## Programme

### MONDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Registration</td>
</tr>
<tr>
<td>09.30</td>
<td>Opening</td>
</tr>
<tr>
<td>10.30</td>
<td>Discussion</td>
</tr>
<tr>
<td>10.40</td>
<td>Break</td>
</tr>
<tr>
<td>11.00</td>
<td>NEW TEST METHODS</td>
</tr>
<tr>
<td>11.10</td>
<td>Chair: Serge Bourbigot, ENSCL</td>
</tr>
<tr>
<td>11.10</td>
<td>Ignition of Pre-Heated Flammable Vapor</td>
</tr>
<tr>
<td>11.10</td>
<td>Clouds in Obstructed Environments:</td>
</tr>
<tr>
<td>11.10</td>
<td>Flame Propagation and Flame Arrestor</td>
</tr>
<tr>
<td>11.10</td>
<td>Performance</td>
</tr>
<tr>
<td>11.30</td>
<td>Development of New Intermediate-Scale</td>
</tr>
<tr>
<td>11.30</td>
<td>Box Test on Sandwich Panel Products</td>
</tr>
<tr>
<td>11.30</td>
<td>Pertaining to the Correlation with ISO</td>
</tr>
<tr>
<td>11.30</td>
<td>13764-1 Room Test</td>
</tr>
<tr>
<td>12.30</td>
<td>Discussion</td>
</tr>
<tr>
<td>12.30</td>
<td>Evaluation of Mitigation Strategies</td>
</tr>
<tr>
<td>12.30</td>
<td>for Propagating Thermal Runaway in</td>
</tr>
<tr>
<td>12.30</td>
<td>Lithium Ion Battery Packs</td>
</tr>
<tr>
<td>12.30</td>
<td></td>
</tr>
<tr>
<td>12.30</td>
<td>Novel Test Bench for Extreme Fire</td>
</tr>
<tr>
<td>12.30</td>
<td>Scenario: Experimental and Numerical</td>
</tr>
<tr>
<td>12.30</td>
<td>Modeling Studies</td>
</tr>
<tr>
<td>12.30</td>
<td>Roland Adamannou, F Samyn, J.</td>
</tr>
<tr>
<td>12.30</td>
<td>Jimenez, S. Duquesne &amp; S.</td>
</tr>
<tr>
<td>12.30</td>
<td>Bourbigot, ENSCL, University of Lille,</td>
</tr>
<tr>
<td>12.30</td>
<td>France</td>
</tr>
<tr>
<td>12.30</td>
<td>Discussion</td>
</tr>
<tr>
<td>12.30</td>
<td>Lunch</td>
</tr>
<tr>
<td>12.30</td>
<td>MASS TIMBER</td>
</tr>
<tr>
<td>14.00</td>
<td>Chair: Marc Janssens, SwRI</td>
</tr>
<tr>
<td>14.00</td>
<td>Enclosure Fire Model for Mass Timber</td>
</tr>
<tr>
<td>14.00</td>
<td>Construction – Benchmarking with a</td>
</tr>
<tr>
<td>14.00</td>
<td>Kinetic Wood Pyrolysis Submodel</td>
</tr>
<tr>
<td>14.00</td>
<td>Colleen Wade, BRANZ Ltd, New Zealand,</td>
</tr>
<tr>
<td>14.00</td>
<td>D Hopkins &amp; Michael Spearpoint, OFR</td>
</tr>
<tr>
<td>14.00</td>
<td>Consultants, UK, J Su, NRCC, Canada &amp;</td>
</tr>
<tr>
<td>14.00</td>
<td>C Fleischmann, University of Canterbury,</td>
</tr>
<tr>
<td>14.00</td>
<td>New Zealand</td>
</tr>
<tr>
<td>14.00</td>
<td>Development of a Fire Performance</td>
</tr>
<tr>
<td>14.00</td>
<td>Assessment Method for Qualifying</td>
</tr>
<tr>
<td>14.00</td>
<td>Cross-Laminated Timber Adhesives</td>
</tr>
<tr>
<td>14.00</td>
<td>Marc Janssens &amp; A. Joyce, SwRI, USA</td>
</tr>
<tr>
<td>14.40</td>
<td>Enclosure Fire Dynamics with a</td>
</tr>
<tr>
<td>14.40</td>
<td>Combustible Ceiling</td>
</tr>
<tr>
<td>14.40</td>
<td>Robert McNamara, Brandskylägat, Sweden,</td>
</tr>
<tr>
<td>14.40</td>
<td>J. Zehluss, Technische Universität</td>
</tr>
<tr>
<td>14.40</td>
<td>Braunschweig (iBMB), Germany, A.</td>
</tr>
<tr>
<td>14.40</td>
<td>Bartlett, L. Bisy, University of</td>
</tr>
<tr>
<td>14.40</td>
<td>Edinburgh, UK &amp; M. Heidari, F. Robert,</td>
</tr>
<tr>
<td>14.40</td>
<td>CERIB Fire Testing Centre, France</td>
</tr>
<tr>
<td>15.00</td>
<td>Thermo-Mechanical Behaviour of</td>
</tr>
<tr>
<td>15.00</td>
<td>Cross-Laminated Timber Slabs Under</td>
</tr>
<tr>
<td>15.00</td>
<td>Standard and Natural Fires</td>
</tr>
<tr>
<td>15.00</td>
<td>Jean-Christophe Mindeguia, I2M,</td>
</tr>
<tr>
<td>15.00</td>
<td>University of Bordeaux, France, S.</td>
</tr>
<tr>
<td>15.00</td>
<td>Mohaine, P. Robert, CERIB, France, L.</td>
</tr>
<tr>
<td>15.00</td>
<td>Bisy, A. Bartlett, University of</td>
</tr>
<tr>
<td>15.00</td>
<td>Edinburgh, UK &amp; R. Janssens McNamara,</td>
</tr>
<tr>
<td>15.00</td>
<td>Brandskylägat, Sweden</td>
</tr>
<tr>
<td>15.00</td>
<td>FACADES</td>
</tr>
<tr>
<td>15.00</td>
<td>Chair: Patrick van Hees, Lund University</td>
</tr>
<tr>
<td>15.00</td>
<td>Fire Performance Evaluation of Cladding</td>
</tr>
<tr>
<td>15.00</td>
<td>Wall Assemblies Using the 16-Ft High</td>
</tr>
<tr>
<td>15.00</td>
<td>Parallel Panel Test Method of ANSI/FM</td>
</tr>
<tr>
<td>15.00</td>
<td>4880</td>
</tr>
<tr>
<td>15.00</td>
<td>Gaurav Agarwal, Y. Wang &amp; S. Dorofoese,</td>
</tr>
<tr>
<td>15.00</td>
<td>FM Global, Research Division, USA</td>
</tr>
<tr>
<td>15.00</td>
<td>European Approach to Assess the Fire</td>
</tr>
<tr>
<td>15.00</td>
<td>Performance of Facades</td>
</tr>
<tr>
<td>15.00</td>
<td>J Anderson, L. Bostrom, RISE Research</td>
</tr>
<tr>
<td>15.00</td>
<td>Institutes of Sweden, R. Chiva, E.</td>
</tr>
<tr>
<td>15.00</td>
<td>Guillaume, EFECTIS France, S. Colwell,</td>
</tr>
<tr>
<td>15.00</td>
<td>BRE, UK, Anja Hofmann, BAM, Germany &amp;</td>
</tr>
<tr>
<td>15.00</td>
<td>P. Toth, EMI LLC, Hungary</td>
</tr>
<tr>
<td>15.00</td>
<td>Validation of the FDS CFD Model</td>
</tr>
<tr>
<td>15.00</td>
<td>Piergiacomo Cancellieri, S. Shariol,</td>
</tr>
<tr>
<td>15.00</td>
<td>Ministry of Interior, Italian National</td>
</tr>
<tr>
<td>15.00</td>
<td>Fire and Rescue Service, S. Sass, M.</td>
</tr>
<tr>
<td>15.00</td>
<td>Madeddu, P. Cazzani, FSC Engineering</td>
</tr>
<tr>
<td>15.00</td>
<td>Milano, A. Lucchini, A. Stefanazzi, EKJ</td>
</tr>
<tr>
<td>15.00</td>
<td>Consulting Company AS, Denmark, B</td>
</tr>
<tr>
<td>15.00</td>
<td>Paulsen Husted, Lund University, Sweden,</td>
</tr>
<tr>
<td>15.00</td>
<td>L. Schiott Sorensen, Technical University of Denmark</td>
</tr>
<tr>
<td>15.00</td>
<td>SUPPRESSION</td>
</tr>
<tr>
<td>15.00</td>
<td>Chair: Chris Jelenewicz, SFPE</td>
</tr>
<tr>
<td>15.00</td>
<td>Experimental Investigation of Human</td>
</tr>
<tr>
<td>15.00</td>
<td>Tenability and Sprinkler Protection in</td>
</tr>
<tr>
<td>15.00</td>
<td>Hospital Room Fires</td>
</tr>
<tr>
<td>15.00</td>
<td>Simo Hostikka, E. Veikkonen, Kelo</td>
</tr>
<tr>
<td>15.00</td>
<td>University, T. Hahmarainen, S. T.</td>
</tr>
<tr>
<td>15.00</td>
<td>Kapoljina, VTT Technical Research</td>
</tr>
<tr>
<td>15.00</td>
<td>Centre of Finland, Finland</td>
</tr>
<tr>
<td>15.00</td>
<td>Impact of Fuel Packaging Arrangement</td>
</tr>
<tr>
<td>15.00</td>
<td>on Fire Growth and Suppression in Rack</td>
</tr>
<tr>
<td>15.00</td>
<td>Storage of Cartoned Commodities</td>
</tr>
<tr>
<td>15.00</td>
<td>James White, Y. Xin, FM Global,</td>
</tr>
<tr>
<td>15.00</td>
<td>Research Division, USA</td>
</tr>
<tr>
<td>15.00</td>
<td>coiling of a Smoke Layer by a Sprinkler</td>
</tr>
<tr>
<td>15.00</td>
<td>Spray: Validation of the FDS CFD Model</td>
</tr>
<tr>
<td>15.00</td>
<td>David den Boer, J. van Oehe, Peutz &amp;  N</td>
</tr>
<tr>
<td>15.00</td>
<td>Tenbült, Eindhoven University of</td>
</tr>
<tr>
<td>15.00</td>
<td>Technology, Netherlands</td>
</tr>
</tbody>
</table>
11.10 Experimental and Numerical Study of Fire Event Involving Two Simultaneous Fire Sources in Confined and Ventilated Compartments
Hugues Pretrel & W Plumecocq, IRSN, France
11.30 Hospital Evacuation Planning Tool for Assistance Devices (HEPTAD)
Michael Joyce, P Lawrence & E Galea, University of Greenwich, UK
11.30 Fire Safety in Underground Power Plants - Design Challenges and Fire Safety Engineering in New Hydroelectric Power Plants in Iceland
David Snorrasen, S Kjarnested, Iceland Construction Authority, B Karlsson, University of Iceland, Iceland & N Johannson, Lund University, Sweden
11.50 Defining the Flame Extension under the Ceiling for Travelling Fires inside Very Large Compartments
Mohammed Heidari, CERIF, France; Imperial College, P Kotsovinos, Arup, UK & G Rein, Imperial College, UK
11.50 Modeling Human Behavior in Emergency Stadium Fire Evacuations
D Aucoin, T Young, John Gales, York University, Canada & M Kinsey, Arup, China
11.50 Identification and Characterization of Design Fires to be used in Performance-Based Fire Design of CERN Facilities
Darko Perovic, DFI, Denmark P van Hees, D Madsen, J Pagels, W Malmborg, L Gren, Lund University, Sweden, O Rios & S La Mendola, CERN, Switzerland
12.10 Spatiotemporal Measurement of Light Extinction Coefficients in Compartment Fires
Lukas Arnold, A Belt, Forschungszentrum Julich & T Schultz, S Sichmat, University Duisburg-Essen, Germany
12.10 Use of Statistical Approach on Stochastic Building Egress Simulations: Applied to BuildingExodus and Pedestrian Dynamics
Quentin Jullien, P Lardet, N Pinoteau, CSTB & J-L Paillet, A Thiry-Muller, LCP, France
12.10 Application of Design Bridge Fires: Fire Performance Assessment of a Highway Bridge
Jayu Hu, University of Edinburgh/Mott MacDonald, UK, T Lewis, Mott MacDonald, UK, R Carvel, University of Edinburgh, UK, & A Usmani, The Hong Kong Polytechnic University, Hong Kong
12.30 Discussion
12.30 Discussion
12.55 Lunch
12.55 Lunch
A. FIRE SPREAD MODELLING
Chair: Eric Guillaume, EFECTIS
Bertrand Girardin, University, Russia
14.10 A Modelling Study on the Impact of Luggage Airworthiness Certification on Aircraft Evacuation
Alexander Johannson, Brandkonsultbyran Sverige, E Ronchi, Lund University, Sweden, S Gwynne, Movement Strategies, UK / NRCC & A Thompson, NRCC, Canada
14.10 An Holistic Framework for Risk-Informed Performance-Based Building Regulation
Brian Meacham, Meacham Associates, USA
Arjan Dexters, S Welch, G Jomaas, University of Edinburgh, UK, R Rikke Laestad, Technical University of Denmark & Ruben Van Cole, Ghent University, Belgium Van Coile, Ghent University, Belgium
14.30 Physical Exertion During Ascending Evacuation While Carrying Load
A Vellisco, A Haderl, K Kuklane, Enrico Ronchi, Lund University, Sweden
14.30 The MaxEnt Method for Probabilistic Structural Fire Engineering – Performance of Multi-Modal Outputs
Danny Hopkin, I Fu, OPP Consultants/University of Sheffield, UK, T Gernay, Johns Hopkins University, USA & N Elhami-Khorasani, University at Buffalo, Canada, R Van Cole, University of Ghent, Belgium
14.50 Quantifying Heat Transfer Level Probability for Local Fire Exposures
Jonathan Hodges, S Kraft, C Rippe, S Hunter & B Lattimer, Jensen Hughes, USA
14.50 Examination of Area Setting around the Bottle-neck Opening
Natsuki Fujimoto, Y Omiya, J-I Yamaguchi, T Sano, M Tange, Tokyo University of Science, Japan
14.50 A Dynamic Probabilistic Fire Risk Model Incorporating Technical, Human and Organizational Risks for High-Rise Residential Buildings
S Tan, D Weinert, P Joseph, Khalid Moinuddin, Victoria University, Melbourne, Australia
15.10 Towards a Simplified Fire Dynamic Simulator Model to Analyse Fire Spread Between Multiple Informal Settlement Dwellings Based on Full-Scale Experiments
Antonio Cicione, University of Stellenbosch, South Africa
15.10 Gaze Point in the Maze Set Evacuation Drills: Analysis of Eye Movement at the Indoor Wayfinding
Young-Hoon Bae, J-Y Son, W-H Hong, Kyungpook National University, Y-C Kim, Hanyang University Erica & R-S Oh, J-H Choi, Pukyong National University, South Korea
15.10 AAMKS – Integrated Cloud-Based Application for Probabilistic Fire Risk Assessment
Adam Krasusi, The School of Fire Service, Poland & S Hostakia, Aalto University, Finland
15.30 Discussion
15.30 Discussion
15.50 Break
15.50 Break
A. LARGE SPACE & CFD MODELLING
Chair: Colin Wade, BRANZ
16.20 Influence of Compartment Geometry on the Occurrence of Backdraft
Chia Lung Wu, National Kaohsiung University of Science and Technology, Taiwan & R Carvel, University of Edinburgh, UK
16.20 Descending Evacuation on Staircases: How Accurate are Models in Representing Movement Without Merging?
Tomonori Sano, Waseda University, Japan, E Ronchi, Y Wu, Lund University, Sweden, A Sekizawa, M Mizuno, S Park, Tokyo University of Science, K Fuji, National Research Institute of Fire and Disaster & H Kadokura, Tohoku Gakum University, Japan
16.20 Fire Safety of Alcoholic Beverages in Retail Stores
Tuula Hakkarainen, T Korhonen & J Vaara, VTT Technical Research Centre or Finland ltd, Finland
16.40 An Analysis of a Method to Estimate the Effect of Wind on Natural Ventilation in Large Spaces
Nils Johannson, Lund University, Sweden & B Karlsson, University of Iceland, Iceland
16.40 Evacuation in Institutions Serving People with Mobility Disabilities – Movement Speed Research Results
Gyorgy Veres & J Raucher, Obuda University, Hungary
16.40 Tank Cars Engulfed In Fires: Heat Flux Measurements
Yoan Ko, C Lam, NRCC, Canada, A Luketa, D Lord, Sandia National Laboratories, USA & A Bulho, C Kim, M Spiess, Transport Canada
17.00 Performance of Two Subgrid Extinction Models in the Simulations of Highly Strained Flames
Egor Kuznetsov, E Markus & A Snegirev, Peter the Great St.-Petersburg Polytechnic University, Russia
17.00 The Influence of individual Impairment on Crowd Dynamics
Paul Georg, A Hofmann, BAM & J Schumann, M Boltes, S Holl, Forschungszentrum Julich, Germany
17.00 Simulated Pool Fire Testing And Modelling of a Composite Metal Foam
Afsaneh Rabiei, K Karimpour, North Carolina State University, Marc Janssens & D Basu SwR, USA
17.20 CFD Modelling of Outdoor Smoke Dispersion with Agglomeration and Deposition Mechanisms using a Cubic-Immersed Boundary Method
Grisel Ros, S La Mendola, CERN, Switzerland, R McDermott, G Forney, NIST, USA, M Vanella, NIST/University of Maryland, USA & E Gissi, Corpo nazionale dei Vigili del Fuoco, Italy, J Floyd, Jensen Hughes, USA

17.20 Quantitative Risk Analysis and Numerical Investigation to Determine Critical Fire Scenarios in the Environment of Handicapped People
Andrea Klippel, F Rabe, U Krause, Otto von Guericke University & A Hofmann, BAM, Germany

17.20 Numerically Solved Flame Spectra of an N-Heptane Pool Fire
H Bordbar, Simo Hostikka, Aalto University, Finland, P Boulet, G Erez & G Parent, Universite de Lorraine/CNRS, France

17.40 Discussion

18.00 Conference Close Day 2
18.00 Conference Close Day 2
18.00 Conference Close Day 2

WEDNESDAY

A. FIRE INVESTIGATION
Chair: Marcello Hirschler, QBH International

B. LARGE OUTDOOR AND WILDLAND FIRES
Chair: Sam Manzello, NIST

C. TRANSPORTATION
Chair: Margaret McNamee, Lund University

8.40 Fire Spread in Wind Turbine Generator Towers
Paulius Tekorius, Teknical Associates, Inc, USA

9.00 Evaluation of an Industrial Building Inferno - A Case Study
C Sesseng, K Storesund, Anna Stein-Hansen, RISE Fire Research, Norway

9.20 Warehouse Fires Ignited by Roof Mounted Photovoltaic Systems
Giovanni Cocchi, Forensic Experts, Italy

9.40 GPL Dispersion and Explosion Modelling
Alberto Tinarru, F Ponziani, Vigili del Fuoco, Italy

10.00 Discussion
10.00 Discussion
10.00 Discussion

10.20 Break
10.20 Break
10.20 Break

A. FLAME RETARDANTS
Chair: Serge Levchik, ICL-Group

B. FURNITURE
Chair: Chris Lukas, Dow Chemical Company

C. FIRE RESISTANCE
Chair: John Gales, York University

10.50 New Brominated Flame Retardants via Alkylation by Pentabromobenzyl Bromide and Tetrabromoxylylene Dibromide
M Gelmont, M Yuzefovitch, D Yohe, IMI Institute for R&D, Israel, E Eden, ICL-IP, Israel & Serge Levchik, ICL-IP America, USA

10.50 Performance Analysis of a Self-Protection System for Vehicles In Case of UWF Fire Entrapment
Elsa Pastor, C Mata, A Agueda, M Valero, & E Planas, CERTEC, Universitat Politècnica de Catalunya BarcelonaTech & J Sebastia, Wildfire Security S.L., Spain

10.50 Vehicle Fire Emissions with and Without Fire Service Intervention
Margaret McNamee, M Runefors, Lund University & R McNamee, M Sandvik, Brandskyddslaget & F Amon, RISE Research Institutes of Sweden, Sweden

11.10 Flame Retardant Polyurethane: An Old, an Actual, and a Future Challenge
Bernhard Schartel, BAM, Germany

11.10 Flame Retardant Polyurethane: An Old, an Actual, and a Future Challenge
Bernhard Schartel, BAM, Germany

11.10 Fire Safety, Sustainable Loose Filling
Karolina Storeshaus, A Stein-Hansen, RISE Fire Research, Norway & F Amon, S Haghjatpanah, I Larsson, RISE Fire Research, Sweden

11.30 Intumescent Polypropylene: Interactions between Physical and Chemical Expansion
Tsilla Bensabath, J Sarazin, M Jimenez, F Samyn, S Bourbigot, UMET, University of Lille, France

11.30 Progress and Status of the U.S. Consumer Product Safety Commission Uphostlered Furniture Flammability Project
Andrew Lock, D Miller, U.S. Consumer Product Safety Commission, USA

11.30 Fire Resistance of Building Assemblies – Results of 13 Full-Scale Wall Tests
Mohamed Sultan & M Adelzadeh, NRCC, Canada

11.50 Flame Retardancy of Flax-Reinforced Composites
Sophie Duquesne, F Samyn, ENSCL, University of Lille, France, L Bonnud, Materia Nova R&D Center, Belgium

11.50 Bedding Ignition, Vertical Flame Spread and Subsequent Thermal Impact on Underlying Mattress
Mark Gratkowski, United States Department of Justice, ATF, USA

11.50 Fire Resistance of Building Assemblies – Results of 13 Full-Scale Wall Tests
Mohamed Sultan & M Adelzadeh, NRCC, Canada

12.10 Discussion
12.10 Discussion
12.10 Discussion

12.30 Lunch

POSTER SESSION B

A. COMBUSTION TOXICITY
Chair: Dick Gann, aGANNesFire

B. MATERIAL BEHAVIOUR IN FIRE
Chair: Bernard Schartel, BAM

C. FIRE RESISTANCE
Chair: Robert McNamee, Brandskyddslaget

14.40 Analysis of Fireground Contaminants From Retired Firefighting Turnout Jackets Using Headspace Sampling-Gas Chromatography-Mass Spectrometry (HS-GC-MS)
Adhiraj Shinde, B Ormond, North Carolina State University, USA

14.40 Effects of Thermal Conductivity on Flame Spread Over Carbon-Fiber Composites
Haiping Guo, R Walters, R Lyon, S Crowley-FAA, J Quinziere, University of Maryland, USA

14.40 Compressive Strength of Concrete in Cooling David Rush, School of Engineering, University of Edinburgh, UK & C Yang, Nanjing University of Technology, China
### POSTER SESSION A

#### A1: Combustion Products and Toxicity

**Toxic Emissions from Processed Wood in Cone Calorimeter Tests**
- **Bintu Mustafa**, University of Leeds, UK
- **University of Maiduguri, Nigeria, M Mat Kiah**, University of Leeds, UK/Universiti Teknologi Malaysia, J Al-Nahdi, G Andrews, H Phylaktou, H Li, University of Leeds, UK

**Analysis of Fire Gases in Early Stages of Fire Development**
- **Tanja Gnutzmann** & A Hofmann, BAM, Germany

**Particle Size Number Distribution from PIR Foam Fires**
- **M Mat Kiah**, University of Leeds, UK/Universiti Teknologi Malaysia, G Andrews, H Phylaktou and H Li, University of Leeds, UK

**Characterization of Soot from Fires in Laboratory Controlled Environments**
- **Dan Madsen**, J Barton, P van Hees, Div of Fire Safety Engineering, Lund University, Sweden, S La Mendola, L Gren, O Ros, CERN, Switzerland, V Malmborg, J Pagels, A Guddmunsdsson, Div of Ergonomics and Aerosol Technology, Lund University, Sweden, D Perovic, DBI, Denmark & B Paulsen Husted, K Wilkens Flecknoe-Brown, Danish Institute of Fire and Security Technology, Denmark/Lund University, Sweden

#### Wildland Fires

**Ember and Fire Modeling to Estimate Safe Separation Distance for Combustible Fences**
- **Kuldeep Prasad**, K Butler, E Johnsson, L Dubrulle, R McDermott & A Maranghides, NIST, USA

**Fatal Fires and Rescue Operations – A Review of Swedish Statistics Compared to other Countries**
- **Martin Forsberg** & A Mossberg, Brandskyddslaget, Sweden

**A Review of the Swedish Fire Safety Regulation – From the Industry’s Perspective**
- **Axel Mossberg**, R McNamee, H Nyman, M Olander, Brandskyddslaget, Sweden

**The Grenfell Effect: A Review of U.S. Exterior Wall Regulations**
- **J Beitel**, Jensen Hughes & M Janssens, SwRI, USA

**Acceptability of Residential Fires – How Much is Ok?**
- **David Rush**, University of Edinburgh, UK & E Mills, Arup, Glasgow, UK

#### Compartment Fires

**Experimental Study on Smoke Leakage Between Two Rooms using Real Scale Model**
- **Yoshikazu Deguchi**, Building Research Institute, M Kishiue, Oyayashi Corporation N Furukawa, M Kan, K Yamazaki, K Kayama, Y Omiya, Tokyo University of Science, Japan

**Analyzing Smoke Evolution in Full-Scale Fire Experiments from Recorded Video**
- **Jennifer Ellingham**, B Forest & E Weckman, University of Waterloo, Canada

**The Evolution of a Ventilation-Limited Fire in a Multistory House**
- **Bronwyn Forrest**, E Weckman, P Senez, N Ryder, M DiDomizio, University of Waterloo, Canada

**Effects of Fuel Geometry on the Burning Behavior in a Compartment**
- **Yusuke Shintani**, Takenaka Corporation, Japan

#### Fire Investigation

**Quality Standards and Accreditation of Fire Investigation in the United Kingdom**
- **Ciara Holland**, D Crowder, BRE Global Ltd, UK

**Alder Street Fire Investigation – Reconstruction and Smoke Toxicity Analysis**
- **Ciara Holland & D Crowder**, BRE Global Ltd, UK
### A2 Fire Resistance

**Material Properties in Eurocode 2** — A Background Synthesis and Beyond, Robert McNamara, Brandskyddslaget, Sweden, P Pimienta, CSTB, France & Jean-Christophe Mindeguia, I2M, University of Bordeaux, France

- Fire Resistance of Aluminium Glazed Partitions Depending on their Height, Bartłomiej Siedlak, Pawel Sulik, ITB, Poland & A Garbarcz, Warsaw University of Technology, Poland
- Experimental Evaluation of the Thermal Behaviour of a Calcium-Silicate Board Subjected to a Natural Fire, Karim Van Mael, Elektro Building Performance & E Annerel, Elektro Building Performance/Ghent University, Belgium
  - Equivalent Fire Severity in Steel Structures, Jonathan MacIntyre, A Abu, P Moss & D Nilsson, University of Canterbury, New Zealand
- Reactive Fire Protection for Structural Steelwork, Alexander Winthorst & P van de Leur DGMR Consulting Engineers, Netherlands
  - Effects of Thermal Conditions of Steel on the Fire Performance of Thin Intumescent Coatings, Andrea Lucherini, C Maluk, The University of Queensland, Australia & J Toroero, University College, London, UK

**Fire Risk**

- Comparative Analysis of Fire Indexing Methodologies, Vasileios Koutsomarkos, D Rush, G Jomaas, A Law, University of Edinburgh, UK

### A3 Flame Retardants and FR Applications

**Synthesis of Copper (II) – Zinc Molybdates as Smoke Suppressants for PVC Compositions**, Antonio Rodolfo Jr, Braskem S/A/State University of Campinas & LH Innocentini-Mei, State University of Campinas, Brazil

- Differences in Simultaneous Thermal Analysis and Time-to-Ignition of Wood Materials Treated with Water Glass Flame Retardants, Juraj Jancik, L Makovickova-Osvaldova, University of Zilina, Slovakia & F Markert, Technical University of Denmark, Denmark

**Combining Fire Safety and Low Emissions in Bedding and Furniture: An Industry Challenge or Opportunity?**, Paul Cookson, Dow Europe GmbH, Switzerland

**Material Behaviour in Fire**

- Ignition of Large Scale Polymers Exposed to High Radiative Heat Fluxes, Guillaume Rambaud, CEA, DAM, GRAMAT, France, K Schmidt, B Roemer, Wehrwissenschaftliches Institut fur Schutztechnologien, Germany
- Evaluation of Fire Performance of Sandwich Panels with Defects Tested in Horizontal and Vertical Orientation Using Cone Calorimeter, Sanjay Pareek, Nihon University, H Yoshioha, NILIM, T Naguchi, The University of Tokyo & T Hayakawa, TSV, Japan

**Calcium Aluminate Based Passive Fire Protection Systems: Main Technologies and Properties**, Bruno Espinosa, S Berger, IMERYS, France & C Alt, IMERYS, USA

- Thermal Behaviour of Laminated Bamboo Structures under Fire Conditions, I Pope, A Osorio, Juan Hidalgo, C Maluk, The University of Queensland, Australia & J Toroero, University College London, UK
- Relationship Between Non-Metallic Material Content and Fire Properties of Electric Cables, Katarzyna Kazcerek-Chrobak, J Fangrat, Instytut Techniki Budowlanej, Poland

**Material Properties of Clay and Lime Based Plaster for Structural Design**, Johannal Liblik, A Just, B Maaten, M Sulg, S Pajusar, Tallin University of Technology, Estonia & J Kuppers, TU Braunschweig, iBMB, Germany

- Exploring the Influence of Stress and Heating Conditions on the Occurrence of Fire-Induced Concrete Spalling, A Lajowski, International Master of Science in Fire Safety Engineering, D Lange, Cristian Maluk, The University of Queensland

- New Approaches for Reaction-to-Fire Assessment of Wooden Products, Elena Mikhailova, Y Tochilkin, All— Russian Research Institutes for Fire Protection, Russia
Transportation
Flow Dynamics Near CNG Passenger Car After Opening of Safety Relief Device
Milan Jahoda, J Ira, University of Chemistry and Technology & L Hasalova, V Vystroil, Technical Institute of Fire Protection in Prague, Czech Republic

New Energy Carriers and Additional Risks for User Safety in Tunnels
Christophe Willmann, Tunnel Study Center & Benjamin Truchot, INERIS, France

LNG Powered Vehicles as an Emergent Transport Fire Risk: An Emergency Management on a Tanker Truck Crash
Vincenzo Puccia, P Cancelliere, Ministry of Interior, Italian National Fire Rescue and Service, Italy

Reaction-to-Fire Properties of Maritime Composite Materials
Anna Sandinge, A Dederichs, RISE Research Institutes of Sweden/DTU, Denmark & P Blomqvist, RISE Research Institutes of Sweden & Frank Markert, DTU, Denmark

Improving Car Fires Heat Release Rate Modelling in CFD Codes
Paul Lardet, G Giovannelli, E Mehdi Koutaiba, CSTB, France

POSTER SESSION B

B1 Flame Spread
Effect of an adjacent wall on the upward flame spread over PMMA
F Tang, University of Warwick, UK & Hefei University of Technology, China, L Chen, Hefei University of Technology, China, J Zhang, FireSERT, Ulster University, UK and Jennifer Won, University of Warwick, UK

Experimental and Numerical Investigations on Wood Lateral Ignition and Flame Spread
J Colombiano, Virginie Dréan, Effects France, T Rogaume, B Batot, F Richard, Université de Poitiers, ISAE-ENSMA, France, F Talal, Efectis UK & A Nadjei, Ulster University, UK

Human Behaviour in Fire including Evacuation
Burning Biases: Mitigating Cognitive Biases in Fire Engineering
Michael Kinsey, Arup, China, M Kinateder, NRCC, Canada & S Gwynne, Movement Strategies, UK
Kinetic Architecture and Collective Intelligence for Fire Evacuation
Angella Johnson, S Zheng, A Nakano, J-H Choi, University of Southern California, USA
The Effects of Linguistic Cues on Evacuation Movement Times
Natalie Mazur, J Gales, York University, Canada, R Champagne, University of Waterloo, Canada & M Kinsey, Arup, China

Evacuation Under the Influence of Alcohol: A Laboratory Experiment
Malin Bjorkqvist, A Broholm, Lund University, Sweden

Pre-School Children’s Knowledge of Fire and Evacuation
Jenny Blom & H Frantzich, Lund University, Sweden

Walking Speed Reduction Rates at Intersections While Wayfinding Indoors: An Experimental Study
Y-H Bae, J-Y Son, W-H Hong, Kyungpook National University, Y-C Kim, Hanyang University
Erica, Ryun-Seok Oh, J-H Choi, Pukyong National University, South Korea

Evaluation of Effective Cognition Area (ECA) of Signage Systems with Backlight in Smoke Condition
S-H Baek, R-S Oh, Jun-Ho Choi, Pukyong National University, Y-C Kim, Hanyang University
Erica, Y-H Bae, W-H Hong, Kyungpook National University, South Korea

Influences of Firefighter’s Movement on Evacuee’s Crowd Flow on Stairs
Kosuke Fuji, National Research Institute of Fire and Disaster, K Kawashima, Y Omiyama, Tokyo University of Science & J-Y Yamaguchi, Obayashi Corporation, Japan

Validation of Pedestrian Simulation by Experiment data
Akihide Jo, M Imanishi, T Sano, Y Omiyama & J Yamaguchi, Takenaka Corporation, Japan

Macroscopic Model for Fire Safety Evacuation: Evaluation and Comparison with a Microscopic Model
Alexis Marchand & A Collin, LEMTA, Université de Lorraine, CNRS, France

Selection of Vertical and Horizontal Routes by using Emergency Signs in Underground Stations
Jun Kubota, T Sano, M Yasue, Waseda University, Japan

An Investigation of the Proportionality of Safety Margins with Increased Ceiling Height in Relation to BS9999:2017
Bill Hay, Arup Fire, UK, I Sanderson & R Thomson, Glasgow Caledonian University, UK

Mass Timber
Heat Flux Distribution on a Façade from Timber-Lined Compartments
Alastair Bartlett, O Kanellopoulos & A Law, The University of Edinburgh, UK

Tensile Strength of Wood in High Temperatures Before Charring
Henri Kuronen, E Mikkola, KK-Palokonsultti Oy & S Hostikka, Aalto University, Finland

Fire Performance of Laminated Timber Assemblies
Lindsay Ranger, C Dagenais, FPInnovations & N Bénichou, NRCC, Canada

Fire Dynamics in Large Open Timber Structures
Bronwyn Forrest, B Weckman, University of Waterloo & B Chorlton, J Gales, York University, Canada

Relative Fire Performance of Heritage and Contemporary Timber
Bronwyn Chorlton, John Gales, York University, Canada

B2 Pool Fires
Lip Height Effect in Quadrangular Steel Containers
Einar Kolstad, V Frette & B Hagen, Western Norway University of Applied Science, Norway

The Chemical Structure of Medium-Scale Pool Fires
Ryan Falkenstein-Smith, K Sung, J Chen, A Hamins, NIST, USA

Modelling
Experimental Study of Smoke Movement Between Two Rooms Connected by a Stairwell
S Haouari Harra, Université de Lorraine/ CSTB, Rabah Mehaddi, P Boulet, Universités de Lorraine & E Mehdi Koutaiba, CSTB, France

Scoping Study on the Significance of Mesh Resolution Vs. Scenario Uncertainty in the CFD Modelling of Residential Smoke Control Systems
Danny Hopkin, C Hopkin, M Spearpoint, OFR Consultants, B Ralph, Foster + Partners, UK & R Van Coile, The University of Ghent, Belgium

Application of the Computational Fluid Dynamics to Analyze Heat Transfer through Protective Clothing caused by Exposure to Flame
Adam Puszkarz, W Machnowski, Lodz University of Technology, Poland

FDS Simulations and Modelling Efforts of Travelling Fires in a Large Elongated Compartment

Re-visiting NIST Reduced/Full-Scale Enclosures (RFSE) Experiments (2007-2008)
Mohamed Beshir, A Ciccone, Y Wang, S Welch, D Rush, University of Edinburgh, UK

Fluent-Based Framework for Modeling Flaming Ignition and Burning of Combustible Materials
Alexander Snegirev, E Kuznetsov & E Markus, Peter the Great St.-Petersburg Polytechnic University, Russia
Dynamic Determination of the Mean Radiation Path Length in the Simulations of Transient Flame Development
E Kuznetsov, Ekaterina Markus, A Snegrev, Peter the Great St.-Petersburg Polytechnic University, Russia

Estimating Experimental Error for Fire Model Uncertainty Assessment
Marc Janssens & J Huczek, SwRI, USA

Characterising Natural Fires in Large Departments – Revisiting an Early Travelling Fire Test (BST/FRS 1993) with CFD

Water Curtains : From Experimental Tests to Near Field CFD Modelling
Fabio Alaimo Ponziani, A Tinabumi, Vigili del Fuoco, Italy

Pyrolysis
Validation of a Wood Combustion Model for use in Numerical Fire Modelling
Islam Goma, M Wainfurter, A Balywa, NRCC, Canada & S Gwynne, Movement Strategies, UK

PVC and EVA/ATH Decomposition in Cone Calorimeter: Experiments and Modeling
Olivier Authier, A Amokrane, EDF R&D Lab Chatou, S Chatenet, EDF R&D Lab Chatou/University of Lille, G Fontaine, S Bourbigot, University of Lille, France

A Model for Pyrolysis and Oxidation of Two Common Structural Timbers
Aleksi Rinta-Paavola & S Hostikka, Aalto University, Finland

Thermo-Oxidative Behaviour of Polyamides and Combustion Products M A Albat, A Schaberg, Roland Goertz, University of Wuppertal, Germany

Gases Evolved when Pine Wood is Heated using the Cone Calorimeter with a Nitrogen Atmosphere
A Irshad, University of Engineering & Technology, Pakistan, Gordon Andrews, H Phylaktou & B Gibbs, University of Leeds, UK

How to Design a Proper Pressure Differential System in High-Rise Buildings: New European Standard in Comparison with Existing Codes
Michal Kozech, Gebäudewirtschafts-Universität Kanton Zürich, Switzerland

Fire and Life Safety Improvements for the Vertical World
Justin Francis, Queensland Fire and Emergency Services, Australia

Hot Smoke Tests – Lessons for Better Design of Fire Protection Systems
Piotr Smardz, J Paliiszek-Saladyny, INBEPO, Poland

Smoke and Heat Control System Based on Air Barrier
Grzegorz Krajewski, Fire Research Department, Building Research Institute, Poland

Influence of Surfaceactants on Cooling Efficiency of Water Droplets Impinging onto Hot Metal Surfaces
Joachim Soering Bjørge, Q Rugdsving AS/PDS Protekt/ University of Bergen, S Arne Bjorkheim, M- M Metallinou, Western Norway University of Applied Science & T Log, Western Norway University of Applied Science/ Equinor Karsto, Norway

Assessment of Correlations for the Evaporation of Droplets using a 1D, Spherical Heat Transfer Model
Jason Floyd, Jensen Hughes, USA

J-Value Analysis of the Retrofit-Fit of Sprinkler Systems to London’s Existing High-Rise Residential Buildings
Matthew Arnott, D Hopkin & M Spearpoint, OFR Consultants, UK

Longer Discharge Times for Clean Agent Fire Extinguishing Systems in Biological Laboratories
Johan Hoogeweg and R Oldengarm, DGMf, The Netherlands

Fireproofing

B3 Ventilation and Smoke Control

The Unintended Consequences of Improved Airtightness Levels on the Operation of Pressure Systems in Tall Buildings
James McConigal, Astute Fire Engineering Ltd, UK, I Sanderson, Glasgow Caledonian University, UK

Control of Ventilation Systems in the Event of Fire - A Practical Test
Gunther Schwabegger, IBS – Technisches Büro GmbH & Josef Huber, Institut für Brandschutzechnik und Sicherheitsforschung GmbH, Austria

Experimental Methodology to Study the Fire Contribution of Cladding Materials
Juan Hidalgo, B Garvey, J Ogilvie, J Carrascal, D Lange, C Maluk, M McLaggan, A Osorio, The University of Queensland, Australia & J Tororo, The University of Maryland, USA

Spreading Fire by the ETICS Façade
Pawel Sulik, B Sedlak, Building Research Institute, Poland

Development and Suitability of BS8414 – A Technical Review
Merlyn Forrer, Design Fire Consulting, UK

Challenging Measurements

Comparison of HRR Results of Cone Calorimeter Tests: With and without FTIR Connected
Tetsuya Hayakawa, TSV, H Yoshioka, NILIM & K Yoshida, Yokohama National University, Japan

Oxygen Index Test for use in Flammability Evaluation in Microgravity
Makiko Fukuda, Intec Co., S Takahashi, Gifu University, KIYoshida, Nippon Hakuyo/in Kentei Kyokai, K Wakatsuki, Shinshu University, Y Nakamura, Toyohashi University of Technology, S Suga, K Katano, Suga Test Instruments Co & M Kikuchi, Japan Aerospace Exploration Agency, Japan

Investigation of Insulation Materials Based on Renewable Resources for Facades According to German Requirements
Christian North, J Kuppers, J Zehfuss, Technische Universität Braunschweig, iBMB, Germany.

The programme is correct at the time of going to print but the organisers reserve the right to make changes if necessary