

COST E55 - Modelling the Performance of Timber Structures

4th Workshop and 6th MC Meeting

University of Zagreb

Croatia

25.-26. September 2008

**Parallel session / WG 3 meeting on the robustness of timber structures
- Background Information -**

The WG3 meeting will focus on

- 1. Review collapses with respect to robustness**
- 2. Benchmark examples**
- 3. Guideline**

1. Review collapses with respect to robustness

A number of examples with failure of timber structures will be collected and analysed with focus on

- a. what can be learned with respect to robustness?
- b. how could the structures have been changed in order to increase robustness?
- c. the identification of key elements

The following collection of examples will be considered:

- Scandinavian investigation of structural failures by Frühwald et al, 2007.

Fulop Ludovic will distribute information on relevant timber structure failures.

- German investigation of 130 structural failures.

Phillip Dietsch will distribute information.

- Danish structural failures

Jørgen Munch-Andersen will distribute information.

Further, **John D. Sørensen** will distribute papers on the Danish approach for robustness.

Preparation before Zagreb meeting:

- Examples to be distributed by above responsible
- All participants in WG 3 meeting:
 - Study the examples with respect to the focus points a, b and c

Zagreb meeting:

- Discuss each example
- Outcome: Prepare a table with information for each example on focus points a, b and c

NB: results could be included in the 'final' guideline as an appendix

2. Benchmark examples

The following example structures are considered:

- Norwegian sports hall – first results presented at Helsinki meeting (paper distributed by Poul Henning Kirkegaard).
- Austrian bridge
- Solid timber building

Information on the structures can be obtained from Poul Henning Kirkegaard.

The purpose and aim of the examples are

- to investigate system reliability (spatial distribution of strength and stiffness) and robustness of timber structures using probabilistic methods.
- to model failure modes (different types incl. connections – behavior after failure: ductile / brittle).
- to discuss how to model the effect of human errors (unintentional errors and defects).
- to model local failures – due to local extreme snow load, design/execution/maintenance error in connections.
- to identify key elements, and how to design key elements.

Preparation before Zagreb meeting:

- All participants in WG 3 meeting:
 - Make qualitatively and/or quantitatively analyses of one or more of the examples with respect to robustness (above bullet points)

Zagreb meeting:

- Presentations and discussions of qualitatively and/or quantitatively analyses of the examples
- Outcome: agree and distribute further work on the examples, and evt. define new examples

NB: results could be published as conference/journal papers and/or included in the ‘final’ guideline as an appendix.

3. Guideline

The main deliverable from WG3 is a guideline ‘Recommendations for practical design for robustness of timber structures’. Further a possible update of the JCSS Probabilistic Model Code on timber structures will be considered, especially with respect to system reliability and robustness aspects.

Preparation before Zagreb meeting:

- John D Sørensen:

- Prepare a draft of the content of the guideline

Zagreb meeting:

- Discuss and agree on the content of the guideline
- Distribute tasks to the WG3 participants to write draft sections of the guideline. The drafts will be discussed and updated at the next meetings.