

# Kuwait International Airport T2: Detailing Design, Fabrication and Construction of a Large-Span Hybrid Shell

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## Abstract

The new Terminal 2 of Kuwait International Airport is one of the most innovative and challenging construction of its kind. This innovative terminal was designed by Foster + Partners [1] and engineered by Arup London in the pre-tender phases for the Ministry of Public Works, Kuwait. Werner Sobek Stuttgart (WSS) has been appointed by the contractor, Limak Insaat Kuwait to develop the design and prepare the construction documentation in the post-tender phases. The building and in particular its shell structures present unique features requiring a new approach towards the integration of structural design, detailing, modelling, and fabrication. A prominent aspect of the architectural design was the definition of a single roof characterized by a non-repetitive organic shape predominantly made of reinforced concrete [1], [2]. Following the inspiration of shell structure pioneers such as Torroja, Nervi, and Candela, the roof was to function as a structurally active shell, thus avoiding the use of claddings panels. In order to achieve this, the design comprised an innovative hybrid shell structure made of prefabricated steel and concrete elements [2].

Starting in August 2016 WSS was responsible for the engineering of all primary structures and facades. WSS' tasks included detailing and development design, coordination and support to fabrication and construction (including BIM up to level LOD 400). In order to fulfill these tasks, WSS developed a design system composed of specific analyses, design methods, workflows and even project specific tools, which allow for a detailed investigation of the structural behavior and support an effective production.

This paper presents the specific solutions created and used by WSS for the design and development of the shell structures, one of the key elements of the terminal building. The overall chain between design and production and related distinctive features and issues are also presented and explained. An overview of the critical aspects of the structural design as well as fabrication and construction of large span shell structures is also included, aiming for a further and broader development of this kind of structures.

## References

- [1] Foster + Partners, "*Designs unveiled for Kuwait International Airport*". [Online]. Available: <https://www.fosterandpartners.com/news/archive/2011/10/designs-unveiled-for-kuwait-international-airport/>. [Accessed Jan. 21, 2019].
- [2] D. Munro, M. Arkinstall, T. Carfrae., "*Kuwait International Airport Terminal II: the development of a new form of precast composite shell*", Proceeding of the IASS Annual Symposium 2018 – Creativity in Structural Design 16 – 20 July 2018, MIT, Boston, USA