WP4: Benchmarks for structural fire engineering

Pan for studies before Aveiro Meeting Oct. 18-19, 2013.

1. Action required

Within one week (**no later than on Monday 17.06.2013**) every COST Action TU09094 member is kindly asked to take via email to kamila.horova@fsv.cvut.cz one of three possible actions:

1. Confirm your participation in the WP4 according to the list of topics attached below (no changes to the topics)

2. Respond with proposed changes/modifications, eventually offer new topics.

3. Refuse to participate (hopefully not). If there is no response from you it also means you will not participate.

Please review the description given by prof. I. Burgess in Section 2 and the list of topics (benchmark studies) provided in Section 3. The idea is to create small task cooperative groups (from two, three universities, countries). It is expected that most of the study will be developed by young researchers supervised by you. We are planning to have benchmark studies, developed according to the templates, ready for Aveiro meeting Oct. 18-19, 2013. It is important to keep the format as much as possible. A regular set will contain three files:

- 6-12 Word document with a detailed description (all assumptions, interpretation of results, etc.)
- Excel file with all input
- Excel file with results

One benchmark study can consist of many related cases (e.g. for steel beams different cross-sections, BC, loading), placed in separate spreadsheets at the same Excel file. Please check Section 2 for more details and the website http://people.fsv.cvut.cz/~wald/fire/ifer/WP4/index.htm for templates (will be updated continuously).

THE DUE DATE for the submission of full papers (studies) is on Monday 30.09.2013.

2. Essential Items in recording of benchmark studies

Different software tools are based on different assumptions and use different approaches, largely because they have been designed for different purposes. Hence, it should not be assumed that all the input data will be common to all software, or that results should be identical when compared. For example, the inclusion or exclusion of high-temperature creep, and the assumptions made about its behaviour, can change the results for simple steel beams in fire very considerably.

The essential parts of a well-documented benchmark study are:

1. Report: a description of the study

   For uniformity in the deliverable to be produced, this should fit into the template provided on the IFER website. For advanced studies it may take the form of a technical paper, not more than 12 A4 pages in length, but must give the information necessary for the study to be re-created. For simpler cases the

description should also be formatted to the same template, but can describe the case more briefly; a few pages should be adequate to describe the case fully.

The report should contain some description of the software used, including references to key published papers and documents. It should also describe any assumptions, either inherent in the software or explicitly made in the setup of the case, which could vary between software codes.

If the study has been compared with experiments, then a brief description should be given and key references cited.

2. Input spreadsheet: Data needed to create the model

   This should take the form of an easily readable spreadsheet; it is suggested that Microsoft Excel workbooks should be used, but a simple ASCII format such as "comma-separated" would also be acceptable. Clearly, each case is unique and requires its own types of numerical data, so a single template is inappropriate. However, the workbook should consider its users by providing any notes or figures which may be necessary to understand the data. An example is provided on the IFER website.

3. Output spreadsheet: Key results

   This should be in spreadsheet format, and present results from the benchmark study in appropriate detail. A typical Excel workbook would contain graphical plots of key deflections, stresses/strains and temperatures, as well as manageable tables of numerical results (not whole output files). An example is provided on the IFER website.

3. List of anticipated contents

These can be classified into 3 categories:

1. Principles of benchmarking

Principles of verification and validation	KWASNIEWSKI Leslaw
Fire model questions	MERCI Bart

2. Basic benchmark cases

RC beams	CVETKOVSKA Meri, LAZAROV Ljupcho, TODOROV Koce
RC columns	CVETKOVSKA Meri, LAZAROV Ljupcho, JOVANOSKA Milica
Composite columns	ZAHARIA Rahul, BOTH Ioan, OSTAPSKA Katarzyna, KWASNIEWSKI Leslaw
Steel beams	PEČENKO Robert, HOZJAN Tomaz, BURGESS Ian KWASNIEWSKI Leslaw, PELCZYNSKI Jan, Bartek SAWICKI
Composite steel and concrete beams	PEČENKO Robert, HOZJAN Tomaz, BURGESS Ian
Steel column	NIGRO Emidio, CEFARELLI Giuseppe,SANNINO D., FERRARO A.
Steel and composite members and frames	BURGESS Ian
Steel frame	PEČENKO Robert, HOZJAN Tomaz, BURGESS Ian
Steel frame	BILLOTA Antonio, NIGRO Emidio, CEFARELLI Giuseppe, SANNINO D., del PRETE Iolanda,

	FAGGIANO Beatrice, MAZZOLANI Federico
Moment resisting steel frame	IAZZETTA Giuseppe, del PRETE Iolanda, FAGGIANO Beatrice, FRANSSEN Jean-Marc, MAZZOLANI Federico, NIGRO Emidio
Steel columns under compartment and localized fire	SANTIAGO Aldina, HAREMZA Cécile, LOPES Fernanda, FRANSSEN Jean-Marc,
Lateral torsional-buckling of steel girders	VILA REAL Paulo, PRACHAŘ Martin, LOPES Nuno, COUTO Carlos, JANDERA Michal, WALD František
Local-buckling of class 4 steel plate girders	VILA REAL Paulo, PRACHAŘ Martin, LOPES Nuno, COUTO Carlos, JANDERA Michal, WALD František
Cold-formed steel element	LAÍM Luís, CRAVEIRO Hélder, RODRIGUES Joao Paulo
T-stub joint component	SANTIAGO Aldina, RIBEIRO Joao, RIGUEIRO Constanca

3. Advanced benchmark cases

3D Frame behaviour	ZHAO Bin, BIHINA Gisele
Temperature development in industrial hall	ZHAO Bin, BIHINA Gisele
Fire protected and unprotected timber	CALDOVÁ Eva, DUFKOVÁ Magdaléna, KUKLÍKOVÁ Anna, KUKLÍK Petr
People evacuation	SZILAGYI Csaba