

The Commerzbank Arena in Frankfurt/Main – “the world’s biggest convertible”



Project: Redesigning of the Frankfurt Waldstadion as the Commerzbank Arena for the World Cup 2006

Client: City of Frankfurt

Location: Frankfurt am Main

Market segment: Construction

Product used: Makrolon multi UV 3/16-16 clear 1090FR

Architects: gmp, Hamburg

Building contractor: Max Bögl Bauservice GmbH & Co. KG



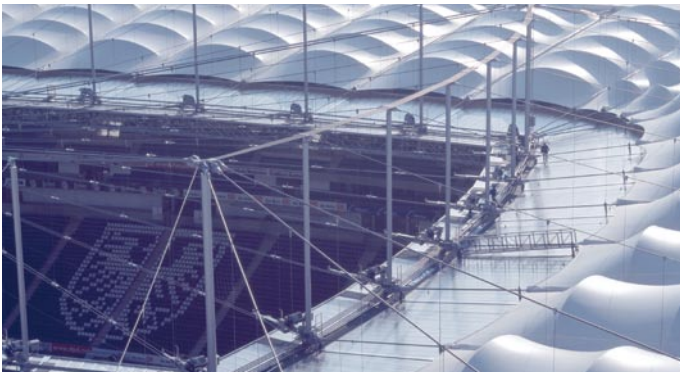
makrolon®

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In preparation for the FIFA World Cup of 2006 the old Waldstadion in Frankfurt was transformed into the ultra-modern Commerzbank Arena. Many fans call the new stadium “the world’s largest convertible”. The reason is that the dynamic inner roof of the world’s largest steel cable-membrane construction will probably only be closed a few times a year, leaving the arena open most of the time.

The stadium is a real highlight

The roof consists of an outer static ring and a dynamic inner part which folds up like the roof of a convertible and is stored in the central video cube of the stadium. The outer ring of the stadium is a steel construction covered by a membrane with an inner rim of polycarbonate sheets. The design for the structural system for the roof was based on a horizontal spoked wheel and the component parts hub, spokes and rim were translated into the roof design. The whole complex is very open and due to a carefully designed effect, created by the roof partition, it conveys an impression of weightlessness. The unusual roof construction is a combination of a sophisticated engineering design and high-quality building materials which give the Frankfurt stadium a completely new look.



A roof which sets the scene for sporting events

Despite spans of 192 metres in a traverse direction and 230 metres in a longitudinal direction the construction is very light. The sparing use of materials means it is cost-effective. The spoked wheel design means that no additional supports are required, leaving an unobstructed view of the pitch. The structure is kept to a minimum and creates a liberating and exciting atmosphere for games, sports and leisure events. The excellent lighting conditions mean that TV cameras can record high quality images and transmit them throughout the world. The cable construction allows the membrane, with an area of 9,000 square metres, to be unfolded via sliding carriages to the inner edge of the static roof, completely closing the stadium roof in just 20 minutes. Spectators can, therefore, rely on complete protection against sun and rain.

An elegant use of polycarbonate sheets

Makrolon® multi UV had been used successfully as glazing for the large-scale roofing for the stands in the Rhein-Energie stadium in Cologne. Hence the architects at gmp decided to use this product for the Commerzbank Arena in Frankfurt. The polycarbonate sheets are extremely stable but also highly elastic, enabling them to withstand strong wind forces without the need for a semi-rigid substructure and so allowing for the movement of the roof caused by the wind. Furthermore, they have high impact strength and can withstand hailstones and heavy snowfall. Nevertheless they are surprisingly light (2.8 kg/m²) and also easy to process. Light transmission of about 75 % guarantees optimum lighting conditions. A special UV layer, which is bonded homogeneously with the polycarbonate in a co-extrusion process, make them even more durable. This filters out harmful UV rays but allows photoactive rays to pass through which means the grass gets enough sunlight to promote growth. An additional advantage is that there are no large shadows or strong contrasts of light and dark in the stadium.

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