

LIGHTING DESIGN & APPLICATION

The lighting installation at the Cape Town Stadium in Green Point is a noteworthy achievement

Lighting up Cape Town Stadium

Information from Gibb

The team from Gibb, a multi-disciplinary engineering and science consulting company, literally 'beamed' with pride recently at the test switch-on of the 360 floodlights of Cape Town's brand new Green Point Stadium, now officially named Cape Town Stadium. An image of the illuminated stadium brought to mind a massive, glowing spaceship, with its glass ceiling – a first in the world – enhancing the almost unearthly spectacle.

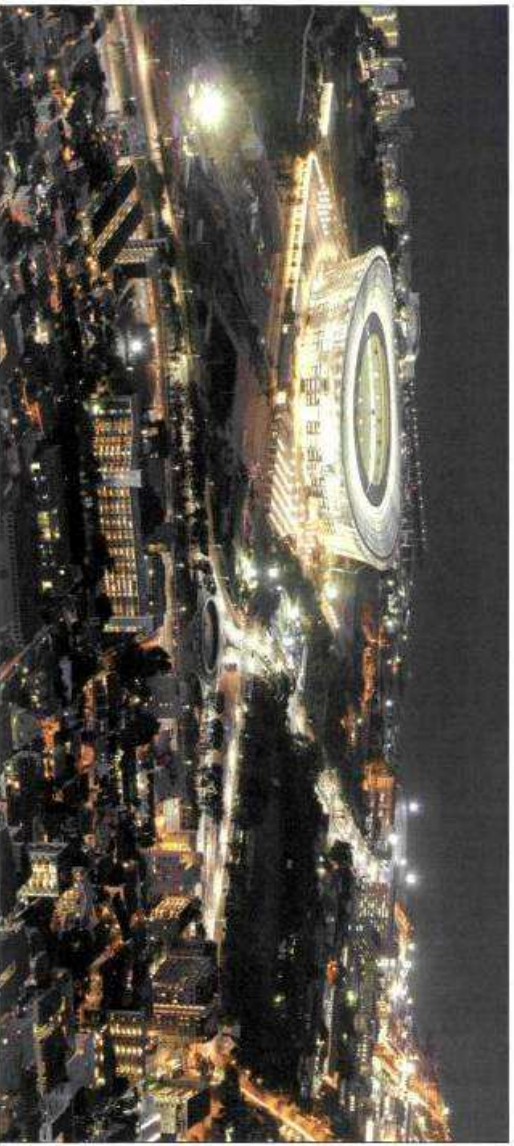
Dennis Forster, project leader at the Cape Town office, told those present that when all the floodlights had been correctly aimed and switched on, there would be an average uniform horizontal illumination on the field of over 3800 lux. Normal daylight is approx 10,000 lux, so this level of lighting is significant. The FIFA lighting standards, designed to meet HDTV requirements to ensure enough light for super-zoom and slow-motion filming in high definition,

have been raised since the 2006 FIFA world cup in Germany. The City of Cape Town successfully tested all of the floodlights on 27 October 2009.

The company's structural, electrical, civil and transportation engineering divisions are part of the professional engineering joint venture teams responsible for work on the stadium. In total, over 50 professional firms were involved in the design of the venue. There were four firms in the JV responsible for the stadium's electrical and electronic engineering, led by BKS. Gibb's electrical engineering responsibility included the event floodlighting, the roof lighting, external facade lighting and podium deck, stair and turnstile lighting as well as the illumination of the surrounding stadium precinct and Green Point Common.

It is practically impossible to switch on 360 floodlights, each producing 215,000 lumens of light, without people noticing. But apart from the inevitable complaints from some local residents, there was an overwhelmingly positive response to this important development.

The lighting installations were designed to, as far as possible, utilise energy-efficient sources. These included metal halide, fluorescent and LED technologies. In total, the lighting installations consume more than 1 MW of electricity during operation, the bulk of which – over 720 kW of electricity – will be used by the event floodlighting in order to meet FIFA's specifications for the illumination



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of internationally televised football matches. The floodlights are all mounted on the inner perimeter of the stadium roof. The technical reflectors and technology in the floodlights mean that there is no glare and minimal light pollution. Unfortunately, it is impossible to remove the light which is reflected up off the playing surface. The sheer amount of light plus the reflection creates a glow above the stadium. FIFA has introduced a requirement that floodlighting be powered by uninterruptible power supplies (UPS) in South Africa and so a rotary UPS, engineered by BKS, was installed to fulfill this function. It was successfully tested with the full floodlight load.

The other lighting components, some of which will be in everyday use, include an indirect lighting system in the roof. This provides a pleasant glow to illuminate the stands by reflecting light off the inside of the glass roof. This concept was proposed by GMP Architects, a German member of the Stadium Architects JV, with technical assistance

from Conceptlicht. The roof glass was chosen and specified so as to ensure the best possible optical characteristics. Decorative façade LED illumination was used to frame the spaces between the upper seating levels and the roof, while narrow-beam floodlights and light poles illuminate the podium and areas around the stadium, with 10 W LED downlighters illuminating the turnstiles.

Much work was done to translate the lighting concept and installation details into a practicable and maintainable solution. This involved numerous night-time lighting mock-ups to fine-tune the lighting solutions and equipment. Public roads around the stadium are illuminated to the city's public lighting standards. Areas in which there will be a mix of pedestrians, such as the permanent and temporary parking areas, will utilise higher levels of illumination for reasons of public safety.

Gibb is also responsible for the engineering of the floodlighting in the secondary sports fields on Green Point Common but, due to the work required

to meet FIFA standards, some of the installations are only due for construction after the football event is over.

The lighting designs included approximately 3700 light fittings and dozens of kilometres of electrical conductors. Individual lamp ratings ranged from less than 1 W for some of the LEDs to 2 kW floodlight lamps. The total construction value of lighting and electrical installations was close to R40-million. By the end of 2009 there had been no significant construction budget overruns.

The contract completion and handover date for the Cape Town Stadium was 15 December 2009 and at least three major events were scheduled for the stadium prior to the FIFA 2010 World Cup. During the preliminaries the stadium was to be operationally tested and fine-tuned. A total of eight World Cup matches, including quarter-final and semi-final matches, were allocated to the 68 000-seat stadium.

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