



5/6 Arches: a Megastructure becoming a land marking Monument

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Abstract

5/6 Arches is an iconic project serving as gateway to Doha's West Bay Business District. The two arches are made of 10.000 tons of steel, with a structural cable net that comprises 90 tons of Full Locked Coil (FLC) cables and their sockets. Designed by AECOM and realized by HYUNDAI CONSTRUCTION and EVERSENDAL, it represents the heaviest steel monument in the world. Redaelli's contribution to this land marking structure includes cables and clamps supply, engineering of cable net installation and tensioning and all related site activities. The net is composed by diagonal and valley cables, connected by 473 crossing clamps for a total mass of 80 tons. Clamps are specially designed with a modular scheme to accommodate for several angles at cable intersections.

Keywords: FLC Cables, Spatial structures, Conceptual design and realization, Clamps, Installation, Tensioning

1 Introduction

5/6 interchange is part of the Lusail Express way, a 5.3 km route connecting central Doha with Lusail city. The arches are built on the site of the old Rainbow roundabout and they sit on a major three levels junction, which comprises both a tunnel and a bridge of three lanes running in each direction. The arches are connected by a cable net composed by 109 full lock coil cables with a diameter of 45 mm. The structure is the iconic feature of the project, creating a steel landmark in the developing landscape.

The paper introduces the main features of this construction, explaining the characteristics of cables and clamps supply, as well as the great challenge of engineering of cables installation. It also describes design details, theoretical study of the process, definition of site activities and actual experience on site.

2 Structure Details

5/6 arches are a pair of inclined steel arches with a rectangular cross section, whose width varies from 3.2 m to 4.8 m for the small arch and from 6 m to 4 m for the large arch. This latter arch measures 147 m in length and stands nearly 100 m high, while the small one rises to almost 78 m, spanning 140 m in length. A cable net links the two arches together, with a pattern of valley cables and two groups of diagonal cables in opposite directions.

The crossing of the two arches creates a unique spatial geometry, with cable layers swapping at the side of the net. A clamping system is positioned at each intersection between cables, connecting two or three tension elements.

Figure 1 and Figure 2 show the overall geometry of structure and cables net.