

## The 1915 Çanakkale Bridge

### Designing a twin-box girder suitable for a world record span

**Valentin-Dan Boteanu**

[vdbo@cowi.com](mailto:vdbo@cowi.com)

COWI A/S

Lyngby, Denmark

**Jesper Warschow Sørensen**

[jeso@cowi.com](mailto:jeso@cowi.com)

COWI A/S

Lyngby, Denmark

**Jeffrey Park**

[wj\\_park@sk.com](mailto:wj_park@sk.com)

SK ecoplant

Seoul, South Korea

**Simon Rem Bjærre**

[snbe@cowi.com](mailto:snbe@cowi.com)

COWI A/S

Lyngby, Denmark

**Henrik Polk**

[hpo@cowi.com](mailto:hpo@cowi.com)

COWI A/S

Lyngby, Denmark

### ABSTRACT

Optimization is the key to the success of any long span suspension bridge. Since the deadload covers up to 80% of the utilisation of the expensive main cables, keeping the weight of the girder down is essential. For the 1915 Çanakkale bridge the twin-box girder design was introduced to ensure sufficient aerodynamic performance, but with a natural quantity penalty. Using extensive FEmodelling on critical and pervasive structural elements, while pushing the limits of the codes, the goal of achieving sufficient structural capacity with lowest possible quantities was achieved. The Vierendeel effect has global influence on the deformations of the deck and therefore the connection between the transverse cross girders and the deck had high focus in the design. The fatigue performance of the girder for both traffic and wind also posed a challenge and here the use of an integrated shell model in the global analysis model was used to ensure that all boundary effects and load behaviours were correctly considered. Another important consideration was the local effects from hanger rupture on the design of the supporting structure not leading to excessive use of thick plates and high strength steel.

**Keywords:** Twin-box bridge girder, Çanakkale, hanger anchorage, FE-modelling, hanger rupture.