



QUALITY SPECIFICATIONS FOR ROADWAY BRIDGES,
STANDARDIZATION AT A EUROPEAN LEVEL

WG 2 and WG 3 WORKSHOP OF COST ACTION TU1406

20 – 21 October 2016

Delft, The Netherlands



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1.2. PROGRAMME

Thursday, October 20th, 2016

Session 1: 9.00 - 11.00

Moderators: Irina Stipanovic, Jose Matos

9.00 – 9.30 Welcome and opening session by:

José Matos, Chairman of the COST TU 1406, University of Minho, Portugal,
 Agnieszka Bigaj-van Vliet and Jos Wessels, TNO, Netherlands
 Irina Stipanovic, WG 2 leader, University of Twente, Netherlands

**9.30 – 10.00 Keynote speaker: Agnieszka Bigaj-van Vliet, TNO, the Netherlands:
 Advancement of fib Model Code for structural concrete to incorporate
 assessment of existing structures.**

10.00 – 10.20 Mariano Angelo Zanini: Performance goal assessment for existing bridges subject to pier local scour

10.20 – 10.40 Dimitrios Nikolaidis: Detailed Evaluation of Deteriorated Highway Bridges in Greece

10.40 – 11.00 Vikram Pakrashi: Principal component analysis as a comparative technique for bridge management systems

11.00 – 11.30 Coffee break

Session 2: 11.30 - 12.30

Moderators: Matej Kusar, Lojze Bevc

11.30 – 11.50 Carmen Andrade: Resistivity as indicator of durability: survey in existing bridge

11.50 – 12.10 Ivan Zambon: Reliability of existing bridges determined with physical models – chloride induced corrosion

12.10 – 12.30 Tomasz Kamiński: Quality control of masonry bridges based on empirical influence lines of displacements

12.30 – 13.20 Lunch

Session 3: 13.20 - 15.00

Moderators: Rade Hajdin, Eleni Chatzi

13.20 – 13.30 Opening of WG 3 by Rade Hajdin

13.30 – 14.00 Keynote speaker: Bruce Johnson, State Bridge Engineer, Oregon Department of Transportation, (WG 3): Overview and preliminary results of Long Term Bridge Performance Program (LTBPP)

14.00 – 14.20 Poul Linneberg: Reflections on Quality Control Plans for Girder and Frame Bridges

14.20 – 14.40 Dimosthenis Kifokeris: Project performance appraisal frameworks as blueprints for bridge quality control

14.40 – 15.00 João Amado: Quality Control Plan for Earth Retaining Walls – Conceptual Framework

15.00 – 15.30 Coffee
Session 4: 15.30 - 17.00

Moderators: Ana Mandic, Amir Kedar

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|----------------------|---|--|
| 15.30 – 15.50 | Ignacio Pinero: | Value-based method for condition assessment and management of bridges |
| 15.50 – 16.10 | Matej Kusar: | Non-destructive investigation techniques in bridge inspection |
| 16.10 – 16.30 | Stefan Maas: | Structural health monitoring based on static measurements with temperature compensation to detect stiffness reductions |
| 16.30 – 17.00 | Collecting findings from the 1 st day workshop – Open Discussion | |
| 17.30 – 19.00 | City tour through Delft, walk to the dinner | |
| 19.00 | Networking dinner (details will follow) | |

Friday 21/10/2016
Session 5: 09.00 - 10.30

Moderators: Alfred Strauss, Yiannis Xenidis

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|----------------------|--|---|
| 09.00 – 09.30 | Keynote speaker: Mitsuyoshi Akiyama, Waseda University, Japan: Long term performance of concrete bridges under multiple hazards | |
| 09.30 – 09.50 | Giel Klanker: | Sustainability score for roadway bridges |
| 09.50 – 10.10 | Boulent Imam: | Environmental performance framework for bridge infrastructure maintenance |
| 10.10 – 10.30 | Joana Almeida: | Life-cycle cost optimisation on a set of bridges |
| 10.30 – 11.00 | Coffee break | |

Session 6: 11.00 - 12.10

Moderators: Vikram Pakrashi, Guðmundur Guðmundsson

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| 11.00 – 11.20 | Nikola Tanasic: | Bridge management practice & methodologies related to flooding hazards |
| 11.20 – 11.40 | Naida Ademovic: | Assessment of bridge performance by load testing after |
| 11.40 – 12.10 | João Amado | Interceptable Decaying Processes in Arch Bridges |

Closing Ceremony: 12.10 – 12.40

Moderators: Joan Casas and Giel Klanker

12.10 – 12.25 Wrap up of the workshop – Open discussion

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| 12.25 – 12.35 | Ana Mandic | Announcement of the next joint COST TU1402 - COST TU1406 – IABSE WC1 Workshop, Zagreb 2-3 March 2017 |
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Value-based method for condition assessment and management of bridges

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Abstract. This paper presents a value-based assessment method to assess the condition of a bridge based on visual inspection. The method has been developed following MIVES, a multi-criteria model for decision making that evaluates alternatives to solve a defined generic problem through an index value. This method increases the objectivity and consistency in the assessment of bridges by establishing general criteria to identify damages and automatically quantifying their relative importance. For this purpose, bridge components and types of damage have been classified, damage indicators have been defined, and relative weights and value functions have been assigned to each indicator. The value-based assessment method has been implemented in a tool that provides a global condition index of the bridge, reports specific warnings for indicators that exceed alarm thresholds, and recommends repair actions.

Keywords: bridge management, condition index, prioritization, value-based analysis, MIVES

1 Introduction

This paper presents a value-based method and tool to assess the condition of a bridge based on visual inspection. This assessment tool has been developed following the Integrated Value Model for Sustainability Assessment or MIVES, a multi-criteria methodology for decision making that evaluates each of the alternatives that can solve a defined generic problem, through an index value. MIVES has been developed by Tecnia, the University of the Basque Country, the Technical University of Catalonia and the University of Coruña (MIVES I, II, III and IV). This methodology is included within the multi-attribute utility theory, because to get the index value of each alternative, a weighted sum of the valuations of the considered criteria is done assuming that there is certainty. That is, the preferences of the decider, with respect to the proposed indicators, are known. MIVES has already been used in number of applications for the sustainability assessment of construction elements and projects, such as the sustainable design of concrete structures of the Spanish Structural Concrete Code (Ministerio de Presidencia, 2008) and instruction of structural steel (Ministerio de Presidencia, 2011).

2 Description of the assessment methodology

Experience on bridge assessment based on visual inspection demonstrates that the importance attributed to the same damage by different inspectors, even if experts, is different. To minimize the subjectivity in the evaluation of damages, it is crucial to develop an inspection tool with an exhaustive damage catalog. This allows to establish a general criterion to identify defects, to assess their relative importance and to assess the general condition of a bridge.

The assessment tool developed here will require the inspector to indicate just the type, location and extension of the observed damage. The tool will automatically assign a weighted value of the damage depending on their location and material by intrinsically considering how severe the damage is, how it is expected to evolve and how it affects other elements of the bridge. For this purpose, the bridge components and types of damage have been classified, and damage indicators have been defined. Relative weights and value functions have been assigned to each indicator following the MIVES methodology.

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