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RESEARCH AND ADVANCED TECHNOLOGY IN FIRE SAFETY

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Daniel Alvear
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P r e f a c e

These proceedings include papers presented at the International Conference on “Research and Advanced Technology in Fire Safety” FireSafety 2017 which took place at University of Cantabria, Santander, Spain on October 20th-21st, 2017. During last decade, our research group organized several on-day events and, in this sense, the success of this conference is a tribute for that continued effort to exchange knowledge on this discipline.

We are very proud to have been able to attract experts from all parts of the world, which some of them could also attend the Fall meeting of subcommittees 1, 3 and 4 of ISO TC92 Fire Safety hosted at University of Cantabria. This congress represented such an excellent “agora” for researchers and engineers to present and discuss new and innovative approaches. In addition, this event was a unique opportunity for Spanish-speaker scientific and technological community to receive them from top references. The need for expertise in this field is also increasing in this geographical context and I feel confident we were offering a leading forum for engineers, regulators and other stakeholders.

The papers selected by our Scientific Committee Board is a testament to the calibre of the research that is on-going around the world. Unfortunately, we could not accept all the papers submitted for oral sessions although we had a strong poster session to tackle interesting emerging research. Moreover, two Invited Lectures about “PANIC IN FIRE EMERGENCIES: MYTH OR REALITY?” and “TRAVELLING FIRES FOR STRUCTURAL DESIGN” were given by Prof. Dr. Daniel Nilsson, Lund University (Sweden) and Prof. Dr. Guillermo Rein, Imperial College (UK) respectively.

We express a special recognition to the Scientific Committee Members for the evaluation and selection of the papers for the International Conference. The Scientific Advisory Board were integrated by the out-standing Professors and Researches, Dr. Orlando Abreu (University of Cantabria, SPA), Dr. Alain Alonso (University of Cantabria, SPA), Dr. Daniel Alvear (University of Cantabria, SPA), Dr. Vytenis Babrauskas (Fire Science and Technology Inc., USA), Dr. Luke Bisby (University of Edinburgh, UK), Dr. Jorge A. Capote (University of Cantabria, SPA), Dr. Ricky Carvel (University of Edinburgh, UK), Dr. Marcos Chaos (Lawrence Livermore National Laboratory, USA), Dr. Wan-Ki Chow (Hong Kong Polytechnic University, CHN), Dr. Arturo Cuesta (University of Cantabria, SPA), Dr. Michael Delichatsios (University of Ulster, UK), Dr. Bogdan Dlugogorski (Murdoch University, AUS), Dr. Sergey Dorofeev (FM Global, USA), Dr. Dougal Drysdale (University of Edinburgh, UK), Dr. Rita F. Fahy (NFPA, USA), Dr. Carlos Fernández-Pello (University of California, Berkeley, USA), Dr. Charles M. Fleischmann (University of Canterbury, NZL), Dr. Pedro L. García (National Distance Education University, SPA), Dr. Steve Gwynne (NRC, Canada), Dr. George Hadjisophocleous (University of Carleton, CAN), Dr. Yuji Hasemi (Waseda University, JPN), Dr. Juan Hidalgo (Queensland University, AUS), Dr. Wolfram Jahn (Pontificia Universidad Católica de Chile, CHL), Mr. Chris Jelenewicz (SFPE, USA), Dr. Christopher W. Lautenberger (Reax Engineering, USA), Dr. David Lázaro (University of Cantabria, SPA), Dr. Mariano Lázaro (University of Cantabria, SPA), Dr. Amable Liñán (Polytechnic University of Madrid, ESP), Dr. Andre Marshall (University of Maryland, USA), Dr. Brian Meacham (Worcester Politechnic Institute, USA), Dr. Bart Merci (Gent University, BE), Dr. Frederick W. Mowrer (California Polytechnic State University, USA), Dr. Daniel Nilsson (Lund University, SWE), Dr. Paulo Piloto (Institute Polytechnic of Bragança, PRT), Dr. David Purser (Hartford Environmental Research, UK), Dr. James G. Quintiere

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We want to express our gratitude to the authors and speakers who have dedicated their time and effort in presenting their experiences, methodologies and scientist - technical advances in the International Conference.

Finally, I would like to thank our event partners and collaborators (Government of Cantabria, City of Santander, University of Cantabria, Simulsoft- Mass Motion, Grupo KOMTES, NTCI, and NEFTAL) for their cooperation and help.

Prof. Daniel Alvear
Congress Chairman
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Protected and Unprotected Cellular Wooden Slabs at Elevated Temperatures

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ABSTRACT

The aim of this work is to present a numerical approach, based on finite element method, to predict the thermal assessment in protected and unprotected cellular wooden slabs, externally exposed to fire, using the standard ISO 843 curve. All numerical calculations will be performed to determine the wood residual cross-section and to determine the fire resistance with the use of insulation materials. These type of elements have several applications in building construction, as walls, ceilings and floors. All requirements according standards (Eurocode 5) were conducted to determine the non-linear thermal properties of the wood material and the proposed charring rate, to be compared analytically. In this study, it is important to determine the type of insulation material (properties and geometries) for guarantee a fire time resistance in cellular wooden slabs. All developed numerical study will contribute to the knowledge in these elements, where the wood material represents a complex behaviour in fire situations and the cavities inside the slabs represent a great problem for intensify the heat conduction, fig. 1. The numerical problem includes all boundary conditions, including a new proposal for the use of the standard ISO 843 curve inside the slab cavity after the char layer occurrence in the wood. The proposed methodology could be used to study others cellular wooden slabs, to assess and contribute for a safe design.

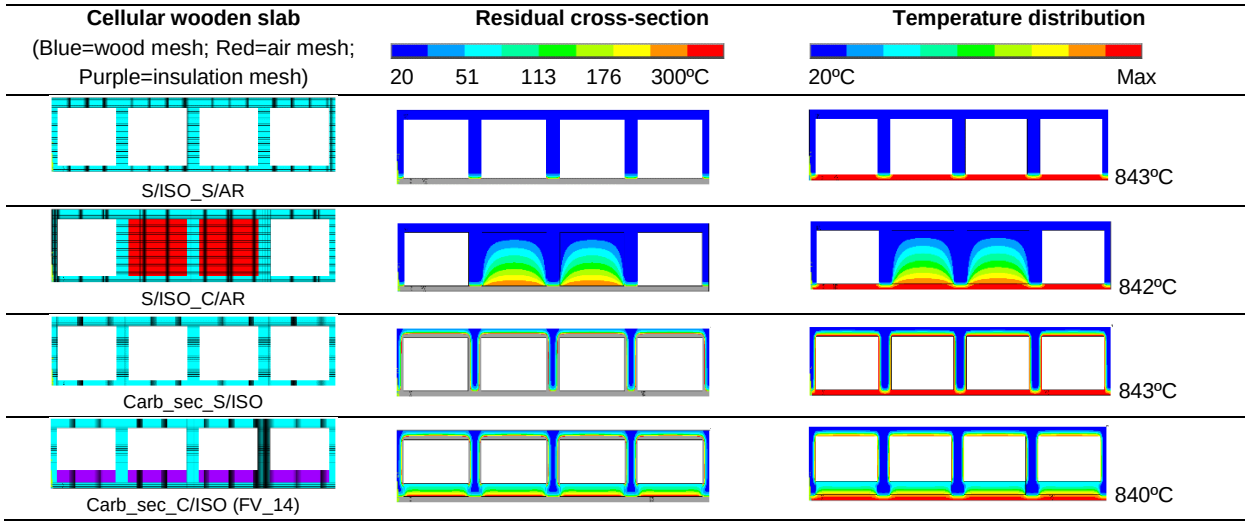

Fig. 1. Numerical cellular wood slabs, 1860s

KEYWORDS: *Wooden sab, wood, charring rate, insulation, fire.*