to Sika Monotop® concrete repair systems, plus from Sika® Igolfex® bitumen basement waterproofing to Sikalastic® liquid applied roof and deck waterproofing membranes (LAM).

All of these and more Sika products and problem solutions were used extensively throughout the refurbishment and modernisation of the Mineirão.



Estádio Mineirão, Belo Horizonte, Photo: Rodrigo Lima/Monitoramento-Ministério do Esporte; Copagov Flickr

PERNAMBUCO ARENA RECIFE

PROJECT DESCRIPTION

The Pernambuco Arena is a new multi-purpose, 6-storey stadium and the second largest in the Country, built in Recife on Brazil's Northeast coast – It is part of a major ongoing development project which will continue after the 2014 football games and include an adjacent indoor arena, a University Campus, hotels and a convention center, as well as commercial office buildings and retail zones, plus around 5000 residential units. The project has been designed and built with a sustainability focus and it has been awarded a silver LEED certificate by the Green Building Council (GBC) and to achieve this recognition the project has its own solar power station, rainwater is captured, natural draught air handling ventilation, plus strict solid waste management; the construction site was even required to have its own sewage treatment plant.

With a seating capacity of around 46,000, the Arena has become the home of the Recife football club Náutico Capibaribe, after the 2014 football games when it is hosting 5 matches.

PROJECT REQUIREMENTS

The project had strict sustainability and environmental management requirements as already mentioned, plus due to Recife's coastal location and proximity to the equator, the temperatures are usually warm, the humidity is high and winds are consistent and sometimes very strong – All of which can be very onerous for quality concrete production and finishing, and these conditions also provide very difficult conditions for the application and durability of many other construction materials, with the additional factor of very high UV light exposure.

The concrete quality and finishing was obviously one of the first major requirements that required practical and cost effective solutions in these conditions for both the insitu and precast structures that were required.

SIKA SOLUTIONS

Sika was involved from the beginning with the development of project specific solutions with superplasticisers (Sikament® and Sika® Viscocrete® Technologies) to control the concrete water content and hardening, plus curing agents (Sika Antisol® range) to control the water evaporation rate. Sika Separol® mould release agents (vegetable oil based) were used in the metal and plastic formwork for the precast concrete elements.

In addition to this major involvement in the concrete works, Sika also provided many other products and systems throughout the project, from the foundations, in the surrounding infrastructure and all over the superstructure and finishing phases of the works. This included huge quantities of SikaGrout®(cement and epoxy resin based systems) for structural column grouting and machine base bedding through to simple void filling, plus Sika Monotop® (cement based) and Sikadur® (epoxy based) concrete repair mortars and Sika Injection (PU based) systems, which were used to make good any defects, surface damage or cracks in the concrete structures. Sikafloor® surface hardeners were also used to seal and strengthen the surfaces of the concrete walkways and terraces.

Arena Pernambuco, Recife, Photo: Portal da Copa; Copagov Flickr

BEIRA RIO STADIUM PORTO ALEGRE

PROJECT DESCRIPTION

Beira-Rio Stadium is the home of Sport Club Internacional in Porto Alegre on the coast in Southern Brazil and was originally opened in 1969. It has been given a major facelift and refurbishment to be ready to host 5 games of the 2014 football games including some of the Quarter Finals. This project for the modernisation of Beira-Rio, funded by Club Internacional themselves through the "Gigante para Sempre" (A Giant for All Time) programme, which included the installation of an innovative metal roof that protects the seats, ramps and access gates in the event of heavy rain – A potential issue in the months of June and July in this region. The project was carried out in 2 phases to prevent total closure and after the refurbishment, the Beira-Rio had seating for 50,287 spectators.

PROJECT REQUIREMENTS

The climate was a major factor for this stadium refurbishment in Port Allegre, which has a humid subtropical climate and where precipitation is high and regular throughout the year. Summer temperatures often rise above 32 °C (90 °F) and create very high levels of humidity. Most summer rainfall occurs during thunderstorms and the occasional tropical storm, and so the stadium design and the materials used, all had to be able to accommodate these conditions and this exposure in service. The secure waterproofing of all of the joints on and around the structure was therefore a critical requirement.

The passionate fans of Club Internacional ('Inter') also traditionally sing and stamp loudly throughout their matches, and as a result the floor and deck areas of the grandstands had become worn over time and needed to be repaired with materials able to withstand this severe treatment for many more years to come.

SIKA SOLUTIONS

Sika was selected as the supplier of all of the joint sealing systems for the works, and especially important were the heavily exposed horizontal joints, which in all areas were primed with Sika® Primer and reliably sealed and waterproofed with Sikaflex® Pro-3 to also accommodate movement and protect the joints and joint arrises from water ingress and damage.

SikaGrout® systems were used for all of the horizontal repairs on the floor and deck areas of the grandstands and will comfortably withstand the stamping Inter fans long after the 2014 football games.

Estádio Beira Rio, Porto Alegre, Photo: Gabriel Heusi/Monitoramento - Ministério do Esporte; Copagov Flickr

Estádio Beira Rio, Porto Alegre, Photo: Gabriel Heusi/Portal da Copa; Copagov Flickr

FONTE NOVA ARENA SALVADOR

PROJECT DESCRIPTION

The original Capital City of Brazil, Salvador de Bahia on the North-East coast has a new stadium built to replace the famous Octávio Mangabeira Stadium, which was demolished to make way for a modern arena with a 52,048 spectator capacity, which has hosted four of the first round matches in the 2014 tournament. The new Fonte Nova Arena Stadium maintains many of the original facilities characteristics, but also has a new lightweight structural steel roof, restaurants with a panoramic view and a museum of football. The new complex was also designed and built to include a shopping mall, several hotels and a theatre with central parking for staff and visitors. This new development is a public-private partnership.

PROJECT REQUIREMENTS

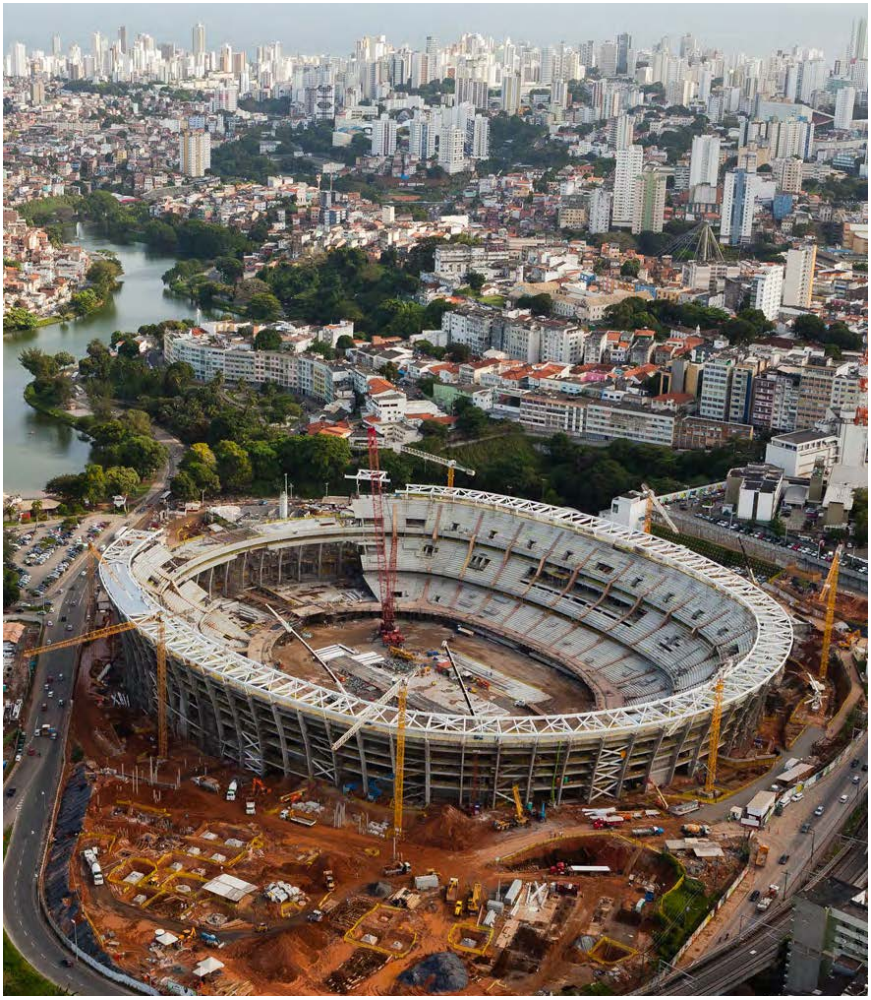
From early in the project the Engineers and Main Contractor were concerned to ensure secure, waterproof sealing of all of the many vertical and horizontal joints in and around the predominantly precast concrete elements of the different structures that combine to form the stadium. This was particularly evident for the grandstands and their ancillary structures such as in the seating areas, the stairwells and the network of corridors and vomitories for access etc.

SIKA SOLUTIONS

The Sika system that would fulfil all the characteristics and durable performance required was a combination of a Sika® Primer applied to the clean and prepared joint arrises, followed by gun applied Sikaflex® Pro-3 and Sikaflex®-Construction, which are elastic, polyurethane resin based sealants, to seal and waterproof all of these joints.

Itaipava Arena Fonte Nova, Salvador, Photo: David Campbell/ Monitoramento Minstério do Esporte; Copagov Flickr

Detalhes da junta de movimentação



Itaipava Arena Fonte Nova, Salvador, Photo: David Campbell / Monitoramento Minstério do Esporte; Copagov Flickr

PANTANAL ARENA CUIABÁ

PROJECT DESCRIPTION

A stadium in Cuiabá, the Capital City of the State of Mato Grosso, hosting games of the 2014 football event and yet bordering on a region rich in unique flora and fauna, the Pantanal, also known as the Southern Gateway to the Amazon, had the construction of a sustainable structure as a high priority from the conception of the project. This outlook was included in every detail: the wood used in the building had to be certified as from a sustainable source, the air-quality was constantly monitored, as was the soil. All of the construction waste and excavated spoil was passed through a recycling process and as much as possible reused within the Stadium and its access routes.

The Pantanal Arena was finished in April 2014 and has capacity for 42,968 spectators. It was built as a multi-purpose venue and hosted four games in the 2014 football games finals.

PROJECT REQUIREMENTS

The Pantanal Arena is therefore located in one of the country's hottest metropolises, where temperatures are often above 40°C (104°F) and there is almost continuous high humidity, which can cause many problems in all areas of construction and finishing's of such a large and important project. To be able to withstand and accommodate these conditions during their installation and throughout their service life was therefore also a key requirement for all of the construction products used on the project.

Demands for the products to be used and provide durable service requirements under these conditions were placed on all of the trades and different applications from the foundations to the roof. Some particularly demanding technical requirements were also additionally set for the secure fixing and waterproof sealing of the walkways to the stands, the protective floor coatings in the stands and the roof membranes over all of the walkways.

SIKA SOLUTIONS

The fixing and sealing of the walkways to the stands was achieved with a combination of cementitious flowable SikaGrout®, plus the highly flexible, polyurethane based adhesive sealant Sikaflex® Pro-3 on horizontal areas, and the elastic joint sealant Sikaflex®-Construction in the vertical joints. Sikafloor® epoxy resin based coatings and PU/cement based Sikafloor® Purcem® floor screeds were used extensively throughout the stadium complex on decks and in the heavily trafficked ramps and service areas. The important roof of the walkways was waterproofed with a Sikalastic® LAM (Liquid Applied Membrane) System, incorporating Sikafleece® fabric reinforcement for additional resistance and durability.
In addition to providing detailing assistance to the professional team and large quantities of many different ecologically sound and sustainainably source products to the project, Sika also provided on-site training and support to the local contractors and local people, so that they could learn new skills for the future and also to enable them to successfully complete the works on time.

Arena Pantanal, Cuiabá, Photo: Portal da Copa; Copagov Flickr

STADIUMS FOR 2014 WORLD FOOTBALL GAMES IN BRAZIL

Maracanã, Rio de Janeiro, Photo: Portal da Copa; Copagov Flickr

WHO WE ARE

Sika AG, Switzerland, is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus, truck, rail, solar and wind power plants, façades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing and protecting loadbearing structures. Sika's product lines feature highquality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

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