

## Briefing

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# Briefing: Activities by IABSE WG8 (Forensic Structural Engineering)

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**A working group on forensic engineering (WG8) was established within the International Association for Bridge and Structural Engineering (IABSE) in 2011. This working group aims to mitigate structural failures and improve forensic engineering practices. To accomplish this goal, several activities were organised such as an international survey among 48 countries to compare forensic engineering practices. Furthermore, several interesting forensic engineering sessions were organised at IABSE conferences with various presentations. Moreover, a pre-conference short course focusing on various types of failures and the process of forensic investigation was well received. It appears that there is great interest in forensic structural engineering both from practitioners and from researchers. This briefing article describes the activities of WG8 in detail.**

Within the International Association for Bridge and Structural Engineering (IABSE), a working group on Forensic Structural Engineering (WG8) was established in 2011.

‘The ultimate objective of WG 8 is to mitigate structural failures and improve forensic engineering practices. To those ends it endeavours to (i) report on the engineering investigation of structural failures; (ii) encourage improvements of design and construction practices based on the lessons learned from failures; (iii) publicise techniques of field and analytical investigation of failures; (iv) promote ethical forensic engineering practices; (v) inform of effective dispute resolution procedures; and (vi) through publications and seminars increase the awareness of students and practicing engineers of the causes, prevention and consequences of failures, thereby increasing the safety and reliability of structures’ (Ratay, 2013).

This briefing will explain to what extent the goals have been reached until now.

First, the working group started with making an inventory of how forensic engineering practices were developed in the various member countries of IABSE. The results of the initial survey for six countries were presented at an American Society of Civil Engineers’ congress on forensic engineering in San Francisco (Terwel *et al.*, 2012). It appeared that forensic practices in the USA and the UK are more organised and structured than in the other European countries that have been reviewed. Furthermore, it appeared that reliable failure data are usually lacking, which hampers a reliable comparison of safety levels in the various countries. The survey was extended and finally 31 out of 48 IABSE member countries responded. Updates of this project were presented at IABSE conferences in Madrid (Ratay *et al.*, 2014)

and Geneva (Palmisano and Ratay, 2015). A final report is expected in the autumn of 2016.

Second, WG8 organised sessions on forensic structural engineering at IABSE conferences in Madrid and Geneva, in which several members of WG8 presented papers. In 2014 in Madrid, two sessions were organised where excellent papers on failures of football stadiums, bridges, residential buildings and rail tracks were presented, apart from general papers on forensic practices such as the responsibility of the forensic engineer.

In September 2015 in Geneva, two sessions were also organised. The first session consisted of the following topics

- The Practice of Forensic Structural Engineering in IABSE Member Countries: Review of a Survey
- Applying Forensic Investigations of Failures of Structural Performance
- Lessons from Confidential Reporting on Structural Safety
- Objectivity, Bias, and Advocacy in Expert Forensic Testimony Concerning the Standard of Care
- Changes in Codes following Structural Failures: an Italian Perspective on Mitigation of Structural Vulnerability
- Exploring Improvements for Structural Safety.

The second session focused on failures of tendons in prestressed bridges, the collapse of a timber roof, vortex-induced vibrations of a suspension bridge and the possibilities of radar interferometry for predicting structural disasters.

Apart from these two sessions the working group organised the pre-conference short course Forensic Structural Engineering –

Causes of Failures & Investigations with five presenters from the USA, Italy and the Netherlands. In the morning this course dealt with various types of failures and in the afternoon the process of forensic investigation was highlighted using several cases as example. The various topics of the day were

- An overview of Forensic Structural Engineering
- Technical Causes of Structural Failures and Underlying Factors
- Typical Cases of Failures and Collapses
- The Forensic Investigation Process
- Investigation of Failures in Concrete and Masonry Structures
- Investigation of Failures in Steel Structures
- What You See Is All There Is: about Bias in Observations.

The course was well attended, with over 20 subscribers, and well received. WG8 intends to repeat this short course at the IABSE Stockholm 2016 conference.

Finally, it was decided that the working group will set up a bibliography with relevant publications related to forensic structural engineering as well as a collection of the most meaningful case studies. This project is currently under construction.

In conclusion, the recent experience of WG8 has clearly shown that there is great interest in forensic structural engineering both from practitioners and from researchers. This interest includes not only case studies and details on investigations but also legal and ethical aspects.

Members of the Institution of Civil Engineers are invited to add to this initiative by submitting papers on forensic structural engineering topics for forensic sessions at IABSE conferences. Moreover, taking into account that, at time of writing, WG8 started its activities only 4 years ago, proposals about new relevant topics are also welcomed by the group.

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