Structural Health Monitoring Standards

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Summary

Although Structural Health Monitoring (SHM) techniques can be considered relatively mature, at least from the scientific point of view, they have not yet become a standard practice in civil engineering because of several reasons. One of these reasons has been individuated in the lack of comprehensive standards addressing the complete SHM process and especially potential utilization. The paper is aimed at briefly reviewing existing standards and tracing the lines for possible extensions, based on experiences gathered from the field and the actual evolution of SHM techniques. Lifecycle approaches including SHM are considered as well. In addition, the relationships between Structural Health Monitoring and Design Standards are addressed, raising the question whether in the design of a monitored structure and of a traditional one, the same safety coefficient should be applied. Consideration is given to the aspect of uncertainty modelling in both cases.

Keywords: Structural Health Monitoring, Lifecycle Engineering, Structural Reliability, Standards.

1. Introduction

In the last two decades, Structural Health Monitoring (SHM) techniques have received considerable attention from academics and engineering practitioners. A very significant number of dedicated conference series and journals have been established on the subject and many important societies, like IABSE, include SHM as an important topic in their general conferences.

From the point of view of practical applications, the use of automated systems for integrity monitoring of assemblies and components is already common in automotive and aerospace engineering but, despite of the theoretical developments available to date and of the several successful application examples, civil engineers look to be somehow reluctant to extensively apply SHM techniques. Among the various reasons that may stay behind this attitude, the following are mentioned here.

- Extreme diversity of the players involved in the civil engineering sector, including facility owners, designers and contractors, in terms of economic interests, size and technical skills.
- Extreme diversity of the structural typologies and situations involved in the construction industry.
- Lack of understanding of the potential benefits induced by the use of SHM techniques.
- Extreme diversity of the players in the SHM market.

Some aspects of the above reasons will be discussed in more detail in the present paper, putting into evidence the different roles that SHM could indeed play in improving knowledge on the real structural behaviour, in allowing effective management of constructed facilities and, generally speaking, in pushing structural engineering towards more effective, safe and sustainable practices.

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