



Multi-level Classification of Bridge Defects in Asset Management

Jan Bień, Małgorzata Gładysz-Bień

Wrocław University of Science and Technology, Poland

Contacting author: jan.bien@pwr.edu.pl

Abstract

In the paper a proposal of the unified multi-level classification of bridge defects declining condition of bridges is presented as one of the most important elements of asset management. General scheme of bridge degradation process is described with classifications of basic mechanisms of bridge degradation as well as stimulators of degradation mechanisms. Criteria of defects classification are proposed taking into account effects of activities of bridge degradation mechanisms. The proposed general conception of classification methodology of bridge defects is addressed to all types of bridge structures and all types of structural materials. Examples of hierarchical three-level classifications of defects are presented for concrete, steel and masonry bridge structures.

Keywords: concrete bridges; steel bridges, masonry bridges, defects; classification; degradation stimulators, degradation mechanisms, asset management.

1. Introduction

Defects of bridge structures, detected as a result of diagnostic procedures, create the most important background for effective bridge asset management. Criteria of defect identification and methods of their classification are usually specific for each Bridge Management System (BMS) and are generally individual in each country [1]-[6].

Conception of the unified multilevel classification of bridge defects were originally proposed in [7] and developed in [8]-[10] during creation of the bridge management systems for Polish road administration and railway administration.

Presented classification methodology has been also partly developed by WUST teams participating in few international research projects: *Sustainable Bridges: Assessment for Future Traffic Demands and Longer Lives* (6. FP EU) [11], [12], *Improving Assessment, Optimisation of Maintenance, and Development of*

Database for Masonry Arch Bridges (UIC) [5], *Structural Assessment, Monitoring and Control – SAMCO* [13], *Quality specifications for roadway bridges, standardization at a European level* (COST TU1406) [14] and can be an input to international integration of bridge asset management policy.

2. Bridge degradation process

Bridge structures are influenced by degradation processes causing defects, failures and even collapses. Information on deterioration processes and their results is significant for improvement of bridge design rules and is of fundamental importance for bridge asset management, using the most effective tools in operation and maintenance of the bridge infrastructure.

Schematic diagram of bridge degradation development is presented in Fig. 1. Various types of stimulators can activate chemical, physical as well as biological degradation mechanisms and influence course of the mechanisms [9]. Final