QUALITY SPECIFICATIONS FOR ROADWAY BRIDGES,
STANDARDIZATION AT A EUROPEAN LEVEL

Scientific Report on Short Term Scientific Mission

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1. AIMS AND OBJECTIVES

The purpose of the STSM was split between the scientific part of the STSM and the obligations towards current needs of COST TU1406 Action.

2. WORK CARRIED OUT

For the needs of the Action, I was assembling the applied performance indicators databases and performing the work of coordinating and managing the responsible persons from each country. This work included helping in filling and screening the national documents and gathering the databases and glossaries from different countries.
Regarding the scientific part of my STSM, before the beginning, the Work Plan was based on the research of effects of structural improvement on technical performance indicators associated with degradation of bridges. Due to needs of current project which I am working on and due to slight change of direction of my doctoral studies, the aim of my STSM extended beyond this topic and I extended my research on methodologies of assessment of performance indicators and methods of combining those methodologies. The main goal was to combine essentially different methodologies of evaluating the reliability of existing RC bridges. One being the probability of ULS or SLS states occurring, calculated by using the analytical formulations of deterioration mechanism (such as chloride penetration, carbonation etc.) and the other being the usage of condition ratings from visual inspection and calculating the probabilities of certain condition states occurring by predictive models such as Markov chain. By adding to this the possibility of using the results of Non-destructive tests (NDT) it is possible to create a holistic framework which uses different levels of information for the assessment of behavior of existing RC bridges.
The preliminary working steps envisaged in Work Plan stayed the same as I researched the deterioration mechanisms and their effect on (RC) bridges. After that, I drew my attention to default values for deterioration mechanisms, and the possibility of predicting the deterioration behavior of certain bridge with having few data (such as period of construction and environmental conditions). Moreover, as described in Work Plan, I concentrated on a detailed elaboration of different techniques for data gathering through inspections, measurements, testing and monitoring activities. From that part of research, in my framework I incorporated the assessment methodologies using condition ratings from visual inspections and other test results from NDTs. To complete the proposed framework, in next few months I will put effort in researching and I will propose updating and merging procedure for probabilities calculated from above described techniques.

3. MAIN RESULTS

The main outcome of my STSM is defining the described framework, for which I plan to develop Windows Standalone Application. During STSM, I did most of the programing for first parts of application, which includes the programing of deterioration processes and Markov chain predictive model in Matlab.
Except for University of Minho, I presented my work on a meeting in Lisbon to Portuguese railway and roadway operator “Infraestruturas de Portugal” (IP). We developed a working relationship, which will be continued with the IP providing me the whole RC bridges database by the end of January 2016.

4. FUTURE COLLABORATION

The future collaboration with the host institution is guaranteed since during the period spent at University of Minho I developed very good relationship with my host Prof Jose Matos. Moreover, with the approval of my supervisor Prof Strauss, Prof Matos became the co-supervisor of my doctoral studies. Except Prof Matos, I developed close friendship and working relationship with several PhD and Master’s students from whom I would single out Joao Fernandes and Hugo Guimarães. With whom I already started to exchange knowledge and literature important for my studies.

5. FORESEEN PUBLICATIONS/ARTICLES

As a final product of my STSM at University of Minho I expect to publish a Journal paper together with Prof Matos. The foreseen publication is planned to be finished and submitted by the middle of 2016 and it will present the second Journal publication of my cumulative PhD thesis. The paper is envisaged to present the work performed during my stay on STSM (described above) applied on bridge database from “Infraestruturas de Portugal” extended with Austrian bridge database from firm “OEBB”. In this way the presented framework will be tested on bridges with very different environmental and execution conditions.

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