

Edward Petzek  
Radu Băncilă *Editors*

# Economical Bridge Solutions based on innovative composite dowels and integrated abutments

Ecobridge

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Edward Petzek · Radu Băncilă (Eds.)

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Ecobridge



Springer Vieweg

*Editors*

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Timișoara, Romania

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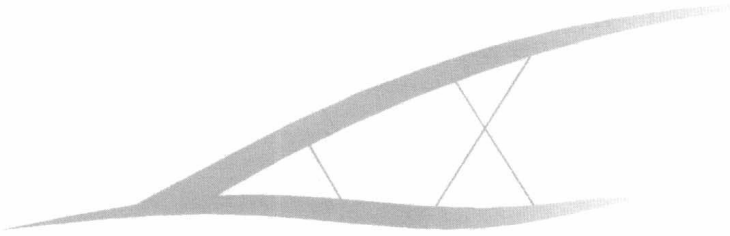
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## Foreword

This book is an outcome of the research project “**ECOBRIDGE** – *Demonstration of ECO-nomical **BRIDGE** solutions based on innovative composite dowels and integrated abutments* – RFCS – CT 2010-00024”, which has been co-funded by the Research Fund for Coal and Steel (R.F.C.S.) of the European Community.

The design and construction of sustainable and durable bridges with low maintenance costs is one of the European Road and Railway Administration tasks. The structures must be safe, economical and with good serviceability issues. All these needs can be found in integral abutment bridges. This solution, by eliminating the bearing and expansion joints, leads to low production and maintenance costs. Integral bridges have a good earthquake resistance. Nevertheless, the design and construction of these structures include a series of specific aspects.

The knowledge gained within the RFCS research projects, INTAB and PRECOBEAM, has enabled us to elaborate cost effective, environmental friendly and sustainable bridge structures. The main objective of the present project entitled “EcoBridge” was the construction of three composite bridges with integral abutments and innovative form of shear transmission – composite dowels. The project focuses on cost efficient, competitive composite bridges with special regard to environmental friendly and sustainable design. The targeted countries are: Germany, Romania and Poland. The bridges were instrumented with a variety of strain gauges, displacement sensors and thermocouples to monitor and help in the assessment of structural behaviour, for future application of integral abutment bridges and/or composite dowels. The consortium members (involving three universities, three design offices, three steel contractors and one steel manufacturer) have long track record and extensive experience in this field. Additionally, the exchange of technical experience from the partners from different parts of Europe contributes to a transfer of information from the different construction fields with different demands.

The main topics of the book are the following: design of integral bridges, innovative composite dowels for the shear transmission, construction of bridges, structural analysis of bridges and monitoring. The book joins the technical experience and the contributions of the involved research partners. The technical content of all the papers is present-day in the field of the design, construction and monitoring of innovative composite bridges. The efficient de-

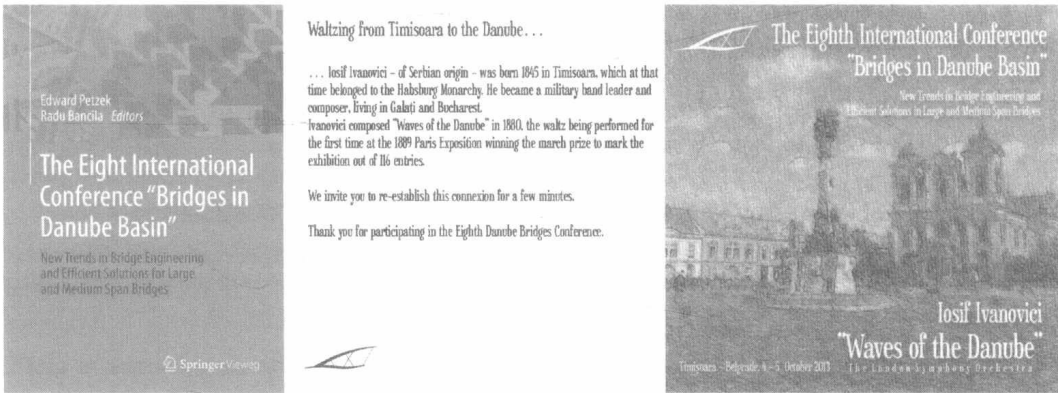


invited speakers and selected papers were presented. On October 4<sup>th</sup> a special meeting dedicated to the European ECOBRIDGE project was organized. A technical site visit in Serbia (Novisad, Belgrade, Zemun) on October 5<sup>th</sup> presenting some new bridges across the Danube, took place.

The general aim of the Conference was the overall exchange of knowledge and experience between different institutions, owners, contractors, bridge designers and constructors as well as scientific experts. The conference intends also to promote advances in bridge engineering and understanding between the countries along the Danube, but also between other European countries.

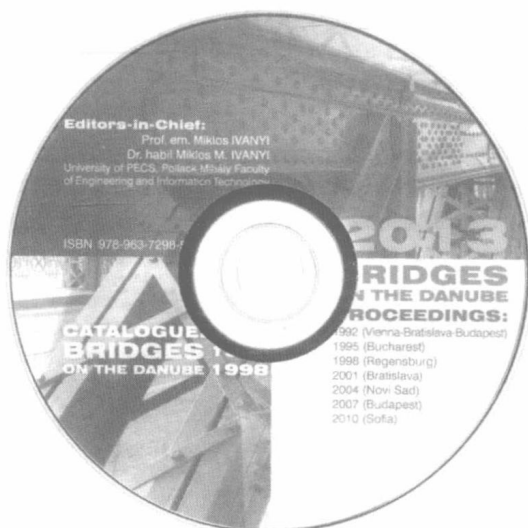
The Conference was under the aegis of important scientific organizations: International Association for Bridges on the Danube (IABD), International Association for Bridge and Structural Engineering (IABSE), European Convention for Constructional Steelwork, Universitatea “Politehnica” Timișoara and the Romanian Academy for Technical Sciences (ASTR).

The proceedings of the Conference were published in the Springer – Vieweg Verlag; the volume comprises 42 papers on 544 pages. The attendance was very good (over 90 persons).



**Figure 2:** The proceedings of the conference

On the laudable initiative of Prof. Miklos Ivanyi the proceedings of all the Danube Bridges Conferences were recorded on a special CD. It is important to mention that on the CD there is also a reproduction of the last version of the Danube Bridges Catalogue (Edition 1997 Regensburg).



**Figure 3:** Danube Bridges Conferences Proceedings (1992 – 2010) and the Danube Bridges Catalogue

The next Danube Bridges Conference will be organized by Slovakia in 2016.

Finally, we want to express our gratitude to:

- the Research Fund for Coal and Steel (RFCS) of the European Community;
- our collaborators – project partners, which contributed to the present publication;
- to the non-profit association SALVPOD, who co-financed – together with RFCS this book.

*In memoriam*

† Prof. Dr. Ing. Miklos IVÁNYI

† Prof. Dr. Ing. Dragoș TEODORESCU

Timișoara, February 2014

**Edward Petzek**

**Radu Băncilă**

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# **Demonstration of ECOmical BRIDGE solutions based on innovative composite dowels and integrated abutments**

*Dipl.Ing. Nicoleta Popa<sup>1</sup>*

## **1. Introduction**

The Research Fund for Coal and Steel is managed by the European Commission, Directorate-General for Research and Innovation, Directorate G (Industrial Technologies), Unit G.5. The types of actions supported are: Research Projects, Pilot and Demonstration Projects, Accompanying Measures.

Pilot and Demonstration projects are aiming to bridge the gap between Research and Innovation. Innovation can be considered as the technological implementation of new products or processes within the relevant industrial sector, or of significant improvements to products or processes, based on previous research results. The innovation is technologically implemented if it is introduced on the market (product innovation) or used within a production process (process innovation).

Demonstration projects aim at constructing and/or operating an industrial-scale installation or a significant part of an industrial-scale installation. Such projects aim to bring together all the technical and economic data in order to proceed with the industrial and/or commercial exploitation of the technology at minimum risk.

ECOBRIIDGE project is a demonstration project funded by the Research Fund for Coal and Steel.

## **2. Motivation**

In the design and construction of bridges, questions of sustainability, maintenance and durability become more and more important for European road administrations in addition to safety and serviceability issues. From this perspective, integral abutment bridges turn out to become highly attractive to designers, constructors and road administrations. The main reason for this is that they tend to be less expensive to build, easier to maintain and more economical to own over their life time. This is principally due to the non-existence of bearings and joints that are main sources of maintenance costs during life time [1] [14].

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<sup>1</sup> Arcelor Luxembourg, Coordinator of the EcoBridge – RFCS Project