

Enhance amenity values - Design and functionality of adaptive lightweight structures

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Abstract

The demand for smart buildings with adaptive components is growing from year to year, since they increase the possible usage options and functionality of a building significantly. On that note, retractable roof or façade elements are often implemented in projects of different sizes, to flexibly protect a space from environmental conditions. Especially in regions with high solar radiation, it is essential to protect people and public areas from direct sun exposure and to enhance a certain user comfort.

From an aesthetical point of view, it is important that the structural design for the retractable elements is developed in close consideration of the overall architecture and appearance of the respective building or space. As a consequence, innovative engineering solutions are required using appropriate materials. A smart structural system in combination with the use of lightweight materials, such as high-strength steel cables and textile membranes, simplifies the drive technology significantly and reduces the overall energy consumption during operation. The geometry of the supporting structural system has to be carefully developed, so that beside the structural integrity also the movability of the retractable elements is given under all relevant loading conditions.

schlaich bergemann und partner has designed a series of adaptive lightweight structures in the Middle East region, varying in scale, concept and functionality. The design developments and implementations on site for two projects will be shown in detail, namely a large FIFA compliant stadium with over 11.000 m² retractable membrane and the retractable shading devices at Al Barahat Square in Doha, Qatar.



Al Barahat Square, Doha

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Al Barahat Square, Doha

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