

Besiktas stadium roof : innovative design and construction method

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Abstract

Located nearby the historic part of the city, the Vodafone Arena Stadium, replacing the former Besiktas JK Inonu stadium, stands out thanks to its remarkable covering of 26000m² that can shelter up to 42 000 spectators. The big lift method, used successfully in the last decades to lift lightweight and flexible structures composed by cables only, has been adapted for this project to lift a mixed structure, allying the stiffness of a highly hyperstatic steel frame and the shape-depending behavior of a cable structure. After being assembled on the ground, the structure was lifted on a distance of approximately 21m with 42 strand jacks, developing a total towing force of 7000t. Strict control procedures and geodetic checks were necessary to coordinate the 42 lifting points.

The paper describes the general design approach and the specific site conditions; the construction method is detailed from both a calculation and an operational point of view.

Keywords: stadium roof; full-locked cables; big-lift; construction methods; strand jacks; distortions; geometric control.

1 Introduction

The BJK Vodafone Arena is located in Istanbul, Turkey. After the demolition of the old stadium in 2013, this new structure belongs already to the remarkable landmarks of the Bosphorus strait.



Figure 1: stadium after work achievement.

The primary building structure of the project consists of concrete grandstands. It provides support for a lightweight roof which covers the full perimeter of the stadium, as well as part of the inner area.

As shown on Figure 2, the oval footprint of the roof structure is approximately 216 m long and 162 m wide. The roof is divided into 42 transversal bays. It is covered primarily by a lightweight textile membrane made of PTFE coated glass fiber installed on arches.