



A local, data-based approach for SHM-based point ranking of bridges

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Abstract

The present paper presents a conceptual approach to combine, via a point ranking method, monitoring data with data arising from visual inspections, in order to maximize the outcome of information used to operate and maintain bridges. Firstly, an overview over current approaches for interpreting monitoring data is given as well as an overview over Operation and Maintenance (O&M) strategies. Then, two examples are shown to illustrate how monitoring data can be used for predicting remaining life of key bridge components such as welded joints or movable joints. Finally, a conceptual approach is outlined describing how monitoring information in terms of the estimated remaining lives can be combined with inspection data via Point Ranking methods to enhance inspection and maintenance planning and budgeting, hence contributing to bridge the gap between Structural Health Monitoring (SHM), visual inspections and bridge management (O&M) strategies.

Keywords: Structural Health Monitoring, Bridge, Point Ranking Methods, Bridge Management System, Fatigue Assessment, Inspections.

1 Introduction

In recent years, the possibility of monitoring, in addition to other techniques such as inspections, has been put forward as an alternative to existing assessment methods of civil infrastructure in general and of bridges in particular. With an increasing number of structures instrumented, the key to unlock the potential of Structural Health Monitoring (SHM) is how to translate the extensive amounts of recorded data into useful information that can provide the basis for an enhanced management of civil infrastructure. Motivated by this, several research works have been, and still are, aimed at developing data-processing routines to interpret monitoring outcomes. In many cases, however, the information extracted from monitoring data is not combined systematically with the information obtained via existing assessment methods such as visual inspections. As a result, there is in general a missing link between the outcome of the analysis

of monitoring data and the results of visual inspections, resulting in only the visual inspection results are used to plan an overall Operation and Maintenance (O&M) strategy over the service life of structures. This has several drawbacks. In effect, monitoring techniques can provide continuous quantitative data at discrete locations over time whereas visual inspections provide snapshots that are more subjective over time and location. It is therefore anticipated that both techniques shall be combined in order to maximize the information needed to manage civil infrastructure assets.

The present paper aims at outlining a conceptual approach for combining monitoring data with data arising from visual inspections to maximize the information needed to operate and maintain bridges. Firstly, an overview over current approaches for interpreting monitoring data is given as well as an overview over O&M strategies. Then, two examples are shown to illustrate how