



STRUCTURAL HEALTH MONITORING OF CRUSELL BRIDGE

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Summary

Crusell Bridge is a cable stayed bridge recently built in the city center of Helsinki. In the very beginning of the project the Client City of Helsinki decided to utilize the newest technology in all phases. The project was a pilot project in using Building Information Modeling (BIM) technology in design and construction and finally in monitoring as part of maintenance. In order to develop modern maintenance scheme, an intelligent monitoring system was designed and installed in the bridge. The monitoring system has been tested by a loading test and comprehensive test results have been compared with theoretical calculation analysis. The results verified the design and gave designers guidelines to specify alarming limits to monitoring system. The owner of the bridge will get a summary report from the maintenance system once per year.

Keywords: Structural health monitoring; cable stayed bridge; BIM modelling; bridge maintenance; reporting

1 Introduction

The Crusell Bridge monitoring system is a mixture of electrical, electrochemical and fibre optic sensors. Electrical sensors include 3-axis accelerometers, boltable strain sensors, a displacement sensor and a weather station. Electrochemical sensors are used in two corrosion measurement fields. Majority of the sensors are Fiber Bragg Grating (FBG) strain sensors with adjacent temperature compensation sensors.

A set of fibre optic strain sensors are enhanced with a thermal compensation algorithm to remove the structural thermal effects from the strain readings. These sensors output more precise

stress-strain data and they are used for real time warning and alarming functions.

The monitoring system collects all data and synchronizes it to a single heartbeat. The daily data is collected locally to an on-site server and sent daily to a remote, centralized data server for long-term storage and further analysis. The real time data can be monitored via Web user interface with any device – including desktops, laptops, tablets and mobile phones.

The centralized data server provides periodical reports depending on desired requirements. The reports are available as interactive HTML format or as PDF files, in case of printing or offline storage is required.