

10th International Scientific Conference



wood & fire
safety 2024

May 12th-15th, 2024 | Hotel Patria | Strbske Pleso | Slovakia

www.wfs-slovakia.sk

info@wfs-slovakia.sk

Programme



Partners



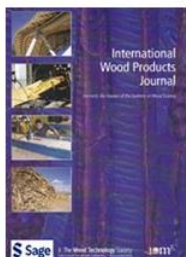
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**WOOD
RESEARCH**

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- Barber David, ARUP, Australia
- Benichou Noureddine, National Research Council, Canada
- Brandon Daniel, RISE, Sweden
- Dagenais Christian, FPInnovations, Canada
- Das Oisik, Luleå University of Technology, Sweden
- Draganić Suzana, University of Novi Sad, Serbia
- Dunn Andrew, Timber Development Association, Australia
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- Fragiaco Massimo, University of L'Aquila, Italy
- Giraldo Forero María del Pilar, Science and Technology Center of Catalonia CTFC - INCAFUST, Spain
- Gregor Pavel, Slovak University of Technology in Bratislava, Slovakia
- Grzeskowiak Wojciech, Poznan University of Life Sciences, Poland
- Hadjisophocleous George, Carleton University, Canada
- Hasburgh Laura, USDA Forest Service, USA
- Hopkin Danny, ORF Consultants, UK
- Iskra Boris, Forest & Wood Products Australia Limited, Australia
- Just Alar, Tallinn University of Technology, Estonia
- Kacikova Danica, Technical University in Zvolen, Slovakia
- Kodur Venkatesh, Michigan State University, USA
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- Kuklik Petr, Czech Technical University in Prague, Czech Republic
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- Majdalani Agustin H., Pontificia Catholic University of Chile, CENAMAD, Chile
- Majlingova Andrea, Technical University in Zvolen, Slovakia
- Markert Frank, Technical University of Denmark, Denmark
- Markova Iveta, University of Zilina, Slovakia
- Martinka Jozef, Slovak University of Technology in Bratislava, Slovakia
- Mikolla Esko, KK-Fireconsult Ltd., Finland
- Ostman Birgit, Linnaeus University, Sweden
- Pokorný Jiri, VSB - Technical University of Ostrava, Czech Republic
- Restas Agoston, National University of Public Service, Hungary
- Sawyer Gervais, International Wood Products Journal, UK
- Sonnier Rodolphe, IMT Mines Alès, France
- Sotomayor Castellanos Javier R., Michoacan University, Mexico
- Svetlik Jozef, University of Zilina, Slovakia
- Todaro Luigi, University of Basilicata, Italy
- Węgrzynski Wojciech, ITB, Poland
- Wiesner Felix, University of British Columbia, Canada
- Xu Qiang, Nanjing University of Science and Technology, China
- Zelinka Samuel L., USDA Forest Service, USA

Organizing Committee

- Katarina Kosutova, University of Zilina, Slovakia
- Jana Jadudova, University of Zilina, Slovakia
- Patrik Mitrenga, University of Zilina, Slovakia
- Kristian Slastan, University of Zilina, Slovakia

Sunday: May 12th, 2024

14:00 – 18:00 Registration

Hotel reception

19:00 – 21:00 Welcome party

Patria Chalet



Monday: May 13th, 2024

08:00 – 10:00 Registration

Hotel reception

10:00 – 12:00 Opening ceremony, Keynote speakers

Congress Hall 1

10:00 – 10:15 Opening ceremony, organizational instructions.

Linda Makovická Osvaldová

10:15 – 10:45 Nano-structural cell wall changes due to thermal degradation in wood.

Nayomi Plaza, Laura Hasburgh, Nathan Bechle

10:45 – 11:15 Application of Iterative Fire Severity Analysis to Fire Safety Design of Multi-Storey Mass Timber Residential Structures – Case Studies. *Dennis Pau, Andrew Buchanan*

11:15 – 11:45 Fire behavior of biochar and its composites.

Oisik Das

11:45 – 12:00 Discussion

12:00 – 13:30 Lunch

Sun Restaurant



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13:30 – 14:30 **Structure and properties of wood and its changes at high temperatures.**
Congress Hall 1

Chair: **Laura Hasburgh, Wojciech Grześkowiak**

13:30 – 13:40 Determination of notional char rates for protected and unprotected timber when subjected to variations in heating regimes, test duration and thermocouple configurations.

Boris Iskra, *Paul England*

13:40 – 13:50 Numerical Analysis of Cross-Laminated Timber (CLT) Wall Panels Under Fire.

Muhammad Yasir, *Kieran Ruane, Vesna Jaksic*

13:50 – 14:00 The method of interpolation of the charred zone in the cross-section of wooden beams with fire-resistant cladding based on impregnated plywood.

Serhii Pozdieiev, *Yana Zmaha, Olga Nekora, Nikola Zmaga, Vadym Nizhnyk*

14:00 – 14:10 Innovative engineered wood product made from densified wood with enhanced fire performance – State of the art.

Lei Han, *Ulises Rojas-Alva, Marica Mikuljan, Matthew Schwarzkopf, Jaka Gašper Pečnik, Lea Primožič, Nataša Knez, Grunde Jomaas, Andreja Kutnar*

14:10 – 14:20 Effects of accelerated aging weathering on fire and mechanical properties of plywood.

Samia Belhadj, Clément Lacoste, Stéphane Corn, Rodolphe Sonnier



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14:20 – 14:30 Thermal degradation spruce (*Picea abies* L.)
by thermal loading.

Jana Jaďudová, Michal Šudý, Iveta Marková

14:30 - 15:00 Fires in historic buildings.

Congress Hall 1 Chair: **Laura Hasburgh, Wojciech Grzeškowiak**

14:30 – 14:40 Wooden historical buildings and determinants of their fire protection as a challenge for firefighters and preservationists.

Dušan Hancko, Jaroslava Štefková, Jozef Vadovič

14:40 – 14:50 Comparative analysis of the flammability characteristics of historic oak wood from 1869 and contemporary wood.

Wojciech Grzeškowiak, Andrzej Jurecki, Marek Wieruszewski

14:50 – 15:00 Discussion

15:00 – 15:30 Coffee break

Foyer



15:30 – 16:40 Stage study of wood burning process.

Congress Hall 1 Chair: **Anthony Abu, María Pilar Giraldo Forero**

15:30 – 15:40 Thermal Finite Element Analysis of a Post-Tensioned Timber Connection

Paul Horne, Anthony Abu

15:40 – 15:50 Chemisorption Trends of Oxygen on Freshly Pyrolyzed Wood Charcoal.

Christoph Preimesberger, Christoph Pfeifer, Christian Hansmann



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- 15:50 – 16:00 Temperature measurement in timber exposed to fire using thermocouples.
Antoine Berezyiat, Maxime Audebert,
Dhionis Dhima, Sébastien Durif,
Abdelhamid Bouchair
- 16:00 – 16:10 Study of the atomization fragmentation mechanism under the electrostatic field.
Yuzhen Wu, Xin Liu, Zhenyu Xu
- 16:10 - 16:20 Report from Case Studies: Combustion Chemistry and Fire Visualisation in the Classroom.
Reet Kasepalu, Stella Polikarpus, Kärt Reitel,
Regina Kaasik
- 16:20 – 16:30 Preparation of glass sampling containers to determine trace amounts of accelerants in fire samples.
Petra Bursíková, Milan Růžička, **Ondřej Suchý**
- 16:30 – 16:40 Discussion

17:00 – 18:00 Poster session

Congress Hall 1

Chamber wood – Development of hybrid components made of steel and wood to increase the load-bearing capacity and fire resistance of steel structures.

Jan-Gabriel Scheller, Jochen Zehfuß

Verification of design value of critical velocity of new railway line using scale model.

Won-Hee Park, Tae-soon Kwon, Su-Hwan Yun, Duckhee Lee



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Spontaneous Ignition of Wooden Structures.

Aline Uldry

Effects of Flame-Retardant Combinations on Particleboard with Urea-Formaldehyde Resin.

Nur Gümüş

Modelling of moisture transport in fire retardant impregnated wood.

Maja Fjalland

Experimental Study on Fire Propagation and Thermal Behavior of Railway vehicle (EMU260) with Mock-up Testing.

Su-Hwan Yun, *Won-Hee Park, Kukil Han, Tae-Soon Kwon, Duck-Hee Lee*

The Progressive Test Method for the Assessment of Flame Spread on the Surface of Spruce wood.

Martin Zachar, *Danica Kacikova, Elena Kmetova*

Experimental Evaluation of Fire Resistance Performance of Steel-Timber Concrete Composite Floor Structure Exposed to Standard Fire for 2 Hours.

Sungmo Choi, *Seulgi Han, Junyoung Gwak, Sunhee Kim*

Fire performance of epoxy mortar repair system.

Laia Haurie Ibarra, Adriana de la Barrera, Edgar Segués, Víctor Rubio, María Pilar Giraldo Forero

19:00 - 21:00 Dinner

Sun Restaurant



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Tuesday: May 14th, 2024

08:00 – 09:30 Fire safety in wooden objects.

Congress Hall 1 Chair: **Andrew Buchanan, Alar Just**

08:00 – 08:10 Load-bearing timber-framed gypsum plasterboard walls subjected to two-sided fire exposure.

Frank Kang, Peter Moss, Hans Gerlich,
Richard Hunt, Anthony Abu

08:10 – 08:20 Fire safe design of structures in hybrid steel-timber constructions.

Patrick Dumler, Jakob Blankenhagen,
Norman Werther

08:20 – 08:30 The Outlook for Wooden Buildings in the Czech Republic from the Point of View of Technical Standardization Committee 27 Fire Safety of Buildings.

Alexandra Kardošová, Jiří Pokorný,
Lenka Brumarová

08:30 – 08:40 Fire Safe Use of Wood in Buildings – Global Design Guide.

Birgit Östman, **Alar Just**, Andrew Buchanan

08:40 – 08:50 Wood-wood system connection for elements - a hook-in system! A fire protection case study of a multi-storey timber building.

Anton Kraler, Martin Saltuari, Andreas Pomaroli



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08:50 – 09:00 The role of insurance in scaling mass timber construction: review on enablers and shortcomings of insurance for mass timber constructions.

Jenan Irshaid, Joanne Linnerooth-Bayer,
Timothy Foreman, Juliette Martin

09:00 – 09:10 Fire safety solutions in Finnish multi-story timber-frame buildings.

Markku Karjalainen, Hüseyin Emre Ilgın

09:10 – 09:20 Structural Integrity Assessment of Two-Story Cross-Laminated Timber House Under Fire Load.

Róbert Uhrín, Michal Gregor, Patrik Štompf,
Jozef Štefko

09:20 – 09:30 Discussion

09:30 – 10:00 Coffee break

Foyer



10:00 – 10:30 Wood burning retardation and wood-based materials.

Congress Hall 1

Chair: **Oisik Das**, **Cristian Maluk**

10:00 – 10:10 Exploring the influence of thin intumescent coatings on the onset and rate of charring for mass timber during fire.

Stavros Spyridakis, **Cristian Maluk**

10:10 – 10:20 Development of Boron Based Additive for Medium Density Fibreboards with Improved Flame Retardancy.

Ümran Burcu Alkan, Başak Bengü



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10:20 – 10:30 Effects of Fire-Retardant Treatment on the Charring Behaviour of CLT: An Experimental Investigation.

Andrianos Koklas, Iasonas Filippidis,
Dionysios Kolaitis

10:30 – 10:40 The progressive test methods for assessing the thermal resistance of spruce wood treated with flame retardants.

Elena Kmeťová, Danica Kačíková, František Kačík

10:40 – 10:50 Thermal properties of borax/lauric acid-impregnated wood.

Ahmet Can, Wojciech Grzeškowiak

10:50 – 11:00 Classification tests of the reaction to fire of modified cellulosic materials protected against fire using expandable graphite.

Wojciech Grzeškowiak, Bartłomiej Mazela,
Waldemar Perdoch

11:00 – 11:10 Militimproving the fire performance of chemically modified pine (*P. sylvestris*) sapwood by an integrated modification approach.

Muting Wu, Lukas Emmerich, Holger

11:10 – 11:20 Fire protection of wood using a coating based on sodium silicate and biochar.

Peter Rantuch, Veronika Kvorková,
Jozef Martinka, Tomáš Štefko, Igor Wachter

11:20 – 11:30 Discussion

11:30 – 12:00 Sponsors presentation

Congress Hall 1



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12:00 – 13:30 Lunch

Sun Restaurant



13:30 – 14:20 Fire modelling, testing, certification.

Congress Hall 1

Chair: **George Hadjisophocleous, Boris Iskra**

13:30 – 13:40 Room-corner tests with exposed timber.

Laura Hasburgh, Keith Bourne, David Barber

13:40 – 13:50 Enhancement of the BAM Fire Test Stand for Testing a Large Transport Package with Wood Filled Impact Limiters.

Tobias Gleim, Thomas Quercetti, André Musolff, Jan Werner, Frank Wille, Martin Feldkamp

13:50 – 14:00 Fire experimental testing of STS-reinforced glulam beam-end connections with metal connectors wood protection.

Oluwamuyiwa Okunrounu, Sam Salem, George Hadjisophocleous

14:00 – 14:10 Combustion Chamber Design for Encapsulated Wood-Component Testing.

Martin Feldkamp, Tobias Gleim, Thomas Quercetti, Frank Wille

14:10 – 14:20 Discussion

14:20 – 15:20 Smoke Control and Combustion Toxicity, Dust.

Congress Hall 1

Chair: **Rouwen Zong, Jozef Martinka**

14:20 – 14:30 Scale Law of Combustion Toxicity of Acrylonitrile-Butadiene-Styrene.

Ruowen Zong, Jingwen Bai, Jiyun Wang



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- 14:30 – 14:40 Study of resistivity of beech wood dust depending on particle size.
Richard Kuracina, Zuzana Szabová, László Kosár
- 14:40 – 14:50 Study of the minimum ignition temperature of the swirled dust of wood dust from a hot surface with different dispersers.
László Kosár, Richard Kuracina, Zuzana Szabová
- 14:50 – 15:00 Smoke Emission from Wood and Wood Based Products.
Jozef Martinka, Peter Rantuch, Igor Wachter, Tomáš Štefko
- 15:00 – 15:10 Explosion parameters of cellulose-based materials.
Zuzana Szabová, Richard Kuracina, László Kosár
- 15:10 – 15:20 Discussion

15:20 – 16:00 Coffee break

Foyer



16:00 – 17:00 Forest fires.

Congress Hall 1

Chair: **Gervais Sawyer**, **Agoston Restas**

- 16:00 – 16:10 Composition and Combustion: A Comprehensive Study of German Tree and Shrub Vegetation.
Lukas Heydick, Kira Piechnik, Andrea Klippel
- 16:10 – 16:20 Applying experimental determined kinetic parameters to the simulation of vegetation fire in the Fire Dynamics Simulator.
Hongyi Wu, Anja Hofmann-Böllinghaus



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- 16:20 – 16:30 Water source from under our feet – case study at Homokhátság area, Hungary.
Agoston Restas, Andras Kristof, Laszlo Bodnar
- 16:30 – 16:40 Principles for firefighting assets allocation. Integrating national and regional forest fires logs into the vulnerability analysis.
Alberto Tinaburri, Fabio Alaimo Ponziani
- 16:40 – 16:50 Drone swarm technology as an option to suppress forest fires.
Agoston Restas
- 16:50 – 17:00 Discussion

19:00 – 21:00 Farewell reception
Sun Restaurant



Wednesday: May 15th, 2024

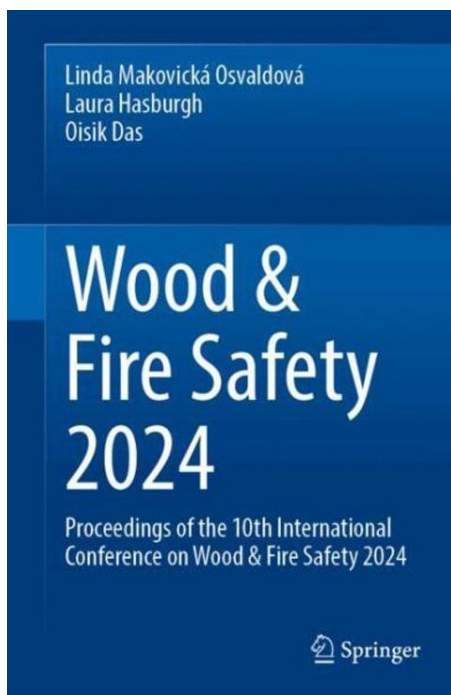
8:00 - 16:00 Social program: Spis Castle and Levoca Tour



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