

# Benchmark Studies in Fire Engineering

The process of verification and validation of engineering models and their results has been an integral part of advanced structural design practice and research for some years. Both of these are strongly supported by information technologies at all levels, from conceptual design, pre-design, calculations, drawings, fabrication and on the construction site – as well as integration with building services and architectural finishes through Building Information Modelling (BIM) systems. The transfer of data on all of these aspects of planned and existing structures is the domain of object-orientated databases, which can be used during the life of the structure for refurbishment, and will in future also be used for demolition. For the purposes of fire safety and structural fire engineering design both purpose-designed and general software tools are used. Reliable means of verification of numerical models, both simple and advanced, is an essential part of the analytical design process. For advanced design using commercial software a range of worked examples, benchmark studies, are necessary to check that a software tool is being applied correctly to particular problems, including validation examples to check the physical correctness of results. In the structural Eurocodes for fire engineering design, see EN1991-1-2, general principles are summarised for the application of advanced models.

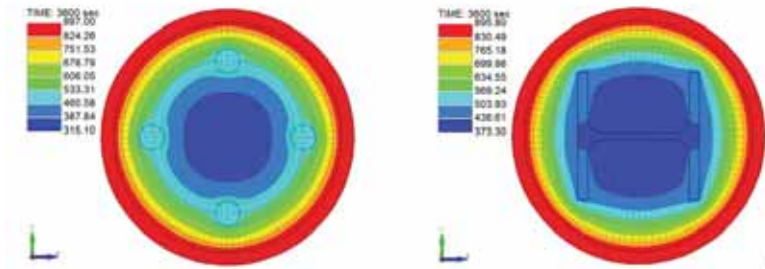
The publication is divided into two volumes; Verification of numerical models in fire engineering and Experimental validation of numerical models in fire engineering. They are intended to help European researchers, educators and design engineers with their application of advanced numerical modelling for fire engineering. To complement the textual presentation of the examples the input and output data are included in MS Excel tables so that the studies can be reproduced in detail by the users of the volume.

Wald F., Burgess I., Kwasniewski L., Horova K., Caldova E.

## Benchmark Studies, Verification of numerical models in fire engineering

CTU in Prague, 2014, <http://fire.fsv.cvut.cz/ifer/benchmark>

ISBN 978-80-01-05442-0



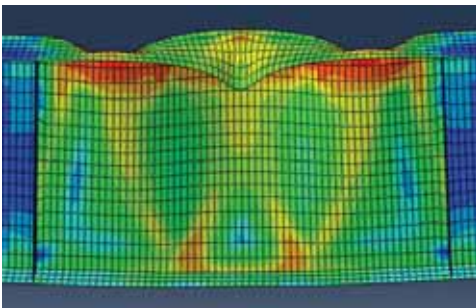
Example for verification of thermal analysis for 2D CFT cross-section with and without I-section cores

Wald F., Burgess I., Kwasniewski L., Horova K., Caldova E.

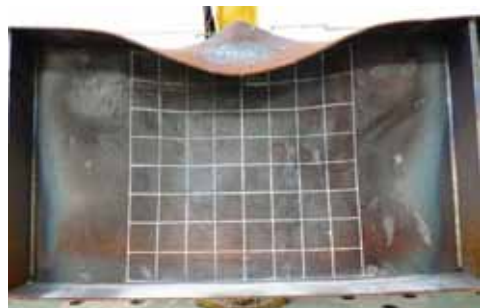
## Benchmark Studies, Experimental validation of numerical models in fire engineering

CTU in Prague, 2014, <http://fire.fsv.cvut.cz/ifer/benchmark>

ISBN 978-80-01-05443-7



Numerical simulation



Experiment

Example of validation of FEM - deformed shape of class 4 section

# Available materials of Action COST TU0904 Integrated Fire Engineering and Response

## State of the Art Report

brings together the current state of research, mainly in participating countries but set into the context of knowledge world-wide.

Wald F., Burgess I., De la Quintana J., Vila Real P., Kwasniewski L., Horova K., Jana T., 2011, ISBN 978-80-01-04598-5.

<http://fire.fsv.cvut.cz/ifer/WP1>

## Case Studies

covers fire engineering applications including clear explanation of the decision processes, the scientific assumptions and the practical constraints, as well as how different aspects of fire engineering are integrated.

Wald F., Burgess I., Rein G., Kwasniewski L., Vila Real P., Horova K., 2012, ISBN 978-80-01-05004-0.

<http://fire.fsv.cvut.cz/ifer/WP2>

## Fire Brigade Reports and Investigations

are one of the most important source of information, which are at present largely unavailable to researchers. It is focused on devising a method of extracting useful information from fire brigade report and investigations in the Action member states.

Wald F., Burgess I., Horova K., Kallerova P., Jirku J., 2013, ISBN 978-80-01-05200-6.

<http://fire.fsv.cvut.cz/ifer/WP3>

## Fire Eurocodes – The Future?

summarises a questionnaire intended to establish current design practice in the member countries with respect to fire safety in buildings and a collection of knowledge developed in recent European and national research projects, which suggests that amendments should be made to the 'fire' parts of the Eurocodes.

Wald F., Burgess I., Outinen J., Vila Real P., Horova K., 2014, ISBN 978-80-01-05476-5.

<http://fire.fsv.cvut.cz/ifer/WP6>

## Proceedings of Conference Applications of Structural Fire Engineering

Prague, 29 April 2011, <http://fire.fsv.cvut.cz/ASFE11/Proceedings.htm>

Prague, 19 – 20 April 2013, <http://fire.fsv.cvut.cz/ASFE13/Proceedings.htm>

## Educational materials

includes the materials of Training Schools of young researchers

Fire Engineering Research – Key Issues for the Future I, 11 – 14 April 2012, Sliema, Malta

[http://fire.fsv.cvut.cz/ifer/2012-Training\\_school](http://fire.fsv.cvut.cz/ifer/2012-Training_school)

Fire Engineering Research – Key Issues for the Future II, 6 – 9 June 2013, Naples, Italy

[http://fire.fsv.cvut.cz/ifer/2013-Training\\_school](http://fire.fsv.cvut.cz/ifer/2013-Training_school)

Advanced Fire Engineering in Practice – Software Tools, 12 – 15 March 2014, Luleå, Sweden

[http://fire.fsv.cvut.cz/ifer/2014-Training\\_school](http://fire.fsv.cvut.cz/ifer/2014-Training_school)

