



Risk-Based Design of Bridges

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Abstract

Bridges belong to critical elements of transport infrastructure. Therefore, it is necessary in the highest extent to address all relevant risks (namely those that are related to ageing of fittings and components of technical facilities and with dynamic development of environment in time) in the preparation of the terms of references and in the design process. In order to design the bridges with these properties, it is not enough to respect only valid standards and norms and good practice, but they also need to be respected data on all possible risks and their combinations. For this it is necessary to use measures identified in the risk management plan for design, which specifies local conditions and possibilities. This paper shows model of procedure which combines norms and risk analysis results.

Keywords: Critical infrastructure; bridges; risk; risk sources; decision support system; risk management plan; risk-based design procedure.

1 Introduction

For security and development, the human society needs bridges on transport infrastructure that provide services, which are safe, i.e. they reliably perform their functions and they have good coexistence with their surroundings, even under critical conditions. In order to ensure that requirement, it is necessary in the highest extent to address all relevant risks (namely those that are related to ageing of fittings and components of technical facilities and with dynamic development of environment in time) in the preparation of the terms of references and in the design process [1,2]. It is necessary to note that present legislation is directed to bridge reliability [3]; i.e. not to bridge safety. In this case an inventory of risk sources is limited; it is missing a number of sources of risks, which are important for the safety of bridges.

Present knowledge [1,2,4,5] shows that for design of safe bridges, it is not enough to respect only valid

standards and norms and procedures of a good practice. At designing, they also need to be respected data on all possible risks and their combinations, and for this aim it is necessary to use measures identified in the risk management plan for design, which specifies local conditions and possibilities [6,7].

It is necessary to use the correct design creation methodology, which considers the relevant risks. Because such methodology has not been specified yet, the article proposes the risk-based design methodology, which has been verified in practice in frame of project [8]. In article, they are presented: list of the causes of risks for bridges based on the world data; decision support system as a basis for risk evaluation; risk management plans for designing; and risk-based design procedure for bridges.

2 Results of research

On the basis of studies from available 56 sources from around the world, it has been compiled a