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Great Belt Bridge – Structural monitoring

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Abstract

The monitoring system on the Great Belt Bridge has been under a renewal process for the last 4 years.

Worn down sensors for alarm and maintenance purposes have been replaced by new more appropriate sensors.

A new structural health monitoring system for maintenance with a database and a graphical user interface (GUI) has been developed. The software collects and stores measurement data from a large number of sensors on both the cable-suspended East Bridge and the low-level West Bridge. From summer 2018 more than 400 sensors can be monitored from one GUI. More sensors are following in 2019.

The project has been carried out by Rambøll as client consultant and Krabbenhøft & Ingolfsson as main contractor.

Keywords: SHMS; monitoring system for maintenance; long span bridges; big data.

1 Introduction

The Great Belt Bridge is a 17 km long combined bridge and tunnel connection via Sprogøe. It consists of

- The cable-suspended East Bridge from Zealand to Sprogøe, carrying road traffic. The cable suspended span is 1624 m. The total length is 6.8 km [1].
- The East tunnel from Zealand to Sprogøe, carrying rail traffic.
- The low-level West Bridge from Sprogøe to Funen, carrying road and rail traffic on two parallel bridge decks. The Bridge is 6.6 km long [2].

The bridge opened in 1998. From the start the bridge was equipped with a large number of

sensors, both for alarm and maintenance. All sensors were connected to a large monitoring system (The SRO-system), that is monitored 24 hours a day from a control room in the Great Belt administration center in Halskov.

In 2014 it was decided to replace worn down alarm giving sensors on the West Bridge with more appropriate sensors. The replacement was carried out in 2015 in a project phase 1.

In 2015 the project was expanded with replacement of sensors for maintenance on the West Bridge, and it was decided to move the data collection and presentation of measuring data for maintenance to a new structural health monitoring system (SHMS). This was carried out 2015 -2016 in a project phase 2.