Structural Design of the New Football Stadium of Panathinaikos F.C. in Votanikos, Greece

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Summary

In this paper the main structural elements of the new football stadium of Panathinaikos F.C. in Votanikos, Athens, Greece are presented, with particular emphasis on the steel roof and its interaction with the underlying reinforced concrete structures. The roof consists of four structurally independent parts, supported through main truss girders on reinforced concrete pylons and on the exterior peripheral reinforced concrete columns of the grandstands. Issues pertaining to optimization of geometry, type and size of cross-sections, supports and connections between members, in order to achieve satisfaction of architectural constraints in the most safe and cost-effective way are discussed. Appropriate decisions that had to be made at the conceptual design stage, in order to minimize the interaction of the steel roof with the pylons and the ten structurally independent grandstand structures during eventual seismic events, are described.

Keywords: football stadium, steel roof, conceptual design, seismic design.

1. Introduction

The new stadium of Panathinaikos F.C., a historic Greek football club, will be constructed in Votanikos, Athens, Greece and will have the ability to host approximately 40.000 spectators, with its granstands being completely covered. The grandstand structures will be made of reinforced concrete and the roof of structural steel (Fig. 1). The stadium has a circular plan view with an external diameter of 210m. The diagonals of the playing field divide the structure in four sectors, which are named accordingly North, South, East and West. In the East and West sectors and parallel to the playing field's longitudinal axis the "large grandstand areas" are thus defined, while in the North and South sectors, behind the goalposts, the "small grandstand areas" are defined. In each "large" area, three structurally independent buildings will be constructed, E1, E2 and E3 in the East sector and W1, W2 and W3 in the West sector. In each "small" area, two structurally independent buildings are foreseen, N1, N2 in the North sector and S1, S2 in the South sector (Fig. 2).

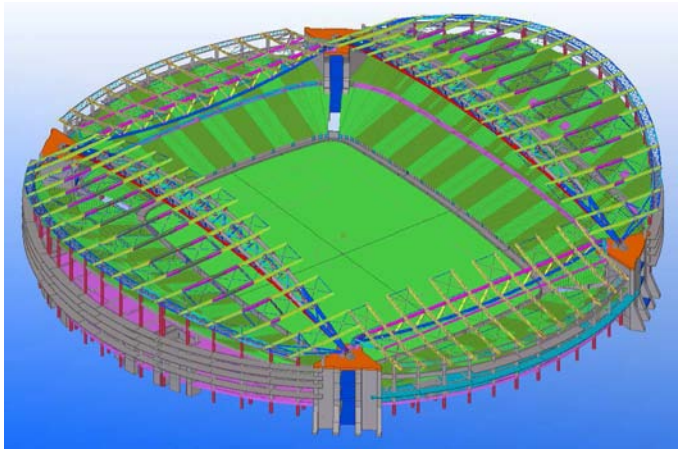

Fig. 1: General layout of the stadium

At the four corners of the stadium, four reinforced concrete pylons will be constructed, which are structurally independent from the grandstand buildings. The total roof structure consists of four independent parts, each of which is supported on a main space truss-girder and on the perimeter columns of the upper building levels. The four main trusses are simply supported on the four reinforced concrete pylons arrayed at the stadium corners. In accordance with the overall cylindrical

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