

International Association for Fire Safety Science

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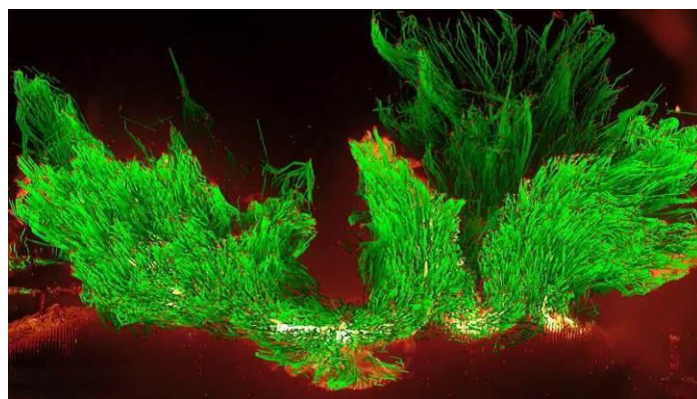
Fire Safety Science News

<http://www.iafss.org>

February 2016, Issue No. 39

Rita Fahy, Editor

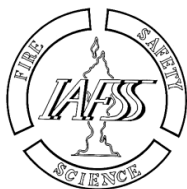
Associate Editors: Michael Gollner (USA), Nils Johansson (Sweden), Naian Liu (China), Ai Sekizawa (Japan), and Michael Spearpoint (New Zealand).



Flame vortex circulations and forward flame bursts through flame troughs in wildfires
(from Finney, Mark A., et al. "Role of buoyant flame dynamics in wildfire spread."

Proceedings of the National Academy of Sciences 112.32 (2015): 9833-9838)

See details on page 30.



IAFSS was founded in 1988 with the primary objective of encouraging research into the science of preventing and mitigating the adverse effects of fires and of providing a forum for presenting the results of such research

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Our Aims

Fire Safety Science News aims to be a platform for spreading the work of IAFSS members, and to be the place where fire safety scientists can read what is not readily found elsewhere, thus favoring news and trending research. A digital archive of previous issues can be found [online](#).

MINUTES FROM LATEST MANAGEMENT COMMITTEE MEETING AVAILABLE

The IAFSS Management Committee met on October 5th in Tsukuba, Japan, in conjunction with the 10th AOSFST conference, where many of the committee members were in attendance. The minutes of the meeting are available on the IAFSS website at <http://www.iafss.org/committees/committee-documents/>. The items on the agenda included organization of the 12th Symposium; reports on the Asia-Oceania Association for Fire Science and Technology and the 10th AOSFST and 2nd European Conferences; updates on the conference proceedings from the 11th IAFSS Symposium, *Fire Safety Journal* and the IAFSS website; and results from the member survey about the cycle for the IAFSS symposia. Between IAFSS conferences, the Committee tries to schedule full committee meetings during large fire safety conferences in order to increase the opportunity for members to meet face-to-face.

11TH IAFSS PROCEEDINGS PUBLISHED

The final version of the *Proceedings of the 11th International Symposium on Fire Safety Science* are now available online in our [digital archive](#). Prof. Patrick van Hees from Lund University, Sweden, edited the volume. With our papers now indexed by Google Scholar, Microsoft Academic and others, citations and other relevant information should appear soon. Note however that other providers index our papers using their "robots" or "crawlers", so we do not control how publications are represented once indexed. If you have questions about specific articles, please contact webmaster@iafss.org and we will do our best to resolve any issues.

We would like to thank Terry Fay, formerly of Jensen Hughes, for countless hours of technical work which enabled posting and archiving of these publications.

Signed: Michael Gollner, University of Maryland

LETTER FROM THE CHAIR



The year after our IAFSS conference is sometimes considered as a year of less activity, but I do not feel this for 2015 as we had two major regional activities. In June, our European regional activity got wings again by organising the 2nd European symposium in Cyprus. Around 100 participants attended and the symposium was organised in half-day slots where a keynote lecture was followed by a poster session and a discussion on keynote and poster. A somehow different approach as in our other conferences but it allowed for a non-formal interaction of researchers and in a number of cases a lively discussion afterwards in the plenary lecture room. We now are investigating how to proceed in the future with this European event. I would hereby like to thank all the people who attended and supported the conference, especially Bart Merci as program chair and George Boustras as local chair.

Another regional activity was the 10th AOSFST conference, organised in early October in Tsukuba Japan. In total 250 people attended, coming from more than 15 countries. From the 127 paper submissions, 95 were selected. During the poster session, 65 were presented. The conference was well organized and gave a lot of opportunity to build up networks. Both at the start of the conference and the symposium banquet, there was a Memorial for Professor Toshisuke Hirano (1939-2014), one of our founders of the IAFSS. I would like to thank our Japanese hosts and AOAFST, which made this conference as a memory for life. Special thanks to Prof. Kazunori Harada as program chair, Dr. Ichiro Hagiwara, local chair, Emeritus Prof. Takeyoshi Tanaka, chair of the advisory board and Prof. Chow as chair of AOAFST. The 11th conference will be organised in Taiwan in three years' time.

In both cases, IAFSS members could obtain reductions and as compensation IAFSS gave awards at each of the conferences. This brings me in fact to the fact that in 2015 we approved a document on how we could sponsor or support scientific conferences in the fire safety science field. You can find the document on our website and please contact me or other members of the committee if you need more clarification.

Another important decision made during the year was the inauguration of young or emerging researcher awards, which will be new for the IAFSS symposium in Lund. More information will follow.

This brings me now to the preparation for our next conference. Elsewhere in this newsletter you can see the composition of the different committees for the 12th conference in Lund. Preparations are now getting into high speed for the first call of proposals. (You will find the Call for Papers in this newsletter and on the website.) An important aspect is the publication of our papers and a small task group is now investigating how to improve this and increase the impact of our papers. Impact and citations are getting more and more important as well as registration at Web of Science. In order to help our young researchers, we need to move forward and I hope we can do so for the Lund conference. More news will come soon. With respect to publications, it is also important to note that changes have been made by Elsevier in the editorship for Fire Safety Journal, see the newsflash in this newsletter.

The most important thing perhaps is to not forget to put the conference in your agenda. The Department of Fire Safety Engineering in Lund is looking forward to meeting you at the 12th International Symposium on Fire Safety Science from June 12-16, 2017. If you feel you want to contribute and support the conference let us know.

One of the visions I formulated was to have an activity flow both top-down and bottom up. As there have been discussions several times on whether to move from a three year interval to a two year interval, we felt it was necessary to get the feeling of our membership. After the survey on the need for printed proceedings, we did a second survey and we noticed that there is no real clear majority in our membership for changing our actual scheme of the conferences from three to two years' interval. I think it is important for us to listen to our members and I appreciate always ideas on how we can proceed with our Association. Do not hesitate to let me know your thoughts.

Finally I would like to wish you and your family all the best in 2016.

Signed: Patrick Van Hees, Chair IAFSS, Lund University, Sweden

12TH INTERNATIONAL SYMPOSIUM ON FIRE SAFETY SCIENCE

The International Association for Fire Safety Science (IAFSS) is proudly announcing that the 12th International Symposium on Fire Safety Science will be held on June 12–16, 2017 at Lund University, Sweden (<http://www.iafss2017.se/>).



will also be a wide range of entertainment and tours in the companion program. Southern Sweden holds both rural and urban areas as well as a marvellous nature within a well accessible area. More information about the different arrangements will be presented as the planning of the Symposium progresses.

Host Venue

The Symposium will be held at the Technical Faculty Campus at Lund University (http://www.lth.se/fileadmin/virtuell_flygtur/en/).

Lund University is a world-class university and it is ranked as one of the top 100 Universities in the world. The city of Lund was founded around year 990 and in 1085 the first school was founded in the city, which makes Lund the oldest seat of learning in Scandinavia. Lund University was officially founded in 1666 and today it has over 42,000 students enrolled. There has been active and well-known research in Fire Science at Lund University since the 1960s. The Division of Fire Safety Engineering (<http://www.brand.lth.se>) is involved in both bachelor and master programs in Fire Safety Engineering, with a yearly enrolment of around 60 new students in these programs.

Lund city center is accessible due to its small size, making it easy to travel both by foot and by the well-developed public transport system. There are also very good connections with the rest of the region and the world. The international airport in Copenhagen is only 35 minutes away by train. Copenhagen airport is the largest airport in Scandinavia and easy to reach from most major international airports.

Registration and Accommodation

Symposium registration and hotel booking for participants and their companions will be available via links from the Symposium website at <http://www.iafss2017.se> in late 2016. Registration will include online access to full papers and posters. If you would like more information on the arrangements for the upcoming Symposium, please visit the IAFSS website at <http://www.iafss.org> or contact the Local Host Committee at <http://www.iafss2017.se>.

The Symposium is the premier fire safety science meeting in the world and has been organized triennially since 1985 by the IAFSS. The program will have parallel sessions for the presentation of fully peer-reviewed papers over the five days of the Symposium, including invited lectures from the world's top fire science researchers. Symposium activities will begin on Sunday, June 11, with several workshops during the day and a Welcome Reception in the evening. The Symposium will also have poster sessions, which will provide an excellent opportunity to interact individually with researchers about their most recent work.

Students are encouraged to participate and awards will be granted for the best student presentations. In addition to the technical sessions, numerous social activities are planned to cater for informal meetings with colleagues and friends. There

12th IAFSS Symposium Timeline

Full Papers

15 October 2016 – Submission deadline for full papers

15 January 2017 – Authors notified of preliminary accept/reject decision

15 February 2017 – Deadline for submission of revised accepted papers

15 March 2017 – Authors notified of final accept/reject decision

31 March 2017 – Final submission deadline for photo-ready copy

Posters

Summer 2016 – Call for poster abstracts

31 March 2017 – Submission deadline for poster abstracts

15 April 2017 – Authors notified of accept/reject decision

15 May 2017 – Poster submission for web posting

Symposium

31 May 2017 – Web publication of all papers and posters

Symposium Committees

12th Symposium Planning Committee

Co-Chair E. Galea
Co-Chair K. Boyce

12th Symposium Program Committee

Co-Chair A. Trouvé
Co-Chair B. Merci
Poster Chair: N. Liu

12th Symposium Workshops Committee

Co-Chair T. Hakkarainen
Co-Chair A. Steen-Hansen

12th Symposium Publications Committee

Editor: E. Weckman

12th Symposium Awards Committee (including best thesis)

Chair A. Hamins

12th Symposium Local Arrangements Committee

Chair D. Nilsson

12th Symposium Writing Mentor Program

Chair: C. Wade

Call for Papers

You are invited to submit a contribution that advances scientific understanding and/or presents new ideas in the entire spectrum of fire safety science. The topic areas include:

- Material Behaviour in Fires (including Ignition, Pyrolysis, Flame Spread, Flame Retardants, Smouldering)
- Fire Dynamics (including Compartment Fires, Pool Fires, Fire Plumes)
- Fire Emissions and Toxicity
- Tunnel Fires
- Structures in Fire
- Fire Suppression
- Wildland Fires
- Explosions and Industrial Fires
- Evacuation and Human Behaviour
- Special Topics (including Fire Safety Engineering, Environmental Fire Impact, Sustainability, Fire Forensics)

Full papers and poster abstracts will be accepted on the basis of their quality and originality in the science of fire safety and its applications. Routine applications of established knowledge and case studies with no generalized results are not appropriate for the Symposium. Refer to prior Symposium proceedings for further information on the scope of contributed papers (<http://www.iafss.org/publications>).

All accepted and presented papers will be included in the Symposium Proceeding, Fire Safety Science, and will be electronically published by IAFSS (<http://www.iafss.org/publications>). All papers will have an assigned DOI and will be part of the CrossRef system, including citation indexing. This assures wide dissemination of the contributions and assures that citations of the papers are fully recognized. Additionally, the option of publishing accepted papers in a fire-research-related peer-review journal is being explored by the organizers and further details on the publication options will be made available before the submission deadline.

Requirements

Papers: Must be original work. The same paper must not have been submitted to another forum.

Style: All papers must be in English. Detailed information for authors on style, including paper length, format, etc., and a paper template will be available via a link on the IAFSS web page (<http://www.iafss.org>). The Symposium offers an English mentoring program. However, the mentoring service will be provided on the basis of technical merit of the paper and the reviewers' recommendation. Poorly written papers will not be considered. Oral presentation of the paper at the Symposium must be made by an author.

Review Process

Submitted full papers will receive at least two independent peer reviews. Reviewers will be appointed by members of the Program Committee. Final decisions on acceptance or rejection of a manuscript will be made by the 12th Symposium Program Co-Chairs.

Authors will be notified of the Program Committee's preliminary decision by January 15, 2017. Notifications will include reviewers' comments and if accepted, detailed style guidelines for the final version of the paper, and the deadline for delivering a revised version in which all reviewers' comments have been addressed (February 15, 2017). Authors will be notified of the Program Co-Chairs' final decision by March 15, 2017. This final decision will be based on compliance of the revised papers with both the reviewers' comments and the formatting requirements of IAFSS publications.

Submitting Your Full Paper

Manuscripts should be submitted electronically, beginning September 15, 2016, through the Symposium author web page that will be available via a link on the IAFSS web page (<http://www.iafss.org>). The submission deadline for papers is October 15, 2016. Papers submitted after October 15, 2016, will not be considered.

Submitting Your Poster Abstract

A Call for Posters will be issued in Summer 2016, which will provide details on poster abstract requirements. Posters may describe work in progress, or completed projects. To assure the inclusion of recent research, the submission deadline for poster abstracts is March 31, 2017. Poster abstracts will be reviewed by the 12th Symposium Program Committee.

The Call for Papers can be found at http://www.iafss.org/portal/wp-content/uploads/IAFSS_Call_For_Papers-v7.pdf. Information about the symposium is at <http://www.iafss2017.se/>.

ORCID REGISTRY

We would like to call IAFSS members' attention to the ORCID registry, whose mission is "to solve the name ambiguity problem in research and scholarly communications by creating a central registry of unique identifiers for individual researchers and an open and transparent linking mechanism between ORCID and other current researcher ID schemes. These identifiers, and the relationships among them, can be linked to the researcher's output to enhance the scientific discovery process and to improve the efficiency of research funding and collaboration within the research community." Registering is free to researchers. For more information, see <http://orcid.org/about/what-is-orcid>.

NEWS FROM *Fire Safety Journal*

From the beginning of 2016, *Fire Safety Journal*, the official journal of the IAFSS, will move to a new editorial structure with four co-editors: Luke Bisby, Bart Merci, Ann Jeffers and Jose Torero. Jose will step down from his role on the journal in 2017 after helping with the transition to this new editorial structure, leaving three editors, Ann, Bart and Luke to lead the journal for future years.



During Jose's tenure as editor, the journal operated a structure with Jose as Editor-in-Chief, supported by a team of associate editors who were involved for varying time periods ranging between three and six years. These associate editors were Albert Simeoni, Naian Liu, Michael Spearpoint, Ricky Carvel, Bogdan Dlugogorski, Ann Jeffers, Bart Merci, Andre Marshall and Colin Bailey. All have been invited to continue to serve on the journal's Editorial Board. This team was responsible for continuing to focus on the high quality legacy set by the previous editor, Dougal Drysdale, while also welcoming in a new era in digital publishing with the advent of Article Based Publishing meaning that the journal was no longer restrained by a page budget.

Over this period the journal's influence across disciplines has become much more apparent, which was the aim of having such a multi-disciplinary representation of editors. Citations to the journal in 2010 came predominantly from the other well-known fire science journals, as well as from the more engineering focused built environment journals, but in 2015 a much wider spread of journals are citing *Fire Safety* including materials, energy, chemical engineering, and safety science journals. The readership of the journal reflects how diverse and far reaching the journal now is with readers in 2014 coming from 104 countries and making over 210,000 downloads of papers published in the journal.

Jose stepped down from *Fire Safety Journal* after six years as Editor-in-Chief, which was the catalyst for the decision to make the editorial changes in consultation with IAFSS and candidates for the editorial roles. Given the broad scope of the journal and the view that there was not one scientist or engineer who could cover the full breadth of the relevant topics, we opted for a de-centralised approach to overseeing the journal that embraces diverse expertise across fire science and engineering. The new team reflects the dynamism in the field, as well as the focus on interdisciplinary aspects of fire science and engineering research, in particular in the area of structure/fire interactions.

Luke Bisby has extensive experience in experimental methods for structural and fire safety engineering. He is the Arup Professor of Fire and Structures, Royal Academy of Engineering Research Chair, and Head of the Institute for Infrastructure and Environment at the University of Edinburgh.





Ann Jeffers is an Associate Professor in the Department of Civil and Environmental Engineering at the University of Michigan. Her research lies at the intersections between the fire sciences and structural engineering disciplines, and specifically seeks to establish novel computational methods that bridge the domains of fire science, heat transfer, and structural mechanics. She has been active within ASCE and SFPE to develop standards and design guidelines for performance-based structural fire engineering.



Bart_Merci is a Professor and Head of Research Unit Combustion, Fire and Fire Safety at Ghent University. He is active in numerical simulations and modelling of turbulent combustion and fire.

While thanking Jose for his commitment and efforts on the journal over the last six years, as well as those of the team of associate editors, we would like to welcome the new editorial structure for 2016. Over the coming years *Fire Safety Journal* will continue to focus on publishing the highest quality research in fire science and engineering, and seek to further strengthen the journal's relationship with the IAFSS.

We thank you for your support of the journal and look forward to receiving your future submissions!

Signed Joe D'Angelo, Elsevier

NEW GUIDELINES FOR IAFSS CONFERENCE SPONSORSHIP

The executive committee of the IAFSS has developed a [new set of guidelines](#) for sponsorship of conferences based on many recent inquiries. These guidelines are intended to provide an indication of the level of support the IAFSS may be prepared to offer appropriate conferences in fire safety science. The following three types of conferences are included in the guideline are:

1. Conferences organized by our sister organization AOSFST or conferences at regional level
2. Other conferences – Level 1
3. Other conferences – Level 2

where “Other conferences – Level 1” includes conferences where, among other things, peer-reviewed full papers are presented and “Other conferences – Level 2” includes conferences that do not fulfil the Level 1 requirements but that still have a high scientific level and are not solely commercial. For a complete description of the different levels, please download the [guideline](#). It must be noted that compliance with the guidelines does not necessarily mean that support will be granted. The final decision as to which conferences will be supported and the level of support that will be provided will be made by the IAFSS management committee.

Remember, regardless of sponsorship, the IAFSS posts all relevant conferences to its upcoming events list. If you have a conference you think would be of interest to the IAFSS for the events list, please contact the webmaster. For inquiries regarding sponsorship, please contact the [IAFSS Chair](#).

Signed: Nils Johansson, Lund University

NFPA'S PHILIP J. DINENNO PRIZE AWARDED TO THE AFFORDABLE HOME SMOKE ALARM



Philip J. DiNenno

In honour of the late Philip J. DiNenno, the highly regarded former CEO of Hughes Associates who passed away in 2013, NFPA established the DiNenno Prize in 2014. A prize committee considers nominations submitted from around the world.

The NFPA announced that the affordable home smoke alarm is the technical achievement to receive the inaugural DiNenno Prize. The award, and \$50,000 in prize money, was presented to Lyman Blackwell who co-developed the smoke alarm with the late Duane Pearsall. The affordable home smoke alarm was developed in the 1960's by Pearsall and Blackwell who recognized a need for an inexpensive and easy-to-install smoke detector that could bring fire safety to every household. Assisted by many team members, they realized



Lyman Blackwell

their goal when the new, battery-powered home smoke alarm entered the marketplace in 1972. The percentage of U.S. homes with smoke alarms increased from 22 percent in 1977 to 96 percent in 2010.

“The affordable home smoke alarm is one of the most important fire safety inventions of our time, helping save tens of thousands of lives in home fires,” said Jim Pauley, NFPA president. “With the inaugural DiNenno Prize, we honor this essential innovation and all those who helped realize the vision for the affordable home smoke alarm, and we honor Phil DiNenno who was one of the greatest leaders in fire and life safety.”

The DiNenno Prize was established to create a legacy in the name of Philip DiNenno. In addition to honouring his memory, the DiNenno Prize is meant to encourage and recognize significant technical developments that have an impact on public safety, including building, fire, and electrical safety. More information can be found at www.nfpa.org/dinenno.

NEWS FROM MEMBERS

News from Arup

Arup-funded Imperial College PhD student Egle Rackauskaite and her academic and industrial supervisors, Guillermo Rein and Panos Kotsovinos, won the Society of Fire Protection Engineers' UK Chapter 'Best Fire Research Project' award. The PhD project is entitled 'Improved Travelling Fires for the Structural Design of Modern Buildings'.

Susan Lamont, with Susan Deeny and Panos Kotsovinos, presented a paper at The First International Conference on Structural Safety under Fire & Blast (CONFAB) in September. The conference was hosted in Glasgow, UK. Their papers were entitled 'Structural fire engineering from research to the built Environment' and 'Engineering inclined columns to deliver fire resistance,' respectively.

Panos Kotsovinos and Neal Butterworth (with Angus Law from University of Queensland) recently published a paper on 'Engineering geometrically bi-linear columns to deliver fire resistance: Standard heating' in the *Engineering Structures Journal*.

Panos Kotsovinos and Krzysztof Wolnicki presented at the 1st European Conference of the Society of Fire Protection Engineers in Copenhagen on 'Selecting design fires for the structural fire engineering of arena roofs' and 'Holistic Design of a Great Building'. Panos' presentation was based on the structural fire engineering work conducted by Arup on the Copenhagen Arena project and Krzysztof's on the fire engineering work conducted for the BskyB project in London.

Aaron McDaid presented his research paper "Human Behaviour in Fire" at the International Conference on Building Safety and Security that took place in Prague, Czech Republic on August 10-12, 2015. The paper, subtitled "Study into the use of signage on exit choice behaviour in a virtual environment", investigates human behaviour in the context of exit choice. The study, which was conducted in a virtual environment, examines the effectiveness of additional floor-based escape signage when compared to conventional exit signage on the same escape routes. This new type of research involves the use of already existing technologies for new purposes; in this case, commercial computer games engines, generally used for entertainment purposes.

Michael Kinsey along with co-authors presented "A Review of Human Behaviour Assumptions within Standard Fire Design Guidance" at the Human Behaviour in Fire Symposium at Cambridge, UK. This paper presents an overview of key human behaviour assumptions within the standard UK fire design guidance document Approved Document B (ADB). Clauses within the guidance where a criteria relate to people evacuating are focused upon. It is of key importance that users of such guidance consider the suitability of human behaviour assumptions for each specific engineering application and whether alternate means of assessment are more appropriate for assessing fire safety.

At the same human behaviour conference in Cambridge, Elisabetta Carattin of Arup, with Valeria Tatano of IUAV (University of Venice), presented "To Areas of Refuge and Beyond: Proposals for Improving Egressibility for the Disabled. A Case Study in Italy". The tools and management approaches adopted in Italy for the evacuation of people with disabilities are similar to the ones present in other countries, especially in the UK and the United States. These were the first countries in the world that introduced the concept of 'Area of Refuge' (AR) as a means to let people egress through distinct evacuation phases, in addition to other specific solutions for people with disabilities. This paper reports on a study to investigate the level of knowledge that mobility impaired occupants in Italy have regarding AR, as well as their relative concerns, expectations and willingness to use AR. Given the importance of the contribution of "buddies" to the overall egress process, a sample of office workers has also been assessed, since these people may have to wait in the AR while accompanying mobility impaired

occupants. Results confirm that there is still a large proportion of disabled occupants that are not aware of the presence and use of AR and that AR are still currently designed in a manner that does not match their expectations. This paper suggests the current design of many AR should therefore be questioned and re-thought.

Signed: Susan Lamont, Arup

News from SP

New hires

As of September 2015, Anne Dederichs is working for SP Fire Research at the office in Lund in the south of Sweden. Anne comes to SP from the Technical University of Denmark, where she led the Fire Safety Group and was head of studies for the Master in Fire Safety. She remains affiliated with the University where she holds a part time position as associate professor. Her area of research interest ranges from formation of toxic compounds from combustion and fire to evacuation.

New doctoral thesis

By due permission of the Faculty of Engineering, Lund University, Sweden, Karl Fridolf successfully defended his doctoral thesis entitled Rail Tunnel Evacuation on June 12. Faculty opponent was Dr. Karen Boyce, Senior Lecturer in Fire Safety Engineering, Built Environment Research Institute, School of the Built Environment, University of Ulster. For his research on rail tunnel evacuation, Karl was also awarded both the ITA COSUF Award 2015, and the SFPE Foundation's 2015 Student Scholar award.

Award

Dr Ying Zhen Li won the Science and Technology Award from the China Railway Group Limited due to the research on key technologies of performance-based fire prevention for urban railway tunnels. China Railway Group Limited is a large corporation group headquartered in Beijing China. Congratulations Li!

New project on fire protection of offshore wind turbines

SP Fire Research recently received funding from the OffshoreVäst consortium to launch a pre-study on the topic of fire protection and safety of offshore wind turbines. The funding is complemented with funding from SP's Offshore competence platform, and the purpose of the pre-study is to explore and describe current practices and research related to fire related risks in offshore wind turbines. The overall goal is to map the status of fire protection and safety in offshore wind turbines, and to provide recommendations for future research, which in a longer perspective could promote both innovative and cost efficient solutions to facilitate a continued growth within the offshore wind industry. The project is led by Karl Fridolf, and is carried out in collaboration between SP Fire Research in Sweden and Norway. The intention is to present the results in a journal paper in the end of November. If you are interested in the project, or if you are an industry representative who wants to contribute to the project, please do not hesitate to contact Karl, karl.fridolf@sp.se.

signed: Björn Sundström, SP

New lab facilities

SP Fire Research has recently invested in a new adjustable false ceiling in its large experimental hall in Trondheim, Norway. The new ceiling covers a floor area of 17 × 28 m and can be set at any height up to 15 m above floor level: The ceiling also has two



Photo of the large-to-full-scale jet fire test at SP Fire Research in Trondheim.

sections so it can be set up in a split-level configuration. This new facility is suited to a range of fire testing and experimental research projects, but particularly so for extinguishment systems that are intended to be used in large spaces such as warehouses, machinery spaces, hangars and atria. One example of testing is in accordance with IMO MSC/Circ. 1165 (water mist systems for use in machinery spaces) where the tested volume is now a maximum of 7 140 m³. With the scaling rules permitted by MSC.1/Circ. 1385, in some circumstances it is possible to obtain an approval for an extinguishing system in double this volume, i.e., 14 280 m³.

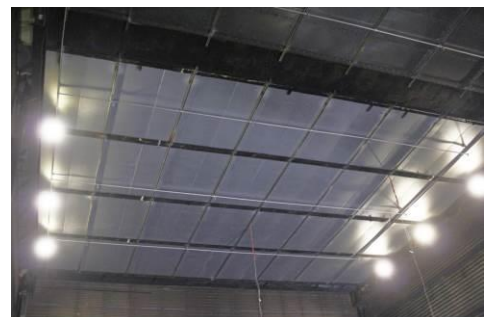


Photo of the new adjustable false ceiling at SP Fire Research in Trondheim, Norway.

At its outdoor test facility in Trondheim, SP Fire Research has investigated how construction elements and process equipment can be protected against large jet

fire exposure which can occur with the pressurised release of hydrocarbons. In large-to-full-scale experiments carried out at SP Fire Research in 1990's heat fluxes of 350 kW/m² were measured. This has led to the recent development of non-standard, extended jet fire testing where in a specially constructed jet fire test facility, objects protected by passive fire protection are exposed to higher heat flux densities. The standard test method ISO 22899 does not stipulate a heat flux exposure but the nominal target is 250 kW/m² compared to the nominal target of 350 kW/m² in the extended test method.

signed: Greg Baker, SP

Nordic Fire & Safety Days 2016

The Nordic Fire & Safety Days 2016 is a yearly event carried out by the Nordic universities and governmental research institutes dealing with risk and fire safety. It will be held by SP Technical Research Institute of Sweden in collaboration with Aalborg University, the Technical University of Denmark, Lund University, Norwegian University of Science and Technology, University of Stavanger, Aalto University and Iceland University as well as Dansk Brand- og Sikringsteknisk Institut and VTT, on June 16-17, 2016, at Aalborg University in Copenhagen.

The days will put a focus on risk and fire research in the Nordic countries. Contributions from other countries are more than welcome. The conference language is English. The organizing committee has extended the deadline for the [abstract submission](#) to March 3rd 2016. Notification will be on March 14th 2016.

Please submit nominations for the NFSD master thesis award before March 7th 2016. The requirements are to be found on the [conference web page](#).

The Nordic Fire & Safety Days shall be a meeting point for all of you who are interested in and work with different aspects of fire. The days shall give a lot of opportunities to tie band between fire industry, municipalities and University. At the Nordic Fire & Safety Days you will have the opportunity to get information on different aspects within fire research. The topics cover fire safety aspects concerning:

Day 1

- | | | |
|----------------------------------|--------------------------|--------------------------------|
| • Fire dynamics | • Forensics | • Transportation |
| • Fire chemistry | • Structural fire safety | • Management of rescue service |
| • Fire detection and suppression | • Off-shore fires | |

Day 2

- | | | |
|----------------------------------|--------------------------------------|--------------------|
| • Safety management | • Societal activities and resilience | • Evacuation |
| • Health and environmental risks | • Risk and innovations | • Crowd management |
| | • Decision-making | • Human behavior |

SP Technical Research Institute of Sweden, Aalborg University, Technical University of Denmark and Lund University look forward to seeing you in June. For more information please contact Anne.Dederichs@sp.se or <http://www.sp.se/en/training/Sidor/nfsd.aspx>. Conference registration is now open – Early bird registration through March 31 and final registration May 1.

signed: Anne Dederichs, SP

News from EU International Master of Science in Fire Safety Engineering

The University of Maryland (UMD) joins IMFSE as Associated Partner!

In August 2015, The University of Maryland (UMD) officially joined the consortium of the International Master of Science in Fire Safety Engineering (IMFSE). With UMD as new Associated Partner, students can from now on perform their IMFSE thesis research at UMD. The other Associated Partners are ETH Zürich (Switzerland) and The University of Queensland (Australia)

Other good news is that IMFSE is now part of the Erasmus+ funding programme. IMFSE initially started under Erasmus Mundus, an initiative from the European Commission. When this first contract ended, IMFSE was one of the few chosen programmes that received prolonged support, now under the Erasmus+ flagship.

Application forms online!

The application forms for the September 2016 intake are currently online (see link below).

Graduation Ceremony

On 3 September, the cohort 2013-2015 students graduated. Congratulations! Pictures of this cheerful event can be found on the IMFSE website (/students and alumni).



As a reminder for recently joined IAFSS Members: IMFSE is commonly organized by the Universities of Ghent (Belgium, coordinator), Edinburgh (Scotland) and Lund (Sweden). The main objective of this two-year full time educational programme is providing the required knowledge for a professional fire safety engineer in a Performance Based Design environment. Besides inter-university cooperation, student mobility in Europe is one of the main points of interest of the overall programme. The mobility structure, with possible change in study location after each semester, gives the students the opportunity to gain from the strengths and expertise of each of the three universities. More information: [www.imfse.ugent.be /](http://www.imfse.ugent.be/) IMFSE@UGent.be

Signed: Elise Meerburg, IMFSE, Ghent University

The 2nd Annual IMFSE Fire Safety Engineering Day: Integration of Fire Safety Engineering in Design

The Erasmus Mundus joint International Master of Science in Fire Safety Engineering (IMFSE) consortium (Ghent, Edinburgh, and Lund Universities), along with a variety of industry partners, delivered a very successful 2nd Annual IMFSE Fire Safety Engineering Day at the Building Centre in London, UK, on October 14th 2015.

The central theme of the day was 'Integration of Fire Safety Engineering in Design'; the intent being that members of the IMFSE Consortium, including academics, students, alumni, and industry partners, could discuss and debate the ways in which Fire Safety Engineering, when properly integrated into the overall engineering design process, enhances building design to create better solutions for clients, developers, users, owners, and operators.



Participants in the 2nd Annual IMFSE Fire Safety Engineering Day, London, UK, on 14th October 2015

More than 40 current IMFSE students participated in the event, along with academic staff from all three core IMFSE consortium partners, a number of IMFSE alumni, and representative from the IMFSE's key industry sponsorship partners, namely: Arup, BRE, IFIC Forensics, UL, Fire Engineered Solutions Ghent, FPC, Promat, and Rockwool.

The meeting provided a unique meet-and-greet opportunity with the IMFSE students and lecturers from the various institutes. Presentations were given by the IMFSE industry partners, and the event also included a panel discussion on 'Integration of Fire Safety Engineering in Design', which was moderated by Prof Luke Bisby (University of Edinburgh) and included panelists Prof Barbara Lane (Arup), Steve Manchester (BRE), Prof Bart Merci (Ghent University), and Brian Martin (Department for Communities and Local Government, UK).

Thanks to all for a successful, enjoyable, and educational event!

The IMFSE is always keen to engage with additional partners. Potential industry partners who are interested in participating in future IMFSE Fire Safety Engineering Days are encouraged to contact: Profs Bart Merci (Bart.Merci@ugent.be), Luke Bisby (Luke.Bisby@ed.ac.uk), or Patrick Van Hees (Patrick.Van_Hees@brand.lth.se).

Signed: Luke Bisby (University of Edinburgh)

News from the University of Edinburgh

Change is in the Air

It's all change at the University of Edinburgh, with the BRE Centre for Fire Safety Engineering expanding once more. Despite the loss of a core member of our team due to the departure of Prof Albert Simeoni (who we wish

well, but who is surely irreplaceable), we're seeking to bounce back and grow the Edinburgh Fire Group by the addition on a new BRE co-funded BRE Chair and BRE Lecturer in Fire Safety Engineering; both posts are currently being advertised. We are also very pleased to announce the appointment of Dr David Rush as Lecturer in Structural Engineering. Dr Rush is a BRE Centre alumnus who has research interests in structural fire engineering, risk, resilience, and public engagement with engineering using the performing arts. Dr Juan Hidalgo has also changed roles within the group, and is now a continuing Postdoctoral Research Associate (PDRA) working primarily with Arup Prof Bisby and Rushbrook Lecturer Hadden on a range of exciting projects related to combustible insulation, sandwich panels, facade fires, and fire safety of bio-based construction materials including: structural laminated bamboo, structural cork, and cross-laminated timber.



Selected members of the BRE Centre for Fire Safety Engineering enjoy a "warm" Scottish autumn evening with a Barbecue at the University's King's Buildings campus.

30th Anniversary of the Fire Science and Fire Investigation Course

We are very pleased this year to be delivering, now in its 30th year, this internationally acclaimed four-day course on fire investigation. The course explores the scientific principles of fire behaviour for practical application by the fire investigator. A wide range of topics is covered, including:

- Ignition & fire growth
- Material and structural response to fire
- Investigation techniques
- Forensic pathology
- Wilful fire raising
- Legal aspects

As in previous years, the programme has been designed to build on previous training for professionals such as Police & Fire Officers, Fire Safety & Security Consultants, Coroners & Procurators Fiscal, Forensic Scientists, and Loss Adjusters. More information on the course, including a list of lecturers on this course, is available here: <http://www.edinburghfire.com/fire-investigation/>

Fighting Fires in Basements

Drs Carvel (Lecturer) and Majdalani (PDRA) continue to support the development of the London Fire Brigade's 'Tactical Ventilation' operational guidance documents, as part of the "Strategies for fighting fires in basements" project, which is funded by the Fire Services Research & Training Trust. This work is on-going but further guidance on tactical ventilation of basements is in preparation and should appear soon. FSRTT have also just granted funding for a new research project investigating the limitations of the "Safety fire fighting technique" used by the UK fire services when they enter enclosed spaces containing fires.



Bench scale backdraught experiments as part of the "Strategies for fighting fires in basements" project - a 1m long flame extends from a 1m long enclosure.

Wildfire Research continues at Edinburgh

Dr Rory Hadden, along with colleagues in the USA, has been awarded a \$2M grant to continue Edinburgh's work to study wildland fires. The project, entitled "Multi-scale analyses of wildland fire combustion processes in open-canopied forests using coupled and iteratively informed laboratory-, field-, and model-based approaches", has been funded by the Strategic Environmental Research and Development Program run by the US DoD, EPA, and DoE. The project will investigate the behaviour of wildfires using a multi-scale approach, and is a 5-year collaborative effort involving the US Forest Service, Worcester Polytechnic Institute, Michigan State University, West Virginia University, and Rochester Institute of Technology. Dr Hadden is also working on a Joint Fire Science Programme funded project with the US Forest Service to investigate the generation of firebrands during fires in pine-dominated ecosystems and linking this to the fire behaviour and intensity.

New Doctoral Student Starts

The past few months have seen the arrival a number of new PhD students to the Edinburgh Fire Group. Recent students to join the Group include; Simon Santamaria, who will work with Dr Hadden to study the ignition of solid materials subject to non-standard heating with a BRE Trust funded studentship; Marion Bourebrab will

work on the development of water borne fire retardants for use in bio-based composite materials supervised by Dr Hadden and funded by TWI; Farian Wu, who will work with Dr Carvel to study backdraught; Nikolai Gerasimov, who will work with Prof Bisby on an industrially-funded project to focus on the performance of intumescent coatings under non-standard heating scenarios; and Felix Wiesner, who will also work with Prof Bisby and in partnership with Arup to study the structural response of cross-laminated and glued-laminated timber walls and columns during fire. Finally, Edinburgh has recently joined as partners in the European Fire-Tools project (<http://www.firetools-fp7.eu/>), by supporting the experimental work of visiting PhD student Blanca Andres Valiente, from Lund University, using our H-TRIS MkII testing methodology and apparatus.

Please visit our Blog to stay up to date with all that's going on in Edinburgh!

<http://edinburghfireresearch.blogspot.co.uk>

Signed: Luke Bisby, University of Edinburgh

News from Luleå University of Technology

Research project on localized fire exposure

In January 2015, a series of tests were performed at SP Fire Research in Trondheim, Norway, to evaluate the thermal and structural response of a steel frame building typical for Swedish conditions. The fire exposure came from a localized heptane fire with effect of approximately 4 and 7 MW. Along with Luleå University of Technology, SP Fire Research contributed to the project. Photographs from the experiments are shown in the figure below. Project leader is Joakim Sandström along with Ulf Wickström from Luleå University of Technology. The full report is available at:

http://pure.ltu.se/portal/files/103926559/Experimental_report_20151001.pdf.



Photographs of two of the experiments.

Signed Michael Försth

A selection of new bachelor and master theses

The full reports can be found on the LTU website <http://pure.ltu.se/portal/en/studentthesis/search.html>.

Quantification of variations in calculation of structural response exposed to a travelling fire

In January 2015 a full-scale test was performed in Karlovy Vary, Czech Republic, to investigate the structural response of a building to a travelling fire. The test was performed with partners from University of Edinburgh, SP Fire Research, Imperial College London, CSTB, Luleå University of Technology, Czech Technical University in Ostrava, MajaCzech, and the Fire and Rescue Service of the Karlovy Vary region. This resulted in one two-authored bachelor thesis and one two-authored master thesis. The assignment of the bachelor thesis of Jakob Degler and Andreas Eliasson was to investigate potential temperature-time curves that would be possible in the compartment from the test. Several scenarios were modeled in FDS where various fire loads (consisting of wooden cribs) were tested. The compartment in FDS and one of the scenarios can be seen in Figures 1 and 2.

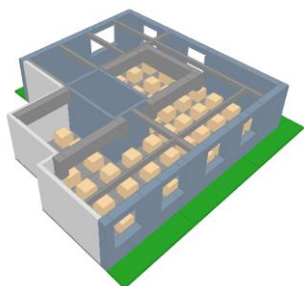


Figure 1 FDS model of the compartment

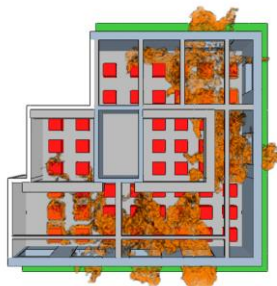


Figure 2 FDS fire scenario in the compartment

The master thesis performed by Erika Palmklint and Matilda Svensson focused on the structural and thermal response of four specific composite slabs in the compartment. The slabs were exposed to three different temperature-time curves represented by the standard fire curve (ISO-834), measured temperature-time curve from the full-scale test and results from the prior study in FDS. Calculations were performed in the software ABAQUS. A demonstration of one of the slabs and a diagram showing the surface temperature of the slab

exposed to the full-scale test fire is presented in Figures 3 and 4.

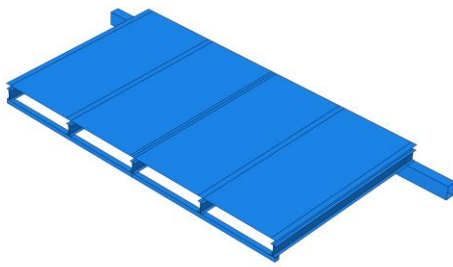


Figure 3 Model of composite slab in ABAQUS.

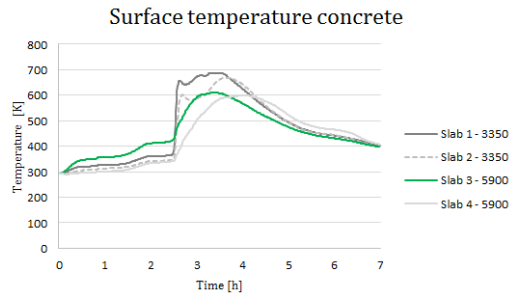
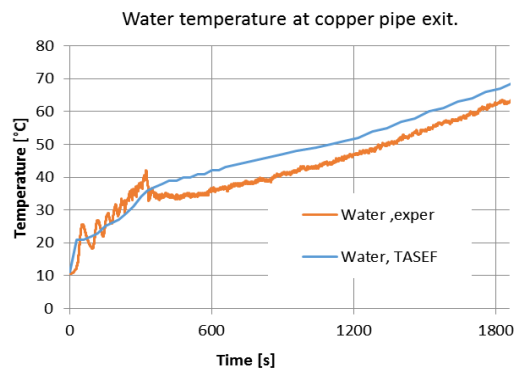


Figure 4 Surface temperature of the fire exposed concrete using full-scale test fire.

Signed Michael Försth

Calculation of temperature in a water pipe – validation of TASEF by comparison with tests in a fire resistance furnace

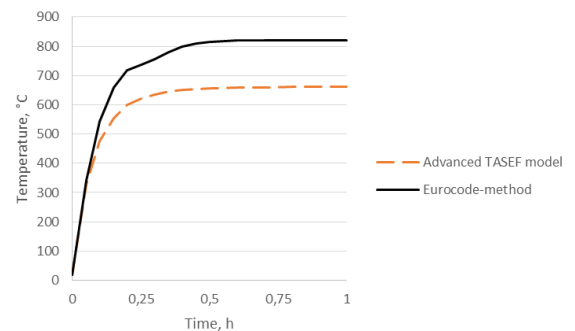
In this thesis by Kristin Jonsson calculations of temperature in a water pipe with the finite element code TASEF was validated by comparison with tests in a fire resistance furnace. An experiment in a fire resistant furnace was performed where a copper pipe with water flowing through it was exposed to fire conditions. The temperature of the water flowing out of the pipe was measured and compared with temperatures calculated with TASEF. The figure below shows measured and calculated water temperatures.



Signed Ulf Wickström

Advanced temperature calculation of bare open steel sections exposed to localized fire - a theoretical model with the finite element program TASEF

In this bachelor thesis by Petter Jönsson the computer code TASEF is used to calculate steel temperatures when exposed to flames of a localized fire. The limited depths of the flames are considered, i.e. the gas and radiation temperatures are not equal. An I-section is analyzed considering the so called shadow effect. This is performed with a virtual shadow cover between the flanges creating closed void. The radiation emanating from flames between the flanges as well as from outside the flanges are accurately accounted for.

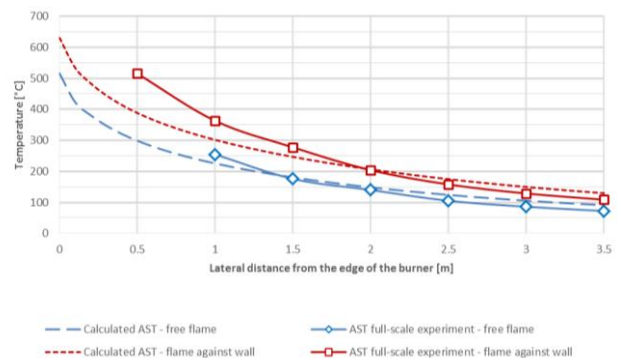


By making a more accurate analysis considering the reduced emissivity of flames with a limited thickness a lower steel temperature can be estimated as shown in the example of the diagram below.

Signed Ulf Wickström

Mapping of incident radiation with plate thermometers from a propane flame – free and adjacent to walls

In this bachelor thesis by Oskar Lind and Per Troedsson the highest adiabatic surface temperature (AST) and the incident radiation q_{inc} to surfaces at different distances and heights from a propane burner flame with a given effect were measured and calculated with the purpose to determine 'safety distances'. Plate thermometers were used to monitor AST as well as q_{inc} . The burner was placed in three ways, free, at a wall or in a corner. A



relatively simple closed form formula was developed and coded in Excel to calculate AST and q_{inc} for the three cases. The diagram below shows a comparison between the calculated and measured AST. Notice that the exposure is considerably higher when a wall is placed behind the burner. No augmented exposure was experience when the burner was place in a corner instead of just at a wall.

Signed Ulf Wickström

News from National Research Institute of Fire and Disaster (NRIFD), Japan

New Director

NRIFD staff received the exciting news that Dr. Tokiyoshi Yamada has been promoted to Director of NRIFD since March 31st 2015. Dr. Yamada is also Chief of Fire and Disaster Investigation Division. Dr. Yamada joined Fire Research Institute (Currently NRIFD) in 1983. He was Director in research and Chief in Research and Development Division before this appointment. He holds a PhD in architecture from the University of Tokyo, as well as a Bachelor of Engineering from Nagoya Institute of Technology, Japan. Dr. Yamada has been active on numerous committees, including currently being in charge of the research committee on Fire Safety in the Architecture Institute of Japan (AIJ).

New Staff

NRIFD has been expanding since 2012 by hiring six young talented researchers so far – both in fire- and disaster-related research areas. NRIFD welcomed two researchers in April 2015.

Dr. Kousuke Fujii joined the Large-Scale Fire Laboratory Group, R&D Division. Dr. Fujii holds a Ph.D., as well as a Bachelor and a Master of Human Sciences, from Waseda University, Japan (supervisor: Prof. Tomonori Sano). His Ph.D. topic was evaluation method of evacuation safety based on human behaviour. His specialty is Architecture Planning & Evacuation Safety as Human Engineering (Ergonomics). He focused on crowd flow, visibility of signs and way-finding.

Mr. Yasuhiro Sato joined the Special Disaster Laboratory Group, R&D Division. Mr. Sato holds a BEng and a MEng from the Department of Applied Chemistry at Tokyo Institute of Technology (TIT), Japan (supervisor: Prof. Takao Ikariya). Mr. Sato is currently finishing up his Ph.D. at TIT and his Ph.D. topic is synthesis and reactivity of iridium and rhodium complexes with C-N chelate benzylic amine ligands.

Research Project

Currently, NRIFD staff are finishing up 5-year research projects as this fiscal year, from April 2015 to March 2016, is the last year of those projects. Those include (1) R&D for the safety for firefighters, (2) Research about improving the safety of hazmat and hazmat facilities, (3) R&D of information technology for assisting firefighting and disaster prevention activity against large scale disaster, (4) Research on ensuring safety against diversified fire, and (5) R&D of firefighting robots as a response against disaster (2014-2018). NRIFD published several reports in Japanese (you can find them at <http://nrifd.fdma.go.jp/publication/gijutsushiryo/index.html>). Dr. Sayaka Suzuki introduced a short summary of those projects in her presentation in Operation Tomodachi: Fire Research workshop held in NIST, March 2015. You can find her presentation in NIST SP 1189 published April 2015. We will start new projects April 2016 so stay tuned!

signed: Sayaka Suzuki, NRIFD

News from the National Research Council of Canada (NRC)

Over the last five years, Canada's forest products and construction industries have worked with NRC and its partners to evaluate the performance of wood-based construction systems for mid-rise buildings five- and six-storeys in height. Instigating this research initiative, the Canadian Wood Council sought NRC's help to evaluate whether wood-based construction systems could achieve the technical performance levels required by Canada's national model building code.

Between 2010 and 2014, NRC completed a series of full-scale experiments and numerical simulations to evaluate the performance of mid-rise wood buildings in three main areas: acoustics, building envelope and fire. NRC staff



completed six fire resistance experiments and five exterior wall fire spread experiments on full-scale assemblies consisting of both lightweight frame construction and cross-laminated timber (CLT). Three full-scale fire experiments on three-storey building sections were conducted at NRC's fire laboratory in Ottawa: one constructed from lightweight wood frame elements, a second constructed from cross-laminated timber panels, and a third constructed from lightweight frame steel elements as a code-compliant baseline for comparison with the other two systems. Each of the three experiments used a realistic amount of furnishings and content items to simulate a fully-developed, unsprinklered fire in a one-bedroom apartment. All three of the wood-based construction systems achieved the level of fire performance required by Canada's current building code for noncombustible construction.

Today, over 250 five- and six-storey wood buildings have already been completed or are under construction in Canada. With Canada's new National Model Construction Codes having provisions to allow wood construction in mid-rise buildings for certain occupancies, it is expected that this number will increase...

NRC has published over 1800 pages of reports on the mid-rise wood building research project, including a summary of the fire experiments (<http://doi.org/10.4224/21274556>). For further information on NRC's research into wood building fire performance, please contact Cameron McCartney (cameron.mccartney@nrc.ca).

Fuselage Fire Test

In early November 2015, the National Research Council of Canada helped execute a full-scale aircraft fuselage fire test at the Ottawa Macdonald-Cartier International Airport that will shed important light on aircraft fires.

The test was designed both as a training exercise for emergency responders and to provide insight into fire



fuselage breach

development, emissions produced and impact on the fuselage. The data collection process required the design and fabrication of sensors, their installation within the aircraft fuselage, and then the collection and analysis of the data produced.



fire development – colour thermal video

Drawing expertise from across NRC, this test is part of an ongoing project under the NRC Aeronautical Product Development Technologies (APDT) program. The test was hosted and coordinated by the Ottawa Airport Emergency Response Services on their destructive-t raining aircraft, a decommissioned Boeing 727. Ottawa Fire Services operated a Canadian-developed firefighting unmanned ground vehicle from the Ontario Drive & Gear Limited of Kitchener, while a similar robot operated by Provectus Robotics Solutions Inc. of Ottawa carried a particulate meter into harm's way.



firefighting efforts

The test generated useful information, as well as some spectacular images. NRC staff involved included Ron Gould, Simon Hind, Sasa Muradori, Josip Cingel, Cecilia Lam, Steven Gwynne, and Michael Ryan.

For further information on this work, please contact Simon Hind (Simon.Hind@nrc-cnrc.gc.ca).

Signed: Steven Gwynne, National Research Council of Canada

News from Glasgow Caledonian University

This academic year saw the launch of the GCU Fire Risk Engineering Degree at our London Campus in Fashion Street in Spitalfields. The first cohort is made of students from London Fire Brigade, Hereford and Worcester, Fire Brigade, Network Rail, London Underground and Fire Engineering Consultancy.

The Fire Risk Engineering degree has been running successfully in Glasgow for 19 years as a BSc (Hons) degree and this year saw the programme change to a BEng (Hons) programme in both London and Glasgow.

Also this year two part time students successfully defended their PhD theses:

Paul Grimwood's theses examined the requirement for the provision of adequate firefighting water supplies, with adequate being an undefined term. As a means of establishing what an 'adequate' amount of firefighting water means, the research undertook analysis of fire-fighting water flow-rates as deployed to control and suppress over 5,000 building fires that occurred in two fire authority jurisdictions in the UK between 2009 and 2012. Dr Grimwood's research has subsequently been used to formulate international fire engineering design guidance (BS-PD7974-5:2014) to assist future building design and fire service intervention strategies and also National Operational Guidance for UK firefighters.

Bill Hay's thesis examined the suitability of current building regulation guidance, in the countries which make up the United Kingdom, pertaining to small diameter waste pipe penetrations in fire rated constructions, and in particular where the construction contained timber I-joists. Part of Dr Hay's research data was subsequently included in a conference paper at The First International Conference on Structural Safety under Fire & Blast, which took place in Glasgow, Scotland, in September 2015.

signed: Dr Iain Sanderson, School of Engineering and Built Environment

News from Case Western Reserve University

Case Western Reserve University (CWRU) is introducing a new fire science and engineering program with start-up funding from Underwriters Laboratories. Two new faculty hires include Professor Fumiaki Takahashi and Assistant Professor Ya-Ting Tseng Liao in the Department of Mechanical and Aerospace Engineering. They join Professor James T'ien in the same department and Professors David Schiraldi, Ken Ishida and Gary Wnek in the Department of Macromolecular Science and Engineering to form the core group of faculty fire researchers in CWRU.



Fumi Takahashi



Ya-Ting Tseng Liao

Dr. Takahashi, previously stationed at NASA Glenn Research Center, has ample experience on combustion fundamentals, laser diagnostics, fire suppression, protection and sensing, microgravity combustion and modeling. Dr. Liao, a graduate from CWRU and previously associated with FMC Technologies, has worked on the modeling of solid ignition, flame spread and two-phase flows.

Initial research effort of the group is on material flammability (in particular polymer), flame spreading, fire sensor, fire protection and spacecraft fire safety. In addition to research, a fire science and engineering option is created within the master degree programs in Mechanical Engineering and in Macromolecular Science and Engineering.

Signed: James T'ien, Case Western Reserve University

News from the University of Cantabria

Postgraduate studies in Fire and Egress Modeling

Between the supply of postgraduate studies at the University of Cantabria for the course 2015-2016, for the first time it has been included a Course in Fire Computer Modeling. The course will be taught so online and in Spanish. This course is very practical and allow you to get the expert mastery of several computational models of fire and evacuation, and training to meet any challenge in the professional field of fire safety. More information can be found in the websites: <http://web.unican.es/estudios/estudios-propios-de-posgrado/detalle-estudios-propios?e=2980> and <http://www.gidai.unican.es/cursoexperto/index.html#>.

EvacTunnel 3.0 presentation at the Sixth Symposium Road Tunnels

Last VI Road Tunnels Symposium organized by the ATC (Technical Road Association) brought together hundreds of professionals and experts in tunnels and underground environments. The event, sponsored by the Ministry of Public Works, with the collaboration of the Government of Aragon and the Zaragoza City Council and sponsored by various companies related to the construction and operation of tunnels.

The GIDAI Group participated in this event by a free communication on the comparison between the EvacTunnel 3.0 model and the model of the risk analysis methodology in State Road Tunnels (MARTE) proposed by the Ministry of Public Works. The results focused on forecasting the number of users of the tunnel may be victims in different fire scenarios. Free communication allowed presenting comparative advantages EvacTunnel 3.0 model such as its predictive capacity, processing speed, versatility and potential for more complex analysis.

The model EvacTunnel 3.0 is currently awaiting approval by the Ministry for use as a complementary tool in the MARTE. It can be downloaded for free at: <http://www.gidai.unican.es/Download.HTML>

Internship in the Queensland University

David Lázaro from the GIDAI Group at University of Cantabria had the opportunity to do internships in the Queensland University under the guidance of Prof. José Torero. During the stay, the PhD student has worked on several projects related to fire resistance of compartmentation systems and heat transfer and degree of isolation provided by such systems. Among the works carried out, would highlight the definition and implementation of experimental tests, and the development of a computational model by using the ANSYS software to calculate the U-Value, parameter that characterizes the insulating ability of a compartmentalization system.

Signed: Mariano Lázaro, Universidad de Cantabria



News from the Hong Kong Polytechnic University

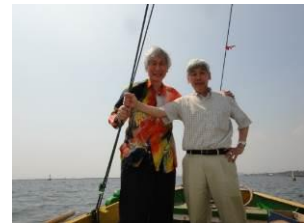
Explosion in Hong Kong

A gas explosion occurred [1] in a garage of about 200 m² for repairing liquefied petroleum gas (LPG) taxis in April 2015. This gas explosion damaged the building structures and killed some people staying inside. The fire investigation is still in progress. In addition to LPG explosion, there is also the possibility of explosion due to flammable clean refrigerants for the air-conditioning unit in the car.

With so many explosions due to fuel leakages reported in residential buildings in this part of the world, there is a need to control the activities for repairing LPG cars to avoid possible explosions. Before putting the scheme into practice, a longer-term study on explosion control of LPG and other flammable gases such as clean refrigerant commonly used in Hong Kong should be carried out.

SFPE Asia-Oceania Chapters Coordinating Group

At the Society of Fire Protection Engineers (SFPE) Asia-Oceania Chapters Exchange Meeting held in Indonesia on the 29 and 30 May 2015, Professor W.K. Chow was elected to succeed Professor Ai Sekizawa as the Chair of Asia-Oceania Chapters Coordinating Group (AOCCG).



Steering AOCCG with Professor Sekizawa

Fire Education

A total number of 33 students graduated in year 2014/15 from the MSc in Fire and Safety Engineering programme at The Hong Kong Polytechnic University with the congregation held in November 2015.

Reference:

1. South China Morning Post, "Three killed in Wong Tai Sin blast", 27 April 2015.

Signed: WK Chow, The Hong Kong Polytechnic University, Hong Kong, China

News from Imperial College London

The Imperial Hazelab has added three new members. Dr. Virginia Alonso joined the group as a postdoc and she is involved in the project N-LAYERS to conduct a holistic quantification of fire protection. She is from Spain and obtained her PhD in Fire Evacuation Modelling at the University of Cantabria. Yuqi Hu from China is a new PhD student working on emissions from peat fires. He has an MSc degree from University of Science and Technology of China (USTC). Franz Richter from Germany is also a new PhD student who is researching the pyrolysis of wood under non-uniform conditions. He has an MEng degree from Imperial College London.

The senior PhD student of Hazelab, Xinyan Huang, our expert in computational smouldering, graduated in the autumn of 2015 and moved to UC Berkeley where he has been offered a postdoc position. His poster, titled "An Experimental Study on the Spread Profiles of Smouldering Wildfires" done in collaboration with another Hazelab PhD student, Francesco Restuccia, won the *Best Poster* award at the 2nd European Symposium on Fire Safety Science in Cyprus. Xinyan has also won the award for



Fire Whirl: a series of images showing the evolution of a fire whirl - Image submitted to the ESPRC Photo Competition by E. Rackauskaite and F. Restuccia

2015 Jack Watts Outstanding Reviewer in Fire Technology.

PhD student Egle Rackauskaite has recently returned from a three-month exchange with the University of Michigan, Ann Arbor, where she worked with the group of Prof. Ann Jeffers on the development of the concept of travelling fires. This exchange was funded by the SFPE Student Research Grant. Egle's research related to travelling fires has also won the 2015 Best Fire Research Project awarded by SFPE UK.

Dr Rein has been promoted to Reader in Thermal Energy at the Department of Mechanical Engineering. Also, he was recently invited to write a commentary article on wildfire for the *Proceedings of the National Academy of Sciences*. This article provides scientific context for the understanding of how wildfires spread and explains the possible impact of new research on the field. Guillermo is also supervising an MSc student from Imperial College, Nahom Daniel, who won the Chief Donald J. Burns Memorial Research Grant awarded by the SFPE to develop a new firefighting tool called Fire Navigator. This tool will forecast the spread of a fire inside a building using sensors and building information modelling (BIM). Moreover, Guillermo delivered a keynote lecture on Timber Behaviour in Fire at the 1st European Workshop on Fire Safe Use of Bio-Based Building Products in Berlin. In addition to his research interests, Guillermo has participated in the creation of a new MSc course on Structural Fire Engineering at Imperial College London.

Signed: Izabella Vermesi, Imperial College London

News from Technical University of Denmark (DTU)

***In-situ* burning of crude oil in the Arctic**

Eirini Adamopoulou (MSc Student) and Laurens van Gelderen (PhD student) performed field experiments on the spreading, chemical herding and *in-situ* burning of crude oil on water in Sisimiut, Greenland in August as part of the DTU course Arctic Technology (<http://www.kurser.dtu.dk/11427.aspx?menulanguage=en-gb>). The experimental setup featured a 4x4 m water basin with a 5 cm water layer and filled with rocks covering a 20% of the surface area of the water. The rocks were used to simulate rigid ice on a water surface to study the interaction of objects with the spreading, herding and burning of crude oil. Crude oil (3.4 L) was poured in upwind direction on the water surface and allowed to spread for 15 min (1) after which a surfactant was added that 'pushes' the oil together to increase the slick thickness. The objects showed a clear influence on the herding process as multiple minor oil patches formed (3) in addition to the main slick (2). The main slick was successfully ignited after 30 min (4) and resulted in a burning efficiency of 71%. Further studies on the influence of ice during *in-situ* burning are being performed at the DTU Fire Lab.



Experimental steps of *in-situ* burning of crude oil on water covered with objects. Spreading of oil (1), herding of oil (2), object interaction during herding (3) and burning of the main slick (4).

Bart Merci named Otto Mønsted Guest Professor at DTU Civil Engineering

Bart Merci has been selected as the Otto Mønsted Guest Professor at DTU Civil Engineering for 2016, where he will participate in both teaching and research activities. The Otto Mønsted Professorship is a very competitive professorship at DTU and the final recommendation to the Otto Mønsted foundation is given by the President at DTU, based on the applications and rankings by the nominating department. We are thrilled to host Bart in the spring of 2016, and look forward to strengthen our collaboration with him and Ghent University.

Fire Safety Investigation Education – Experiments in enclosures

In June 2015, DTU arranged a module on Fire Patterns and Fire Investigation for the Danish National Police. Two days of theory were followed by two days of fire investigations in Revinge, Sweden (see photos below). Douglas Carpenter from Combustion, Science and Engineering (http://www.csefire.com/about_carpenter.html) participated all four days – first as an instructor during the first two days, and then as a sparring partner for the fire investigators during the practical days.



Burns were carried out in Revinge, Sweden (<https://www.msb.se/en/>). The picture to the left shows one of the fires, and the picture to the right shows two fire investigators that are examining the fire patterns after the fire.

The fire investigators had 'speed-investigations' on all four fires, followed by longer investigations for peer-review work (2 hours) and for a fire investigation report written in the new fire investigation report template used in Denmark (full day). In August, the work was presented and discussed, and the fire causes and origins were revealed, and the fire investigators had done an impressive job in finding both the cause and origin in all the fires.

Staff changes at DTU

Anne Dederichs has, after nine years at DTU Civil Engineering, sought new challenges at SP in Sweden, where she started as a Senior Research Scientist on September 1, 2015. She still holds a part-time position at DTU. During her years at DTU, Anne has been instrumental in the successful operation of our Master in Fire Safety Program (<http://www.brand.dtu.dk/>), where she was the Head of Studies, and in establishing the DTU Fire Safety Day, which was arranged for the fifth time in June. She thanks all her colleagues at and outside of DTU for a great collaboration.

As of August 1, Grunde Jomaas has taken over as Head of Studies for the Master in Fire Safety.

Signed: Grunde Jomaas, Technical University of Denmark

News from the University of Central Lancashire

Fire Toxicity Conference 2016 to gather international leaders in fire and hazard science

The University of Central Lancashire will host the three-day Fire Toxicity Conference 2016, which is an important international forum for experts from across the world to highlight research and open discussion on a variety of fire and hazard related topics.

Topics up for discussion at the 2016 gathering include lessons learned from major fire disasters, smoke toxicity and the effect of combustion conditions, clinical care of fire smoke injury, forensic investigations of fire toxicity, the physiological effect of fire toxicants, and more. Offering their insights into those topics are some of the fire prevention leaders in Europe, including Juergen Troitzsch, Fire and Environment Protection Service, Germany, Mr Peter Holland, UK Chief Fire & Rescue Advisor, and Mr Tommy Kiaer, Vice President, European Fire Fighters Unions Alliance.

To emphasise the international nature of this conference, in addition to speakers listed above, experts from the University of Leuven, Netherlands, Effectis, France, University of Waterloo, Canada, Lawrence Livermore National Laboratory and the National Institute for Occupational Safety and Health, USA, SP Technical Research Institute, Sweden and the European Commission will also deliver their latest fire hazard research findings, hypotheses and advice.

The event takes place from 21 to 23 March 2016 in Preston, United Kingdom. For more information, including the full conference programme, visit <http://firetox2016.eventbrite.co.uk>.

News from Lund University

The 12th International Symposium on Fire Safety Science will be hosted by the Department of Fire Safety Engineering June 12-16, 2017. The Department is very honoured and proud to host this event! More information can be found on the symposium page (www.iafss2017.se).

Education

On the 1st of September, Lund University welcomed the 30th class of students in our bachelor program in fire protection engineering. Our new students start a slightly modified program that will include, among other things, a greater focus than previously on structural engineering and the performance of structures in fires.

Research

There are several on-going research projects and many of them are reported in open access Lund University reports. You can access our publications through our webpage: www.brand.lth.se/publications. A short presentation of some of our on-going projects is given here.

EMRIS

Researchers at the division of Fire Safety Engineering are involved in the EMRIS project. EMRIS stands for *Emerging Risks from Smouldering Fires* and the project is aimed to improve the knowledge on the smouldering mechanisms and on properties of different relevant materials. Self-ignition will also be studied in the project as well as how the emergency management can deal with these type of fires. The project will be conducted in collaboration with University of Magdeburg, Germany and Stord/Haugesund College, Norway.

Ascending stair evacuation

A collaboration project lead by Lund University in collaboration with Brand & Riskingenjörerna AB (BRIAB) and DeBrand Sverige AB on ascending evacuation finished at the end of September. New data-sets on walking speeds and physiological data associated with human fatigue during ascending evacuation on stairs and escalators will soon be published. For more information, please contact the project leader: enrico.ronchi@brand.lth.se

FIRE TOOLS

The FIRE TOOLS project is well underway and a lot of interesting results are being analysed. FIRE TOOLS is a European Industrial Doctoral Program (EID) jointly funded by European Commission and DBI under the European Union's (EU) 7th framework program under Marie Curie Actions. The overall objective of the FIRE TOOLS project is to develop tools for obtaining the fire properties and behaviour on a continuous scale for individual products, composite products and complete systems. FIRE TOOLS will advance the state-of-the art by developing a novel methodology to be used in performance-based fire safety design. The five PhD students involved in the project have established collaboration with and conducted work at the University of Maryland, Rockwool and Fire Testing Technology (FTT). For more information, please see the project homepage: www.firetools-fp7.eu

Work in the International Standards Organization

Enrico Ronchi has initiated and is currently leading a Task Group within the ISO/TC92/SC4/WG7 of the International Standards Organization on the development of a standard for the Verification and Validation of evacuation models for fire safety engineering. For more information please contact: enrico.ronchi@brand.lth.se
The latest ISO TC92 meetings took place at NIST Maryland. Daniel Nilsson chaired the ISO TC92 SC 4 on fire safety engineering and Patrick van Hees chaired the plenary committee as chair of TC92 Fire Safety.

Appointments and awards

Marcus Runefors has been appointed Lecturer (Universitetsadjunkt) at the division. In addition to teaching, Marcus will continue his postgraduate studies at 50%. Furthermore, Nils Johansson has been appointed associate senior lecturer (Biträdande universitetslektor). Nils received his PhD degree in Fire Safety Engineering at the division in April.

Karl Fridolf successfully defended his PhD thesis: "Rail Tunnel Evacuation" on June 12, 2015. The faculty opponent was Dr. Karen Boyce, Senior Lecturer in Fire Safety Engineering, Built Environment Research Institute, School of the Built Environment, University of Ulster.

Dan Madsen is a new doctoral student that will work in the EMRIS-project. Dan has a B.Sc in Mechanical Engineering and also in Fire Protection Engineering from Lund University. Dan has worked within the process industry and as a fire consultant. Starting date was September 1.

Upcoming events

For more information, please visit the division website (www.brand.lth.se) that is continuously updated with news from the division.

Signed: Nils Johansson, Lund University

News from University of Maryland

Prof. Gollner Receives NSF CAREER Award

Michael Gollner is the recipient of a 2016 National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award for “Understanding the Mechanisms of Wildland Fire Spread.” The project’s main objective is to understand the previously-unexplored role of intermittent heating that is driven by reacting-flow instabilities on wildland fire spread, in the hope that this knowledge may lead to a testable, physical theory of wildland fire spread. The five-year award is worth \$500,000. The NSF CAREER program fosters the career development of outstanding junior faculty, combining the support of research and education of the highest quality and in the broadest sense.

Promoting Better Understanding of Fire Science in Textiles and Clothing Flammability and Burn Injury Prevention

Dr. Steven M. Spivak and co-authors have two new papers in press on textiles and clothing fire and flammability. The essence is to correct misunderstandings and erroneous textile flammability opinions and issues in the public's mind, as well as to better educate business, industry and consumers worldwide on the imminent fire risk, flammability and potential for severe burn injury wearing ordinary consumer apparel, and work wear, uniforms or career apparel. On related topics of textile flammability of clothing-wearing apparel, work wear or career apparel, contact Steven M. Spivak, Prof. Emeritus, at ss60@umd.edu or see <http://enfp.umd.edu/faculty/spivak>.

Fire Protection Engineering: New Associated Partner in Intl. M.S. Program

The University of Maryland’s (UMD) Department of Fire Protection Engineering (FPE) has joined the consortium of the [International Master of Science in Fire Safety Engineering \(IMFSE\)](#) program as an associated partner. IMFSE students will now have the opportunity to pursue their M.S. thesis research at UMD under the mentorship of FPE faculty members. To learn more about the IMFSE program, visit www.imfse.ugent.be.

UMD Startup Helps Design Highly Efficient Fire Sprinkler Systems

Custom Spray Solutions (CSS), a startup comprised of UMD faculty and alumni, is working to solve problems and help advance the performance-based design of fire sprinkler systems. Using the company’s revolutionary device—the 4S or Spatially-resolved Spray Scanning System—the team can calculate the efficiency with which fire sprinkler systems can saturate a surface. 4S generates a 3-D map of spray velocity, density, and drop size, leaving “nothing to guess,” according to Department of Fire Protection Engineering Associate Professor André W. Marshall, who is also Principal of CSS.

Marshall says that 4S gives unprecedented spray insight, and when coupled with CSS-designed software SprayVIZ, it can generate a real-time analysis of a sprinkler head’s wetting performance. SprayVIZ generates valuable information that allows users to compare similar products, nozzle placement, and other design parameters. Using SprayVIZ, it is also possible to evaluate and redesign systems that are non-standard resulting in better efficiency and performance. Another product developed by CSS is fire suppression spray nozzles developed in partnership with the international Fog Inc.

To learn more about Custom Spray Solutions, visit: www.customspraysolutions.com.

Marshall Group Fire Safety Modelling System Highlighted by SFPE

A Cyber Physical System (CPS) developed at the University of Maryland that shows first responders what a fire is doing before they ever enter a burning building has been highlighted by the Society of Fire Protection Engineers (SFPE). Department of Fire Protection Engineering (FPE) Associate Professor Andre Marshall and FPE graduate student Rosalie Wills (M.S. '15), designed the system with support from Siemens Industry, Inc. and the SFPE Foundation’s Chief Donald J. Burns Memorial Research Grant, funded by Bentley Systems, Inc.

The article explains how Marshall’s team used data from commercial sensors, data from Siemens' specially designed experimental sensor system, and Bentley’s 3D Building Information Modeling (BIM) software to visualize conditions in a full-scale experiment conducted at the Maryland Fire and Rescue Institute (MFRI). The model shows both an accurate representation of the building and dynamic fire activity within, including the temperature, size and location of the fire, carbon monoxide levels, ventilation conditions, and smoke layers. This realtime information allows firefighters to build a strategy, improve preparedness, and make decisions before entering the flames – including choosing not to if conditions are too dangerous.

Signed: Michael Gollner, University of Maryland

News from the National Institute for Standards and Technology (NIST)

NIST's Expanded National Fire Research Laboratory

The expansion of NIST's National Fire Research Laboratory (NFRL) was recently completed. The expansion will enable research on the response of real-scale structural systems to realistic fire and mechanical loading. With the expansion, the lab now has about 3800 m² (40,500 ft²) of laboratory space, a strong floor/strong wall combination to support and load components or systems to be tested, and an Emissions Control System (ECS) to treat smoke and combustion products. The function of the lab is to advance real-scale fire measurements, test the validity of physics-based fire/thermal/structural models through experiments, support fire investigations, and enable advances in performance-based fire and building codes and standards. The lab maintains four large fire calorimeters to measure the heat release rate of fires ranging from 20 kW to 20,000 kW. The expanded lab capabilities facilitate the conduct of experiments to quantify the performance of large-scale structural systems, assemblies or components, loaded mechanically to simulate in-service conditions, under realistic fire exposure. Structures, ranging in size from small components to large systems, such as buildings up to 2 stories in height and 2 bays × 3 bays in plan, can be tested under fully developed fires up to 20 MW using natural gas, liquid hydrocarbons, wood cribs, or actual building contents. Application of mechanical loads and restraint of motions using hydraulic actuators allow experiments to be conducted to the point of incipient local or global collapse. A series of experiments are being planned that will investigate the fire performance of composite floor systems in steel frame buildings. Measurements of temperature, heat flux, strain, force and displacement will be conducted to characterize the structural fire performance. Further information on research at the NFRL can be found here: http://www.nist.gov/el/fire_research/nfrl.cfm.

Smart Firefighting Roadmap

In partnership with NFPA's Fire Protection Research Foundation (FPRF) and contributing technical experts from a large number of organizations, NIST recently released Special Publication 1191, entitled "Research Roadmap for Smart Fire Fighting." The roadmap charts a path to exploit new opportunities in technology development to improve the effectiveness of fire protection and firefighting. The importance of cyber-physical systems (CPS) is emphasized, including the fusion of emerging sensor and computing technologies with building control systems, firefighting equipment, and apparatus. The Roadmap focuses on identifying the R&D needs for implementation of smart firefighting, highlighting the use of existing technologies, development and deployment of emerging technologies, and use of standards for data collection, exchange, and situational awareness tools. High-priority research challenges are identified, including the technical barriers that hinder widespread application of smart firefighting technologies and systems. The Roadmap is available at <http://dx.doi.org/10.6028/NIST.SP.1191>. For additional information about the report, contact cgrant@NFPA.org or anthony.hamins@nist.gov.

Operation Tomodachi -Fire Research

NIST's Engineering Laboratory (EL-NIST) hosted "Operation Tomodachi - Fire Research" on March 16-18, 2015 in Gaithersburg, MD USA. Tomodachi means friendship in Japanese. This workshop was organized by Dr. Samuel L. Manzello of EL-NIST in partnership with the Japan Association for Fire Science and Engineering (JAFSE). Dr. Sayaka Suzuki of the National Research Institute of Fire and Disaster (NRIFD) served as the liaison between JAFSE and EL-NIST. This activity was a formal continuation of the kickoff meeting held at EL-NIST in June, 2011. Due to the success of the kickoff meeting, EL-NIST signed a Statement of Intent with JAFSE to hold two more workshops, the first held in Tokyo in 2012 (see Manzello *et al.*, [1] for a summary of that workshop), and the second on March 16-18, 2015. The objective of the March, 2015 workshop at EL-NIST was to: (1) develop scientific knowledge and translate it to building codes and standards that will be of use to both countries to reduce the devastation caused by unwanted fires, (2) provide a forum for next generation researchers to present their work in order to develop research collaborations, (3) and allow participants a chance to visit EL-NIST's newly expanded National Fire Research Laboratory (NFRL).



Group Photo Inside NIST's NFRL taken during Operation Tomodachi - Fire Research

To this end, oral presentations were focused on two topics: Large Outdoor Fires (LOF) and Fire-Structure Interaction (FSI). Justification on why these two topics were chosen are provided elsewhere [1]. The final program included oral presentations from the following organizations in the USA: NIST, Insurance Institute for Business and Home Safety (IBHS), California Polytechnic University (CALPOLY), University of Maryland, United States Forest Service (Missoula and Madison), Simpson, Gumpert, and Heger, University of Michigan, Purdue University, Worcester Polytechnic Institute (WPI), University of Texas-Austin, and Michigan State University. Oral presentation from Japan were delivered by: National Research Institute of Fire and Disaster (NRIFD),

National Institute for Land and Infrastructure Management (NILIM), Building Research Institute (BRI), Nagoya University, Toyohashi University of Technology, Tokyo University of Science, Kajima Corporation, Hilti Japan Limited, Takenaka Corporation, Chiba University, Taisei Corporation, University of Tokyo, Hirosaki University, and Kyoto University (all organizations are listed based on the order of oral presentation). In addition, poster sessions were held in the areas of LOF and FSI, as well as two general fire safety science poster sessions. All of the presentations were documented in a recent NIST Special Publication 1189 [2]. Authors that delivered oral presentations were invited to submit papers to a special issue to provide a flavor of the state of the art research in LOF and FSI ongoing in both countries that was presented at the workshop to the broader fire safety science community. Please be sure to look for the forthcoming issue in *Fire Technology*. Please contact Samuel Manzello (samuelm@nist.gov) for more information.

References

- [1] Manzello, S.L., *et al.*, Summary of Workshop for Fire Structure Interaction and Urban and Wildland-Urban Interface (WUI) Fires – Operation Tomodachi – Fire Research, *Fire Safety Journal* 59:122-131 (2013).
- [2] Manzello, S.L. and Suzuki, S., Summary of Workshop for Fire-Structure Interaction and Large Outdoor Fires Operation Tomodachi - Fire Research, *NIST SP 1189*, 2015. (May be downloaded free of charge at: <http://dx.doi.org/10.6028/NIST.SP.1189>).

Workshop on Structure Ignition in WUI Fires

A workshop entitled *Structure Ignition in Wildland-Urban Interface (WUI) Fires* was held on June 18-19, 2015 in Anaheim, CA. The workshop was sponsored by ASTM International Committee E05, and was led by Dr. Samuel L. Manzello of the Fire Research Division, part of the National Institute of Standards and Technology's (NIST) Engineering Laboratory, and Dr. Stephen L. Quarles of the Insurance Institute for Business & Home Safety (IBHS). Wildfires that spread into communities, commonly referred to as WUI fires, are a significant problem in Australia, Europe, and the United States. WUI fire spread is extraordinarily challenging and presents an emerging problem in fire safety science. While it is accepted that WUI fires are an important societal problem, little understanding exists on how to contain and mitigate the hazard associated with such fires. From a simple point of view, the WUI fire problem can be seen as a structure ignition problem. Some building codes and standards already exist to guide construction of new structures in areas known to be prone to WUI fires in order to reduce the risk of structural ignition. These codes and standards have been developed based on best information at the time they were developed. Often this information was anecdotal. This workshop has formally begun the discussion: *based on current research, are these current codes and standards adequate?* Proven, scientifically based retrofitting strategies are required for homes, and other buildings, located in areas prone to such fires. The presentations of the workshop were separated into four topic areas: post-fire studies, structure ignition/firebrand accumulation and generation studies, WUI modeling, and evaluation of mitigation strategies.

The workshop was a success and clearly highlighted the need for better interaction between those involved in the WUI codes and standards business with researchers involved in the fire safety science field. It was apparent that many of the researchers present had no idea how codes and standards are implemented in the WUI area, even though they are engaged in WUI research. The converse was true for the codes and standards representatives: there appeared to be no idea there was so much ongoing research even though it was published in many venues. The plenary talk highlighted the deficiencies in the current WUI codes and standards, with the research presentations reinforcing these issues. The overarching issue was the lack of firebrands (embers) in the current building codes and standards, yet firebrand ignition are an accepted major structure ignition mechanism in these fires. A major result of this workshop is that is clear more such activities need to be arranged to allow transfer of research knowledge to the WUI codes and standards area. Please contact Samuel Manzello (samuelm@nist.gov) for more information.

To access the report, please see:

Manzello, S.L., and Quarles, S.L., Summary of Workshop on Structure Ignition in Wildland- Urban Interface (WUI) Fires, *NIST SP 1198*, 2015. (May be downloaded free of charge at: <http://dx.doi.org/10.6028/NIST.SP.1198>).

Signed: Samuel Manzello, NIST

News from NFPA and Fire Protection Research Foundation

Sprinkler Protection Criteria for Lithium Ion Batteries Stored in Cartons

The Foundation is conducting a multi-phase research program sponsored largely by a group of property insurers to develop guidance for the protection of lithium ion batteries in storage. The first two phases of this project, a hazard assessment and a large scale flammability characterization, were completed in 2013. The latter program provided good information on the performance of cartoned small format batteries in storage and

indications are that a practical sprinkler protection solution, similar to that used for other common stored commodities will be effective.

In order to confirm this finding, a third and final phase of the test program is now underway. This will consist of large scale testing (8-24 pallet loads) to ensure that the sprinkler system proposed will be effective in controlling the fire hazard.

Protection of Storage Under Sloped Ceilings - Phase 1

Background: There is limited prior research related to protection of storage under ceilings with slopes steeper than 2/12. Previous studies exist from FM Global, University of Maryland/Custom Spray Solutions, the Fire Protection Research Foundation, and National Fire Sprinkler Association (NFSA), but there are still many open questions related to the protection criteria for storage under sloped ceilings. The questions include, but not limited to, sprinkler activation pattern relative to fire source location, and optimal sprinkler installation orientation. There are many different parameters related to this design challenge. Some of the key parameters include the slope of the ceiling, the commodity being stored, types of sprinklers (including ESFRs), sprinkler orientation, and sprinkler spacing. Some possible protection design solutions to sloped ceiling facilities are to use higher densities or larger calculation areas than for storage under flat ceilings.

Further modeling analysis will be beneficial in order to understand the potential protection challenges related to sloped ceilings, and to determine the range of scenarios that should be studied further through testing. The information from this work as well as information gathered from testing could help inform the NFPA 13 requirements.

Research Goal: The overall goal of the project is to determine the impact of sloped ceilings on protection of storage and develop the technical basis for the NFPA 13 Technical Committees for new requirements and guidance. The objective of the first phase is to develop a test plan based on the review of current range of typical storage configurations and modeling. [Download the project summary.](#)

New report: Fire Department Connection (FDC) Inlet Flow Assessment

This Research Foundation report is the result of tests evaluating the actual flow that can be achieved from 2.5 inch (6.35 cm) fire department connection (FDC) inlet. A Fire Department Connection (FDC) is "A connection through which the fire department can supplemental water into the sprinkler system, standpipe, or other system, furnishing water for fire extinguishment to supplement existing water supplies." FDCs are required on all standpipe systems per *NFPA 14, Standard for the Installation of Standpipe and Hose Systems*, and sprinkler systems per *NFPA 13, Standard for the Installation of Sprinkler Systems*.

In 2007, the Technical Committee for NFPA 14 added the requirement for one 2-½-inch inlet per 250 gallons per minute (946 liters per minute), but this requirement lacks supporting scientific documentation, so there was a need to conduct flow testing to determine the amount of water that is possible to flow into an FDC inlet.

The overriding goal of this research project was to provide a technical basis to the NFPA 14 Technical Committee for a possible change to the standard. The new report documenting the testing has been published by the Fire Protection Research Foundation, titled, "[Fire Department Connection \(FDC\) Inlet Flow Assessment](#)" and authored by Y. Pock Utiskul, Ph.D., Neil P. Wu, P.E., and Elizabeth Keller, all with Exponent, Inc. A full listing of project observations as they relate to the current NFPA guidance is provided in Section 8 of this report. [Download the full report, for free, from the Foundation website.](#)

New report: Smoke Alarm Nuisance Source Characterizations: Experimental Results

During the revision cycle for the 2010 edition of *NFPA 72, National Fire Alarm and Signaling Code*, the Technical Committee on Single- and Multiple-Station Alarms and Household Fire Alarm Systems (SIG-HOU) focused renewed attention on nuisance alarms. Based on the information in the NFPA report "Smoke Alarms in U.S. Home Fires" authored by Marty Ahrens, during the development of the 2013 edition of *NFPA 72* the SIG-HOU Technical Committee added several new provisions to Chapter 29 to further reduce nuisance alarms. At present there is a lack of characterization of common nuisance sources for the development of new performance test protocols. Accordingly, the Foundation initiated a project to work toward characterizing common nuisance sources for the development of new test protocols to meet the *NFPA 72* requirements. This Phase 2 project involved collecting data to characterize nuisance sources from cooking and steam/water mist and comparing the nuisance source data to existing fire test data.

Download the [executive summary for this report](#). See the related report, "[Smoke Alarm Nuisance Source Characterization: Phase 1](#)"

Signed: Kathleen Almand, NFPA

News from AECOM

Collaboration with the University of Greenwich, UK

Charlie Hopkin, a graduate fire engineer working at AECOM St Albans, UK and part-time PhD student with the University of Greenwich, has co-authored a conference paper with Professor Ed Galea and Dr Steven Deere of the Fire Safety Engineering Group (FSEG). The paper, entitled '*A Study of Response Behaviour in a Theatre during a Live Performance*', presents the results of an unannounced theatre evacuation of 1200 people, and in particular focuses on response phase behaviour. Key findings of the work indicate that occupant response time follows a log-normal distribution and is strongly related to the geometrical position of the theatre occupants, where response time was found to increase relative to distance (seating location) from exit aisles and exit rows. The findings of the paper were presented by Professor Ed Galea on the 29 September at the Human Behaviour in Fire Symposium 2015.

Structural Fire Workshop

In September, AECOM hosted a structural fire engineering workshop which was facilitated with the support of The University of Edinburgh and Impact Acceleration funding from the EPSRC (Engineering and Physical Sciences Research Council). The purpose of the workshop was to promote knowledge share between AECOM and academic institutions currently active within the field of structural fire engineering. There were a wide range of presentations on the day including project examples from AECOM looking at alternative approaches to defining the requirements for passive fire protection in differing building types. Representatives from Imperial College London, The University of Edinburgh, The University of Manchester and The University of Sheffield were all in attendance and provided a wide range of interesting and exciting presentations ranging from The Use of Recycled Polymer Fibres to Mitigate Spalling [Dr. Shan-Shan Huang, Sheffield] to The Effect of Eccentric and Fire Loading on Punching Shear [Rwayda Al-Hamd, Manchester]. Active discussions throughout the day were the highlight and, AECOM and its academic partners are all looking forward to many more similar events in the future.

Visit to University of Technology, Johor Bahru, Malaysia.

In July, Joanne Knox of AECOM Qatar visited Dr Mariyana Ab Kadir at the University of Technology, Johor Bahru, Malaysia. Whilst there, she gave a knowledge-sharing seminar to members of the Civil Engineering department – academics and students. This included information on the research she carried out at the University of Edinburgh from 2007 to 2012, on finite element modelling of the changes in concrete's material properties at high temperatures. Then she spoke about her career since graduating – working as a fire engineer at AECOM. Having worked in both St Albans, UK and Doha, Qatar, this part of the talk reflected on the differences between working in a country where performance based design is the norm, and somewhere where code compliance is key. This included examples of projects that AECOM have worked on recently in both the UK and the Middle East. Following the seminar there was a lunch with the department and a tour of the Civil Engineering facilities, including their fire test furnace. That evening Dr Mariyana was able to show Joanne around Johor Bahru – looking across the Johor Strait to Singapore and enjoying traditional steamboat style food.



Joanne Knox at the University of Technology, Johor Bahru, Malaysia

New Starter

Eugenio Garcia, who has just joined the AECOM St Albans, UK office as a Graduate Fire Engineer, completed his MSc Dissertation titled '*Advanced Computational Simulation of Fire Performance and External Spread on Multi-storey Facades*', under the supervision of Dr Weiming Liu at the University of Central Lancashire (UCLan). This included reviewing the deficiencies in the current UK methodologies to assess facade fire performance, comparison of Igor Oleszkiewicz's full-scale experimental testing with CFD simulation predictions, and analysing the effects on fire performance and spread of several facade systems, materials and safety features (ventilated versus non-ventilated facades, insulation combustibility, glazing type, fire-stopping, etc.).

Signed: Roger Harrison, AECOM UK

News from the University of Queensland

New Fire Programme

In 2016, the School of Civil Engineering will launch a new BE-ME program in Civil Engineering and Fire Safety Engineering. This combined degree will introduce five new classes into the fourth and fifth years of study at the University of Queensland. The new courses on offer are:

- Fire Engineering Design: Solutions for Implicit Safety;
- Fire Dynamics;

- Structural Fire Engineering;
- Fire Engineering Design: Explicit Quantification of Safety;
- Fire Dynamics Laboratory.

In addition, to obtain the BE-ME, students will be required to take an eight-unit Research Thesis in the area of Fire Safety Engineering. All courses will be delivered by UQ staff: Professor Jose Torero, Dr Angus Law, and Dr Cristian Maluk. More information about Fire Safety Engineering at the University of Queensland can be found at www.civil.uq.edu.au/fire.

New SFPE Student Chapter

In October 2014, SFPE formalized a University Chapter started by current fire students at the University of Queensland. The induction of the chapter marked the first SFPE Chapter in Australia. The chapter is comprised of current fire research undergraduates and postgraduates as well as students in the new Fire Safety Engineering BE/ME. The chapter continues to keep strong ties with UQ-SFPE alumni working in industry.

One of UQ-SFPE's main objectives is to provide continued education outside of the classroom and to promote interaction between industry professionals and current students. A primary way this is accomplished is through a popular seminar series. Professor José Torero (Head of School, UQ Civil Engineering) delivered the inaugural lecture in 2014—a presentation entitled “Fire Safety Engineering: Profession, Occupation, or Trade?” Employees from Brisbane engineering firms, fire fighters from Queensland Fire and Emergency Services (QFES), and numerous interdisciplinary students as well as members from the Society of Fire Safety (SFS) attended the event.

To date, speakers have included:

- Dr. Jonathan Barnett (Technical Director for RED Fire Engineers), who delivered his 100th lecture on the events of 9/11 and the Building Performance Study that was completed by him and a core group of other selected members;
- Dr. Rory Hadden (Rushbrook Lecturer in Fire Investigation at the University of Edinburgh), who spoke on standard and non-standard exposures and their influence on charring rates as well as the suitability of their use in design;
- Peter Johnson (Arup Fellow), who spoke on his professional life as a fire safety engineer and various projects he worked on in the past;
- Dr. Michael Woodrow (Foster+Partners), who presented his role as a fire safety engineer in one of the most recognized architecture companies in the world;
- Ted Simmonds (Queensland Fire and Emergency Service), who presented several case studies highlighting the need to consider fire service intervention and operations within the design of the building ; and
- Arne Inghelbrecht (New Zealand Fire Service), who spoke on the New Zealand Fire Service's perspective on building design as well as pros and cons of the Verification Method of fire safety.

The UQ-SFPE events to date have been extremely popular and with the newly created BE/ME in Fire Safety Engineering the attendance should only increase as the popularity of fire engineering has risen on campus. Further events and educational activities will be planned for 2016 as the first BE/ME students are enrolled.

Signed: Angus Law, University of Queensland

News from the University of Canterbury

It is now five years since the first of the main earthquake shocks hit the Canterbury region and the University but recovery is now well on its way.

We have now relocated back into our offices after almost 18 months in temporary accommodation. The next step is to move much of our experimental equipment to another building so that construction can begin on the new fire engineering laboratory wing. In the meantime the main engineering building is being expanded to include a new two-storey atrium space, new chemical engineering laboratories and much more. While all this is happening the day-to-day teaching and research carries on.



Construction of the engineering core gathers pace with some of the steel frame erected and the roof about to go on the Chemical Engineering wing.



Experiment on the post-fire stability of external walls

We are collaborating closely with BRANZ on a number of projects including experiments on the post-fire stability of external residential garage walls and fires in compartments that are partially lined with untreated timber. In that set of experiments, a garage unit was constructed on top of the standard furnace in its floor orientation.

Other current research projects include 1:20 tunnel experiments, developing a bench-scale smoke explosion apparatus and a project that is using various ranking methods to identify how

stakeholders view their selection of passive protection systems for steel-framed buildings. Due to the length of the tunnel the laboratory space was extended by adding a temporary cover into the neighbouring parking spaces.



1:20 scale tunnel experiments.

Signed: Michael Spearpoint, University of Canterbury

News from the University of North Carolina at Charlotte (UNC Charlotte)

UNC Charlotte offers a Bachelor of Science program in Fire Safety Engineering Technology (FSET, with concentrations in Fire Safety and Fire Protection) and a graduate program in Master of Fire Protection and Administration (MFPA, with concentrations in Fire Protection and Fire Administration). More information about the FSET program can be found at <http://et.uncc.edu/undergraduate-programs/fire-safety-engineering-technology>. More information about the MFPA program can be found at: <http://et.uncc.edu/graduate-programs/master-fire-protection-administration>.

New Fire Research Projects at UNC Charlotte

Fire Ember Production from Wildland and Structural Fuels: Sponsored by the Joint Fire Science Program (JFSP), the purpose of this project is to investigate fire ember production from selected burning wildland and structural (construction materials) fuels under a range of environmental conditions through full-, intermediate- and small-scale laboratory experiments. The leading PI for this project is Dr. Aixi Zhou at UNC Charlotte. The partnering researchers are Dr. Stephen Quarles from the Institute for Business and Home Safety, Dr. David Weise at the Pacific Southwest Research Station of the U.S. Forest Service, Prof. Ofodike Ezekoye at the University of Texas; Prof. Michael Gollner at the University of Maryland, Mr. Casey Grant at the Fire Protection Research Foundation, and Prof. Alan Long from the JFSP Southern Fire Exchange. See more information at: <http://inside.uncc.edu/news-features/2015-08-11/fire-safety-researcher-leading-new-study-wind-blown-fire-embers>.

Ignition of Attic Insulation Materials subjected to Burning Fire Embers: An estimated 30 deaths, 125 injuries, and \$477 million direct property loss resulted from an estimated 10,000 residential building attic fires each year in the U.S. Attics are commonly not occupied and thus usually do not have smoke alarms or heat detectors. The location of the attic adds many more challenges for firefighters when suppressing the fire. Therefore, attic fires are very dangerous for both residents and firefighters. Insulation materials accounted for 36% of the first items ignited in attic fires. Among all ignition sources, more than 20% attributed to heat from embers or smoldering objects. The objective of this project is to examine the ignition of PU foam insulation materials subjected to heat from burning fire embers. The project is sponsored by ICL Industrial Products. The PI for this project is Dr. Aixi Zhou.

Collaboration between UNC Charlotte and the Institute for Business and Home Safety (IBHS)

Effect of Weathering on the Performance of Fire Retardant Coatings: The use of ignition-resistant materials on the exterior of structures for fire protection in the Wildland-Urban Interface (WUI) has been recommended and practiced. However, the effect of weathering on the long-term performance of these ignition-resistant materials is not yet known. One concern is that weathering may reduce the ignition resistance of the layer. Another concern is that after weathering, some ignition-resistant materials may contribute as a flammable fuel to the ignition and fire spread of the structure. Thus, it is desirable that the effect of weathering on the fire performance of these ignition-resistant materials should be evaluated. Dr. Aixi Zhou at UNC Charlotte is collaborating with Dr. Stephen Quarles at IBHS in investigating the effect of weathering on the fire protection effectiveness of some selected ignition-resistant materials (fire retardant intumescent coatings and penetrants for wood). About 1,000 samples will be tested over the course of the anticipated five-year project. The specimens will be weathered at IBHS' outdoor weathering station and tested at UNC Charlotte's Materials

Flammability Laboratory at predetermined weathering duration intervals. Basic flammability data will be collected, analyzed, and compared with available data from the open literature and private sources.

Fire Safety Student Organization Activities at UNC Charlotte

The Society of Fire Protection Engineers (SFPE) Student Chapter at UNC Charlotte was established in 2013. Click [here](#) for more details from the SFPE Blog. The chapter had their Fire Awareness Event on campus in April 2015, where they set up a table and handed out fire safety sheets, and had CFAST and FDS fire modeling demonstrations. The chapter has connected with the SFPE Carolinas Chapter as well as many guest speakers from the fire and safety industry, such as Aon Fire Protection and AIG. Chapter members also volunteered to [share with new Fire Safety students learning about the program](#) on the university's Day of Convocation on August 24, 2015. The chapter's web site is at: <https://orgsync.com/85347/chapter>.

The UNC Charlotte FAST (Fire and Safety Technologist) student organization has been actively involved in many on-campus activities. The FAST Facebook page can be found at: <https://www.facebook.com/UNC-Charlotte-FAST-1502648803296149/timeline/>.

UNC Charlotte's SFPE and FAST performed a live burn demonstration on campus in October to raise the awareness of the effectiveness of automatic sprinklers in residential fire safety. More details about this event will be provided in next news update.

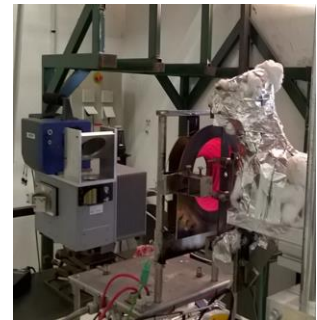
Signed: Aixi Zhou, UNC Charlotte

News From Hestia Platform, Prime Institute – Poitiers – France

France is now at a major turning point of fire safety management in dwelling, buildings, industry and transportation, until now based on a regulatory approach. However, numerous organisations nowadays seek to develop, a performance based approach to manage fire risks in an integrated way. Pprime Institute (University of Poitiers - ISEA/ENSMA), through its fire safety platform, Hestia, is a leading player of this change, providing a strong link between research, industry and public authorities. The news below describes some of the current collaborations as well as team's highlights for 2015-2016.

Evolution of radiative properties of material in cone calorimeter

In February 2015, within the context of different research projects, an experimental campaign has been led at Pprime Institute with the LEMTA (Nancy) in order to determine the evolution over time of materials' radiative properties when exposed to fire. Tests on different materials have been performed using vertically oriented cone calorimeter coupled to infra-red multi spectrum camera and infra-red spectrometer oriented towards the exposed face of the sample. Meanwhile an infra-red camera was measuring the temperature backwards. Main objective of this study is to obtain scalable radiative properties of materials during their thermal decomposition and combustion, which could be used in numerical calculations to improve their accuracy.



Research on dwellings and multi-compartment fires

- Several works integrating numerous partners are in progress on dwelling fires. For several years, Poujoulat Company (duct, chimney manufacturer) and the CERIC laboratory (independent lab for chimney standardization) work beside the Platform Hestia to understand soot/chimney fires. In this context, a former trainee, Pierre Cremona, begins his PhD. on the issue of the creosote accumulation and its ignition in ducts.
- Introduced by the Paris fire brigade, Democrite project aims to predict the evolution of the fires in an urban scale. Calyxis (association focused on domestic risks) supports the Hestia Platform researchers in obtaining a better understanding of the fire spread between housing compartments. This study is jointly led by Huy Quang Dong (post-doctoral), and Simon Roblin (PhD. student) whom expertise rests on solid fuels auto-ignition modelling towards CFD calculations.
- Besides, the MAIF Foundation (French insurer group) introduced another study on the dwelling fire spread which is led in Pprime Institute by Khac-Tien Nguyen (post-doctoral).

Fire research for the fire services... and fire services for the fire research!

In a previous newsletter, we had tackled our activity beside the LEMTA and the Vendée fire department, with aim of improving health and safety in shipping containers as fire compartment behaviour trainings and, by extension, in operation. This work, carried out for three years by all the mentioned actors, was opened in November 2014 to the community of the French and Belgian civil safety by means of a seminar on the fire

brigades' trainings. Approximately 250 people attended this event (firefighters, researchers, protective clothes manufacturers and students). These trials are also beneficial to the scientific community, as a paper had already been published by the LEMTA on the radiative properties of protective jackets and another one had been presented during a poster session in the 2nd ESFSS in Cyprus in June 2015.

2015-2016 highlights

- Two PhD. defences were planned for the end of 2015. Etienne Mathis worked in collaboration with Areva on smoke re-ignition issues in air ducts in the nuclear industry. Fabien Hermouet worked on the solid decomposition on materials used in the field of the automobile in tunnel fire related conditions. Straddling experiment and numerical modelling, its study allows a better description of fire development and will allow improving models used in tunnel emergency devices design. This study is lead in collaboration with the CETU ("Centre d'ETude des Tunnels") and the LNE ("Laboratoire National de métrologie et d'Essais").
- This year, seven trainees had come strengthen the team for punctual works. From two-year technical Degree to Masters Students, all were able to bring successful conclusions for the entrusted works, in an autonomous way. We greet them and wish them success for the defences to come and the future years.
- For the third Year, IRIAF (« Institut des Risques Industriels Assurantiels et Financiers ») component of Poitiers University, offer to its risk management students the opportunity to specialize in fire safety engineering. Student receives the basis of fire safety research methodology in learning about fluid mechanics, turbulence, thermodynamic, homogenous and heterogeneous combustion, etc.



The objective of the formation is to provide them the right methodology and tools to be able to manage fire safety issues, in terms of prevention and protection, in leading fire safety analysis in their future works. We wish them a good school year!

To finish, congrats to Thomas Rogaume, head of the Hestia Platform, who will take a new function of "Professeur" at Poitiers University.

Signed: Simon Roblin, Fabien Hermouet, Thomas Rogaume

UPDATES ON WILDLAND FIRE RESEARCH

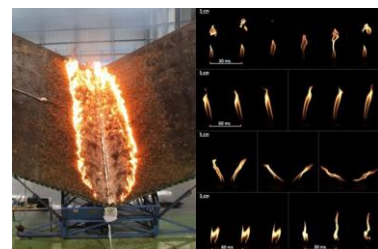
Mark Finney from the Missoula Fire Sciences Laboratory, Professor Michael Gollner of the University of Maryland, Kozo Saito from the University of Kentucky and colleagues recently published a paper on what was, perhaps, the first big breakthrough in decades in understanding how wildfires spread. The paper, entitled "Role of buoyant flame dynamics in wildland spread," was published in the *Proceedings of the National Academy of Sciences*. Co-authors included Jack Cohen, Jason Forthofer and Sara McAllister of the Missoula Fire Sciences Laboratory, Daniel Gorham of the University of Maryland, and Kozo Saito, Nelson Akafuah, Brittany Adam and Justin English of the University of Kentucky. The open access article can be found at <http://www.pnas.org/content/112/32/9833>. Photos of flame vortex circulations and forward flame bursts through flame troughs in wildfires from the study are shown on the cover of this newsletter. The work is described in more detail below, in a piece authored by Guillermo Rein and Naian Liu, which is reproduced with permission from the Combustion Institute.

Fire Science is in Season

Reproduced with permission from <https://www.combustioninstitute.org/News/indexNewsDetails.php?details=149>

*Guillermo Rein, Imperial College London, UK
Naian Liu, University of Science and Technology, China*

Wildfires in the United States this season are raging in California and other regions. Thousands of people have been evacuated from their communities, their homes lost. Millions of hectares of forest have burned. Countries in the southern hemisphere such as Australia and South Africa are preparing for what government agencies expect to be a severe brushfire season. Billions of U.S. dollars are spent annually around the world to fight wildfires.



Particularly large firefighting budgets are approved in the United States, Australia, Canada, China and the European Union.

But let's start with the broad context to the wildfire problem borrowing ideas from (Rein 2015). Fire is a natural phenomenon. It contributed to shaping most ecosystems on Earth and plays essential roles supporting life through the regulation of atmospheric oxygen, the carbon cycle, and the climate. However, wildfire is also a hazard to life, and when it threatens human populations or valuable ecosystems, it must be suppressed.

Despite its central importance to the planet and to humanity, our understanding of fire remains limited. For example, we currently cannot predict the location of a fire in 30 minutes time. To quote Prof HC Hottel at MIT (1984): "A case can be made for fire being, next to the life processes, the most complex of phenomena to understand". It comes as no surprise, then, that the discipline of fire science is less mature than other combustion topics.

Fire has been a topic of interest to the Combustion Institute since its foundation in 1954. For the combustion expert, wildfires are large-scale turbulent non-premixed flames fed by pyrolysis of a condensed-phase natural fuel. Historical contributions from combustion research have been especially important in understanding ignition and flame spread of natural fuels, flame radiation and emissions. Recent contributions include work published in *Combustion and Flame* or *Proceedings of the Combustion Institute* on flame spread over porous fuel beds (Liu et al. 2014), wildfire radiation (Cruz et al. 2011), forecasting wildfire dynamics (Rochoux et al. 2013), thermofluids of fire whirls (Lei et al. 2015) and heterogeneous chemistry of smoldering wildfires (Huang and Rein 2014).

We must highlight the most recent contribution of combustion science to wildfires. The work of Finney et al. (2015) just published in PNAS is a scientific breakthrough. Finney et al. have discovered the long-missing piece of the puzzle to understand wildfire dynamics.

For the first time, their work puts forward a fundamental, comprehensive and verifiable theory of flaming wildfire spread. Finney's theory relates the rate of spread to basic fluid mechanics and heat transfer, and it is strongly supported by laboratory measurements and field observations.

We expect Finney's theory to have a profound impact in the field. Once implemented into a new fire spread model, the theory would improve predictions of fire behavior and help them gain in both accuracy and consistency. This in turn would allow the simulations used by the Fire Service worldwide to provide more reliable information for deployment and disaster management of fire incidents.

Combustion science is an essential enabler of understanding of wildfire dynamics. It is expected that by strengthening the importance of fundamental knowledge and by growing the fire community in the Combustion Institute, combustion science will serve as the basis for tackling wildfires.

Images: (Left) Flame spread experiment over an artificial inclined canyon. Photo by JR Raposo (Laboratory for Forest Fire Studies - LEIF, Coimbra, Portugal) 2014. (Right) Combination of high-speed imaging shots shows the formation of a 1kW fire whirl under different angular speeds. Image by J Lei (SKLFS, China) 2014.

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CONFERENCE REPORTS

10th Asia-Oceania Symposium on Fire Science and Technology – 5-7 October 2015, Tsukuba, Japan

The 10th Asia-Oceania Symposium on Fire Science and Technology (10th AOSFST) was held in Tsukuba, Japan, 5-7 October 2015. The symposium was jointly hosted by the Building Research Institute (BRI), the Japan Association for Fire Science and Engineering (JAFSE), and Tokyo University of Science (TUS), and was supported by the National Research Institute of Fire and Disaster (NRIFD) and the National Institute for Land and Infrastructure Management (NILIM). About 250 registrants attended three parallel sessions in which 94 peer-reviewed papers and six invited lectures were presented. Also, one poster session was held at the symposium in which 61 posters were displayed.



Plenary lecture by Prof. Andrew Buchanan

Delegates from 15 countries and regions were presented: Australia, Canada, China, France, Hong Kong, Indonesia, New Zealand, Japan, Russia, Singapore, Sweden, South Korea, Taiwan, the United Kingdom, and the United States of America.

The opening ceremony was conducted by representatives from the host country and AOAFST/IAFSS: Professor Wan-Ki Chow, president of AOAFST, presented the greetings, Professor Patrick van Hees, president of IAFSS, made remarks, and local organizers give welcome speeches.

Following the opening ceremony, Professor Andrew Buchanan from the University of Canterbury delivered a plenary lecture entitled “Fire Resistance of Multi-story Timber Buildings”. Five other invited lectures were also presented during the symposium.

1. Prof. Hiroyuki Suzuki (Tsukuba Univ.): Ultimate Strength and Its Application to Post-Earthquake Fire Resistance of Steel Frames in Fire
2. Prof. Yulianto Sulisty Nugroho (Universitas Indonesia): Integrating Wildland and Urban Fire Risks in Local Development Strategies in Indonesia
3. Prof. Jinhua Sun (University of Science and Technology of China): Thermal analysis and flame spread behavior of building-used thermal insulation materials
4. Prof. Wan-Ki Chow (Hong Kong Polytechnic University): A Discussion on Tall Building Fire Safety in the Asia-Oceania Regions
5. Prof. Brian Meacham (Worcester Polytechnic Institute): Towards a Risk-Informed Performance-Based Approach for Post-Earthquake Fire Protection Design of Buildings

Prior to the banquet, the Hirano Memorial Session was held by Professors Ritsu Dobashi, Kazunori Kuwana, and Lijing Gao. Professors Wan-Ki Chow, Bogdan Dlugogorski, and Jinhua Sun conveyed their sympathies for the great loss of one of important founders of AOAFST.

At the awards reception during the banquet, Professor Naian Liu, Chair of the Symposium Awards Committee, presented the Lifetime Contribution Award to three delegated leaders in fire science and technology in Asia-Oceania district: Professors Wan-Ki Chow (Hong-Kong Polytechnic Univ.), Takeyoshi Tanaka (Kyoto Univ.), and Yuji Hasemi (Waseda Univ.).

At the closing ceremony, excellent paper awards, excellent student paper awards, and excellent poster awards were presented. The IAFSS contribute the prize of money for excellent paper awards.

The award committee selected excellent papers and excellent student papers by voting. The recipients of excellent paper awards were:

1. Heisuke Yamashita, Toru Yoshida, and Takeo Hirashima. Influence of Water Content on Total Strain of Super-high-strength Concrete Under Elevated Temperature (Japan Testing Center for Construction Materials)
2. Yichul Shin, Yoshifumi Ohmiya, Shin-Ichi Tsuburaya, Yuki Yoshida, Kazumasa Tashima, and Jun-ichi Suzuki. Study on Fire Plume Behavior in Vertical Shafts of Buildings (Tokyo University of Science)
3. Tatyana Bolshova, Sergey Yakush, Vladimir Shvartsberg, Andrey Shmakov, Oleg Korobeinichev, and Anatoly Chernov. Development and Validation of Skeletal Mechanism for Flame Inhibition by Trimethylphosphate (Institute of Chemical Kinetics and Combustion, Russia)
4. Charles Fleischmann. Defining the Heat Release Rate per Unit Area for Use in Fire Safety Engineering Analysis (University of Canterbury, NZ)

The recipients of excellent student paper awards were:

1. Wei Gao, Naian Liu, Xieshang Yuan, Yueling Bai, Linhe Zhang, and Koyu Satoh. Neutral Plane and Length Scale of Spill Fire Plume Considering the Effects of Cross-Ventilation (SKLFS, USTC, China)
2. Toichiro Okawa, Wataru Ebina, Hiroyoshi Naito, and Akira Yoshida. Inhibition of Propane/Air Premixed Flame by Water Mist, (Tokyo Denki University)
3. Fietrysia Leonita, Harfan Sakti, and Yulianto Sulisty Nugroho, Study of the Overall Movement Speed on Medium and High-Rise Buildings in Indonesia (Universitas Indonesia)

Excellent poster awards were decided in terms of the on-site performance of the poster presentations. Ballots were collected from all participants during the Poster Session. Final decisions were made by the ballots for each poster. The recipients were:

1. Supan Wang, Xinyan Huang, Haixiang Chen, Naian Liu, and Guillermo Rein, Expandable Polystyrene Foam Spot Fire Ignition by Hot Metal Particle (SKLFS, USTC, China)
2. Ken Mizutani, Kyosuke Miyamoto, Nozomu Hashimoto, and Osamu Fujita, Comparison of Limiting Oxygen Concentrations of Spreading Flame over Different Electric Wire Insulations in Microgravity (Hokkaido University, Japan)
3. Cheng-Chun Lin and Liangzhu (Leon) Wang, Real-Time Forecasting of Building Fires Using Data Assimilation (Concordia University, Canada)
4. Ping Ping, Qingsong Wang and Jinhua Sun, Study of the Fire Behavior of High-Energy Lithium-Ion Batteries with Full-Scale Burning Test (SKLFS, USTC, China)

After the symposium was over successfully, the one-day technical tour was held. About 80 participants visited the fire test facilities in BRI and TUS. It was very exciting and good experience for all.

The proceedings of the symposium will be published as E-book around May, 2016. During the finalization process of manuscripts, IAFSS supported the English mentor process for non-English native authors. The voluntary assistance is greatly acknowledged.

The next AOSFST (11th AOSFST) will be held at Taiwan in 2018.

Signed: Ichiro Hagiwara, Building Research Institute

2nd European Symposium of Fire Safety Science - update

The 2nd European Symposium on Fire Safety Science was held in Nicosia, Cyprus in June 2015, with approximately 120 participants from 19 different countries, five keynote lectures, a poster session and a discussion forum on the keynote lecture topics. The program committee, chaired by Prof Bart Merci (Ghent University, Belgium), invited the following keynote speakers:

- Dr. Guy Marlair (INERIS, France): 'Fire Hazards with New Energy Carriers'
- Dr. Bert Yu (FM Global, US) 'Fire Extinguishment in Large Facilities'
- Prof Stefan Svensson (Lund University, Sweden): 'Fire Research for the Fire Service'
- Prof Domingos Viegas (University of Coimbra, Portugal): 'Forest Fire Research'
- Prof Luke Bisby (The University of Edinburgh, UK): 'Probabilistic Structural Fire Engineering'



IAFSS provided financial support to grant three 'Best Poster Awards' of US \$500 each to: Mr. Xinyan Huang (Imperial College, UK), for his poster on smouldering peat fires; Dr. Juan Hidalgo (The University of Edinburgh, UK), for his poster on thermal barriers for combustible insulation materials, and Dr. Jorge Raposo (University of

Coímbra, Portugal), for his poster on experiments and numerical simulations of fire spread across fuel breaks in a ridge in the context of forest fires.

A selection of papers from the conference proceedings is undergoing the regular review process for possible publication in a Special Issue of the journal 'Fire Technology', devoted to the symposium.

Bart Merci (Ghent University, Belgium) and George Boustras (European University of Cyprus)

UPCOMING CONFERENCES

8th International Seminar on Fire and Explosion Hazards (8th ISFEH) – 25-28 April 2016, Hefei, China

We are pleased to announce that 8th International Seminar on Fire and Explosion Hazards (8th ISFEH) will be held in Hefei, China from 25 to 28 April 2016. This seminar is hosted by the State Key Laboratory of Fire Science (SKLFS) from the University of Science and Technology of China (USTC). The ISFEH has been organized since 1995, and the previous seminars were successfully held respectively in Moscow (1995, 1997), Lake Windermere (2000), Londonderry (2003), Edinburgh (2007), Leeds (2010), and Providence (2013). Please visit the symposium website at <http://www.isfeh.org.cn> for more information.

Papers were invited in all areas of fire or explosion research, including the following topical areas: compartment, tunnel, and mine fires; fire dynamics; flame spread and growth; ignition and extinction; pyrolysis and fire chemistry; suppression and mitigation; wildland fires; blast analysis and mitigation; deflagration and flame acceleration; deflagration venting; detonation and DDT; dust explosions; and hydrogen safety.

The 8th ISFEH will include invited lectures from the world's top fire and explosion hazards researchers and presentations of peer-reviewed papers. All accepted and presented papers will be included in the seminar proceedings, which will be published by the Press of USTC. Poster sessions will provide an excellent opportunity to interact individually with researchers about their most recent work. Students are encouraged to participate and awards will be made. In addition to the technical sessions, colorful social activities are planned to provide opportunities for participants to meet with other colleagues and friends from around the world. The four-day symposium is a good platform for all of us who are interested in fire and explosion hazards science and technology to share our new ideas and recent research findings. It is our goal to make this seminar both enjoyable and informative for everyone.

The venue of the Seminar will be at the Crowne Plaza Hotel, which is located in the downtown area of Hefei, the capital city of the state of Anhui, China. Hefei is an ancient city over 2000 years old with historic and cultural landscapes located at the shore of Chaohu Lake, one of the five largest freshwater lakes in China. It was awarded "Best Case City in Urban Competitiveness" in 2010 and "Top 10 Happiest Cities in China" in 2011. It is a lovely and attractive place to visit. There are also many famous landmarks in Anhui Province, including Yellow Mountain, the most beautiful mountain in China, and Jiuhua Mountain, one of the four sacred mountains of Chinese Buddhism. Moreover, the local opera (Huangmei opera) and culinary enjoyments shouldn't be missed.

Please join us at the 8th ISFEH and enjoy academic collaboration as well as a beautiful/comfortable autumn in Hefei, China. Early registration until March 1, 2016. For details, please see the attached flyer as well as the Seminar website (<http://www.isfeh.org.cn>). We hope to see you in 2016!

Seminar Secretariat: Prof. Jie Ji, Contact E-mail: isfeh@ustc.edu.cn

Signed: Naian Liu, Co-Chair of 8th ISFEH.

Suppression, Detection and Signaling Research and Applications Symposium (SupDet 2016) – 1-4 March 2016, San Antonio, TX, USA

We invite you to join us at the *Fire Suppression, Detection and Signaling Research and Applications Symposium* (SupDet 2016) March 1-4, 2016 in San Antonio, Texas. SupDet 2016 will address the latest developments in research, technology, and applications for the fire protection community. A free half-day workshop on "Big Data and Fire Protection Systems" is open to all attendees, Wed. March 2, 1-5 pm at the symposium site. For additional details and program visit: www.nfpa.org/supdet2016.

On the afternoon of Monday, February 29th, there will be an opportunity for SupDet participants to tour the Fire Technology Department at Southwest Research Institute (SwRI). The tour will take place at 3pm and participants will need to arrange their own transportation.

If you are interested in the tour or have any other questions, please email Eric Peterson (epeterson@nfpf.org) at the Foundation.

Signed: Eric Peterson, Fire Protection Research Foundation

UPCOMING WORKSHOP

Call for Participation in the First Workshop Organized by the IAFSS Working Group on Measurement and Computation of Fire Phenomena

A new initiative, endorsed and supported by the International Association for Fire Safety Science has been launched: “the IAFSS Working Group on Measurement and Computation of Fire Phenomena” (or the MaCFP Working Group). The primary objective of this letter is to engage the members of the fire research community to participate in the first workshop organized by the MaCFP Working Group and which is scheduled as a pre-event to the 12th IAFSS Symposium in Lund, Sweden, in June 2017. Constantly updated information on the MaCFP Working Group effort is found at <http://www.iafss.org/macfp/>.

Background and motivation

The general objective of the MaCFP Working Group is to establish a structured effort in the fire research community to make significant and systematic progress in fire modeling, based on a fundamental understanding of fire phenomena. This is to be achieved as a joint effort between experimentalists and modelers, identifying key research topics of interest as well as knowledge gaps, and thereby establishing a common framework for fire modeling research. The MaCFP Working Group is intended as an open, community-wide, international collaboration between fire scientists. It is also intended to become a regular series of workshops, with workshops held every two years.

The MaCFP Working Group is modeled after the successful example of the TNF Workshop (<http://www.sandia.gov/TNF/abstract.html>) and is tailored to the needs of fire modeling. The TNF Workshop was established approximately twenty years ago in the combustion science community and has since then emerged as an exceptionally effective framework for the collaborative development and promotion of the field of turbulent combustion. The TNF Workshop offers: (1) a digital library of well-documented target flame experiments; (2) examples of comparisons between experimental measurements and simulation results; and (3) the active participation and support of the entire turbulent combustion scientific community in the data collection and analysis. The MaCFP Working Group aims to achieve similar benefits.

The MaCFP initiative was started following discussions that took place in February 2014 at the 11th IAFSS Symposium (<http://www.iafss.org/symposium/11th-symposium/>), in particular during a pre-Symposium workshop entitled “Benchmarking/Data Sharing” with the participation of Prof. Assaad Masri (University of Sydney, Australia, and co-founding member of the TNF Workshop) as guest speaker. These discussions led to the formation of a Task Group of fire researchers (both modelers and experimentalists) on the topic of the experimental validation of CFD-based fire models. The Task Group produced a white paper (http://www.iafss.org/portal/wp-content/uploads/MaCFP-white_paper.pdf) and subsequently received the endorsement of IAFSS in March 2015. This was followed by a planning meeting in May 2015 during which a list of target experimental databases was produced, deemed suitable for validation of fire models. This list brings structure and focus to the MaCFP effort for the coming 18 months and essentially defines the bulk of the program of the upcoming first MaCFP workshop.

Objectives

As mentioned, the central objective of the MaCFP Working Group is to develop a fundamental understanding of fire phenomena and to advance predictive fire modeling. The strategy is based on the study of elementary academic problems and a gradual move towards complexity and realism by following a building block approach to model development. The new MaCFP workshop series is intended to be complementary to both the existing Verification and Validation guides developed in support of the FDS fire modeling software (<http://firemodels.github.io/fds-smv/>) and the FM Global Open Source Fire Modeling Workshop series (<https://sites.google.com/site/firemodelingworkshop/>).

The specific objectives of the MaCFP Working Group are to:

- Develop a digital archive of well-documented fire experiments that can be used as targets for CFD model validation;
- Develop a digital archive of well-documented CFD-based numerical simulations corresponding to the selected target experiments;
- Develop protocols for detailed comparisons between computational results and experimental measurements;
- Identify key research topics and knowledge gaps in computational and experimental fire research;
- Develop best practices in both computational and experimental fire research (including quality control and quantification of uncertainties);
- Establish a network between fire researchers and provide a community-wide forum for discussion and exchange of information.

The initial list of target experiments identified by the MaCFP Working Group includes five categories:

- *Category 1:* Turbulent buoyant plumes;
- *Category 2:* Turbulent pool fires with gaseous fuel;
- *Category 3:* Turbulent pool fires with liquid fuel;
- *Category 4:* Turbulent wall fires;
- *Category 5:* Flame extinction.

These target experiments correspond to basic configurations (building blocks) with carefully-controlled conditions and quality instrumentation and diagnostics. They also correspond to available open databases. This list will be enhanced after the first workshop.

MaCFP Repository

The MaCFP repository is hosted on GitHub (<https://github.com/MaCFP>) and is under development. The repository already contains or will soon contain:

- A description of each selected target experiment (organized according to the categories (1)-(5) mentioned above), including a description of the experimental configuration and a description of measured quantities and measurement uncertainties (if known);
- An electronic copy of experimental data organized in simple comma-delimited ASCII files;
- Protocols to perform comparisons between experimental data and simulation results based on (provided) MATLAB-based post-processing tools.

Furthermore, the repository is meant to host the contributions submitted by different modelers in preparation of the first MaCFP workshop. It will therefore also contain:

- An electronic copy of computational results submitted by researchers, also organized in simple comma-delimited ASCII files.

The repository was created and is managed by Dr. Randy McDermott (National Institute of Standards and Technology, USA).

June 2017 Workshop

The first MaCFP workshop will be organized immediately before the 12th IAFSS Symposium, on June 10-11 2017 (dates may be subject to change).

The organizing committee for the first MaCFP workshop is composed of:

- Alexander Brown, Sandia National Laboratories, USA
- Michael Gollner, University of Maryland, USA
- John Hewson, Sandia National Laboratories, USA
- Andre Marshall, University of Maryland, USA
- Randy McDermott, National Institute of Standards and Technology, USA
- Bart Merci, *Co-Chair*, Ghent University, Belgium
- Jose Torero, *Co-Chair*, University of Queensland, Australia
- Arnaud Trouvé, *Co-Chair*, University of Maryland, USA
- Yi Wang, FM Global, USA
- Beth Weckman, University of Waterloo, Canada

The exact format of the workshop is yet to be determined but is likely to be a mix of poster/oral presentations by researchers, one or two plenary talks by invited keynote speakers and group/panel discussions, guided by plenary introductions and concluded by reports of main outcomes. It is intended to be centered on in-depth topical discussions. Proceedings will be edited and put online on the MaCFP website (<http://www.iafss.org/macfp/>). The proceedings are intended to review progress, summarize accomplishments of the workshop and provide guidance with clear objectives for the next workshop.

Call for Participation

The MaCFP Working Group is inviting the members of the entire fire research community to participate in the first workshop. While the workshop topic is of direct interest to experimental and computational fire researchers, the workshop should also be of broad interest to the community at large. Registration to the June 2017 workshop will be fully open.

Members of the fire research community can participate in one or both of the following ways:

- From now until June 2017: participate in the planning of the workshop by interacting with the organizing committee and generating/contributing simulation results to be discussed at the workshop;
- June 10-11, 2017: attend and participate in the discussions at the workshop.

Important issues like membership to the organizing committee of the MaCFP Working Group and the selection of new target experiments for the second MaCFP workshop will also be discussed at the first workshop. Suggestions on these topics are also welcome anytime.

The organizing committee of the MaCFP Working Group is looking forward to welcoming many of you in its effort and to holding its first workshop at the 12th IAFSS Symposium in June 2017.

Bart Merci (bart.merci@ugent.be)

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Arnaud Trouvé (atrouve@umd.edu)

Co-Chairs of the organizing committee of the MaCFP Working Group

CALLS FOR PAPERS

Fire Safety 2016

The International Conference on Research and Advanced Technology in Fire Safety (Fire Safety 2016) will be held at the University of Cantabria, Santander, Spain, from June 8-10, 2016. The Call for Papers is open until March 31, 2016. Papers will be accepted by April 29th. See http://www.firesafety2016.unican.es/index_en.html.

12th IAFSS Symposium 2017

Manuscripts should be submitted electronically, beginning September 15, 2016, through the Symposium author web page that will be available via a link on the IAFSS web page (<http://www.iafss.org>). The submission deadline for papers is October 15, 2016. A Call for Posters will be issued in Summer 2016, which will provide details on poster abstract requirements. To assure the inclusion of recent research, the submission deadline for poster abstracts is March 31, 2017. See full details in Symposium news item above and on the IAFSS website.

UPCOMING EVENTS – 2016-2017

2016

- | | |
|-----------|---|
| Mar 1-4 | Suppression, Detection and Signaling Research and Applications Conference (SupDet 2016) – San Antonio, Texas (USA) - http://www.nfpa.org/supdet2016 |
| Mar 16-18 | 7 th International Symposium on Tunnel Safety and Security (ISTSS) - Montréal (Canada) - http://istss.se/EN/Sidor/default.aspx |
| Mar 21-23 | Fire Toxicity 2016 (FireTox2016) – Preston (UK) - http://firetox2016.eventbrite.co.uk |
| Apr 11-15 | 5 th Fire Behavior and Fuels Conference – held concurrently in Portland, Oregon (USA) and Melbourne (Australia) – http://www.iawfonline.org/conferences.php |
| Apr 24-20 | International Association of Arson Investigators – International Training Conference (IAAI 2016 ITC) – Orlando, Florida (USA) - https://www.firearson.com/Training-Certifications/Local-Classes-Events/ITC2016.aspx |
| Apr 25-28 | 8 th International Seminar on Fire and Explosion Hazards (8 th ISFEH) – Heifei (China) - http://www.isfeh.org.cn/dct/page/1 |
| May 23-25 | SFPE 11 th Conference on Performance-Based Codes and Fire Safety Design Methods – Warsaw (Poland) - http://www.sfpe.org/page/Warsaw2016STD/ |

- May 25-27 Risk Analysis 2016 – Crete (Greece) - http://www.wessex.ac.uk/conferences/2016/risk-analysis-2016?utm_source=wit&utm_medium=email&utm_campaign=risk16rem2&uid=1673382
- Jun 8-10 International Conference on Research and Advanced Technology in Fire Safety (Fire Safety 2016) – Santander (Spain) - http://www.firesafety2016.unican.es/index_en.html
- Jun 24-29 11th Int. Symposium on Hazards, Prevention, and Mitigation of Industrial Explosion (ISHPMIE) – Dalian (China) - http://ishpmie.dlut.edu.cn/meeting/index_en.asp?id=2551
- Jul 4-6 Interflam 2016 (14th International Conference and Exhibition on Fire Science and Engineering) – Windsor (UK) - www.intersciencecomms.co.uk/html/conferences/Interflam/If16/if16.htm
- Sep 18-21 Safety 2016, 12th World Conference on Injury Prevention and Safety Promotion – Tampere (Finland) - <https://www.thl.fi/fi/web/injury-prevention/safety-2016>
- Oct 4-6 Fires in Vehicles (FIVE) 2016 – Baltimore, Maryland (USA) - <http://www.firesinvehicles.com/EN/CONFERENCE/FIVE2016/Sidor/default.aspx>

2017

- Jun 12-16 12th International Symposium on Fire Safety Science (IAFSS2017) – Lund (Sweden) – <http://www.iafss2017.se>

MEMBER ANNOUNCEMENTS

Prof. David Purser awarded CBE in the 2015 Honours List

David Purser, Director of Hartford Environmental Research, was appointed Commander of the Most Excellent Order of the British Empire for Services to Fire Safety, in the Queen's 2015 New Year's Honours list.

His investiture took place at Buckingham Palace on 12th June 2015, with Prince Charles representing the Queen. He is pictured here with his wife, Jenny.



Prof. Serge Bourbigot awarded a prestigious ERC grant

Prof. Serge Bourbigot of the University of Lille was awarded a five-year, 2.4 million euro ERC Advanced Grant for a project devoted to the reaction and resistance to fire of materials. The grant will allow the hiring of five PhD students for three years each, three postdocs for two years each and one engineer for five years. The project is titled, "Multi-conceptual design of fire barrier: a systemic approach – 'FireBar-Concept'."

The development of science and technology provides the availability of sophisticated products but concurrently, increases the use of combustible materials, in particular organic materials. Those materials are easily flammable and must be flame retarded to make them safer. In case of fire, people must be protected by materials confining and stopping fire. It is one of the goals of the FireBar-Concept project to design materials and assembly of materials exhibiting low flammability, protecting substrates and limiting fire spread.

The objective of FireBar-Concept is to make a fire barrier formed at the right time, at the right location and reacting accordingly against thermal constraint (fire scenario). This fire barrier can be developed in several ways according to the chemical nature of the material and/or of its formulation:

- Heat barrier formed by inherently flame retarded materials (e.g. mineral fibers, ceramic ...) and exhibiting low thermal conductivity (note the assembly of those materials can also provide low thermal conductivity controlling porosity and its distribution)
- Evolution of reactive radicals poisoning the flame and forming a protective 'umbrella' avoiding the combustion of the material
- Additives promoting charring of the materials and forming an expanding carbonaceous protective coating or barrier (intumescence)
- Additives forming a physical barrier limiting mass transfer of the degradation products to the flame

The FireBar-Concept project is multidisciplinary and it requires expertise in material science, chemical engineering, chemistry, thermal science and physics. The approach is to make five actions linked together by transverse developments (3) according to this scheme: (i) fundamentals of fire barrier, (ii) multi-material and combination of concepts, (iii) modeling and numerical simulation, (iv) design and development of experimental protocols and (v) optimization of the systems.

Guillermo Rein publishes a commentary article in PNAS on wildfires

Dr. Guillermo Rein published a commentary article in the Proceedings of the National Academy of Sciences on wildland fires. In this short article, he discussed the recent paper authored by Missoula Fire Sciences Laboratory on flame spread (http://www.fs.fed.us/rm/pubs_journals/2015/rmrs_2015_finney_m001.pdf), making an effort to place the research in the broader context of fire, introduce the work of Richard Rothermel of the U.S. Forest Service and stress the multidisciplinary opportunities in fire, all in language that is accessible to the non-expert. The article is titled "Breakthrough in the understanding of flaming wildfires" and can be found at: <http://www.pnas.org/content/early/2015/07/29/1512432112>

JOBS

Two positions at the University of Edinburgh

I am very pleased to announce, and invite applications for, two new academic positions at The University of Edinburgh; to build and strengthen our team in Fire Safety Engineering research and education:

(1) The BRE Chair in Fire Safety Engineering - <http://edin.ac/1TUi7Bz> - This post is intended to build on the 40+ year legacy of Rasbash, Drysdale, Torero, and Simeoni; the successful candidate will take up the role of Director of the BRE Centre for Fire Safety Engineering (www.fire.eng.ed.ac.uk).

(2) The BRE Lecturer in Fire Safety Engineering - <http://edin.ac/1NXqNqw> - This is an entirely new post, created by the School of Engineering to support critical mass in the Fire Safety Engineering team in Edinburgh.

The University of Edinburgh has been an important institution in the field of Fire Safety Engineering for over four decades. Many of those who are now leaders in the field came to Edinburgh to study and research under the supervision of the late Prof David Rasbash, one of the main pioneers of the discipline, Prof Dougal Drysdale, author of the definitive text book on the subject, 'Introduction to Fire Dynamics', and Profs Jose Torero and Albert Simeoni who have both since held the BRE Chair in Fire Safety Engineering. A large and vibrant international group of students and staff continue teaching and research in fire safety science and engineering at Edinburgh under the acting leadership of Prof Luke Bisby, Arup Chair of Fire and Structures. The BRE Centre for Fire Safety Engineering is part of the Institute for Infrastructure and Environment, School of Engineering, at The University of Edinburgh.

Please spread the word, and feel free to get in touch with me (luke.bisby@ed.ac.uk) if you would like to discuss.

AECOM

Our Sydney Fire & Risk Team is currently looking to recruit graduates and senior fire engineers to join the team. All Australians and international applicants are welcomed to get in touch with Jonathan Gormley (jonathan.gormley@aecom.com).

Job postings on the IAFSS Website

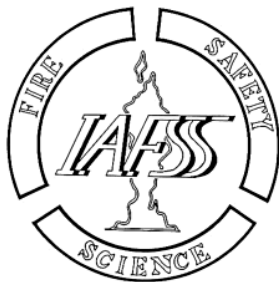
Remember, you can always check the website for current job postings at the bottom of the front page.

CALL FOR CONTRIBUTIONS

To continue succeeding with this newsletter, it is important that we receive contributions from the IAFSS membership at large. Please consider submitting articles, letters to the editor, images, news, announcements or job offers related to fire safety science or IAFSS members. These could be collected from your department, institution, country or region. Please send your contributions to the Editor (Rita Fahy, rfahy@nfpa.org).

Letters to the Editor are most welcome, anytime, in response to newsletter content or any other topic related to the IAFSS.

For the next issue (No. 40), the deadline for submissions is April 30, 2016.



<http://www.iafss.org>

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