



## Kinetic Roof Structure: Msheireb Heart of Doha

Thomas Hermeking, Thomas Prang

*Pfeifer Seil- und Hebeteknik GmbH, Memmingen, Germany*

Gregor Grunwald

*Pfeifer Covertex, Shanghai, China*

Contact: [thermeking@pfeifer.com](mailto:thermeking@pfeifer.com)

### Abstract

Barahat Al Nouq is the central square of the heart of Doha, capital of Qatar. Following traditional Arabic architecture, the new roof construction is reinterpreting ancient building elements which already functioned adaptive and responding. This is also the case with the new retractable roof with its movable membrane covered shading panels.

**Keywords:** kinetic, adaptive, retractable, membrane, cable, roof, Msheireb, Barahat Al Nouq, architecture, Pfeifer.

### 1 Barahat Al Nouq

Qatar has recognized the need to establish a clear cultural identity expressed through adequate urban planning architecture. Msheireb Heart of Doha is one of the flagship projects designed by the architects Mossessian & Partners [1]. It tries to achieve this by regenerating and at the same time preserving the historical centre of Doha. Barahat Al Nouq central square is the main public space of this development and is designed as an urban room functioning as a multi-purpose meeting space that comprises nine mixed-use, residential, commercial and retail buildings surrounding a major public square at the heart of the Msheireb. It is conceived as the 'urban majlis' – a room where visitors to Msheireb are welcomed and received [2].

Drawing on the traditional majlis, Barahat Al Nouq is ordered, simple and elegant. Hosts and guests are seated on the cushioned floor around the perimeter that is edged by a highly ordered colonnade where people can enjoy the perimeter restaurants and cafes. Reflected light through the traditional malqaf (in Arabic: wind-catcher) is

reinterpreted in the form of a suspended, retractable roof where natural light is filtered to reduce solar transmission and to allow significant cooling.

In Doha, daytime temperatures easily rise to 50°C. The concept of Barahat Al Nouq is to limit temperatures to below 32°C. This is achieved by a shading combination of the retractable roof 30 m above ground together with conventional membrane canopies on the ground.

### 2 Structure

The moveable roof consists of 1080 individual membrane covered frame modules suspended on 60 structural cables that span the rectangular 35 m wide square; the length of the square is 90 m. The cables are anchored in the roof area of the six buildings located at both ends of the square. The storage of the membrane elements are also located here. The elements are stored vertically and folded in packages.

The membrane module itself is a rectangular shading element; outer dimensions are approximately 2,70 m x 1,40 m. It consists out of