

Parametrization, integration and buildability: Design and construction of a 50m span freeform roof in Bangkok

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Abstract

Whizdom 101 is a new high-end fully integrated and digital mixed-use development comprising both commercial spaces and residential towers. Whizdom 101 was designed to create a sense of place where the individual could live, work and play in one's own backyard and connect to a community that is free from the tensions of the bustling city that surround us. The centre of the commercial space is covered by the big roof, a 50m span freeform steel roof covered with ETFE, forming an aerated and relaxing space for the pedestrians.

The big roof is supported by 4 main supports and 2 secondary supports. Without many more constraints from the client, several shapes and structural systems have been explored at early stage of the project to best integrate the roof in its environment. The resulting shape is a quiet and smooth surface providing shade and natural ventilation to the spaces below.

The structure is composed of main arches made of built-up rectangular hollow sections and 4 edge beams made of built-up pentagonal hollow sections and providing a support to the main beams and transferring the loads back to the concrete. Following a language of lines to maintain an elegant structure, the edge beams have been designed to integrate the gutter within their section. Although complex, the geometry was generated to fully take into account the buildability - all the steel members were translated in a language of plates and single radii, comprehensible for the fabricator. Initially made of conical surfaces, the edge beams sections geometry were rationalized through parametric modelling in order to be only made of cylindrical surfaces which are developable and therefore easy to fabricate.



Figure 1. Left: View of the roof under construction. Right: Inside of the roof during construction

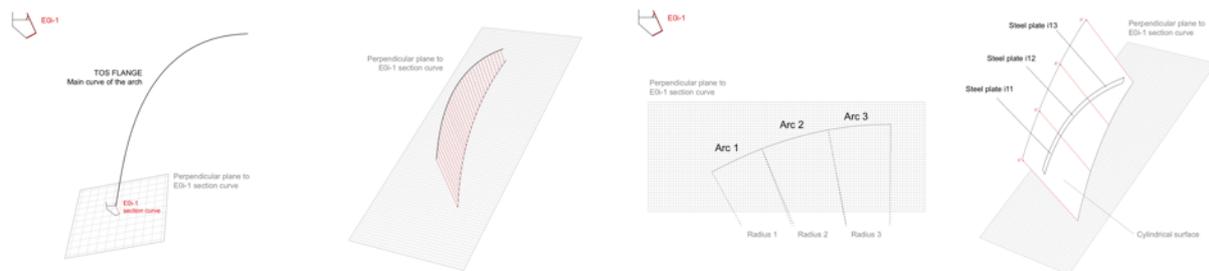


Figure 2. Edge beam geometry generation