

Sports Venues in China - Over the Code

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Summary

The fascinating process of building in China is very much related to the exceptional size and the speed with which the construction industry builds. schlaich bergermann partner has been involved in large scale projects in China for more than 15 years and designed mostly long span structures. Many of these follow the well-known spokes wheel principle, which has been transformed, bespoke and refined in many ways to attain new design solutions.

The innovations applied to the design principle resulted in lightweight cable-structures that are exceptional in their architectural appearance and in their structural challenges. They deal with pure tension and compression exposed members rather than bending, subjecting them to advanced form-finding processes. These structures are subjected to concentrated forces, which are carried by high strength materials, combining spatial load bearing structures to a highly efficient whole, thus saving resources.

Keywords: stadium, ring cable roof, structural specialties, long span, lightweight structures, overcode, over the code, membrane structures, beyond the code, building code, sports venue, form-finding

1. Introduction

Country specific building codes ensure that buildings are structurally feasible (ULS, SLS). Nevertheless, building codes generally apply to standard buildings, often lacking the necessary guidelines for long span structures and more complex structural systems, often the case with state-of-the-art designs. In such cases, the design is beyond the code, or as discussed in the Chinese construction industry, “over the code”.

The principle of the spokes wheel, frequently found within the realm of extraordinary designs, has been used by schlaich bergermann partner for many years to stiffen structures and to create exceptionally lightweight and architecturally pleasing buildings. To achieve the stiffening effect, forces are mainly carried in the plane of the wheel, however, when it comes to roof structures, the wheels are turned in the horizontal position and they have to carry in plane as well as out of plane forces. Since they are no longer a wheel we name them ring cable structures. This typology and its multiple variations are used for our numerous stadia designs.