International Association for Fire Safety Science

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Fire Safety Science News

http://www.iafss.org

Feb 2014, Issue No. 36 Editor-in-Chief: Guillermo Rein

Professor Philip Thomas passed away in the morning of 14 Jan 2014.
He was the first Chairman and co-founding father of the IAFSS in 1985.

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, trending research, opinions, and controversial topics in the field. A digital archive of previous issues can be found online.

EDITORIAL

It is with great sadness that we learnt of Professor Philip Thomas' death on 14th January 2014. We dedicate this issue to him, and its cover is illustrated with a photo of him taken in 1980. Professor Thomas was the first chairman and co-founding father of the IAFSS in 1985. Included in this issue is an obituary written by Geoff Cox that overviews Professor Thomas' numerous scientific accomplishments. Those who would like to send condolences to his family can do so via email to Carole Franks at iafssmembers@dial.pipex.com.

For this issue, I have invited three authors to write Featured Articles on the recent legislative changes to the TB117 flammability test of upholstered furniture in California. The three articles cover a wide range of technical points of view on this controversial debate regarding the effectiveness vs. toxicity of certain flame retardants. The progress of the debate and its legislative and technical conclusions will have a substantial impact on fire safety in the USA and the rest of the world in years to come. I therefore call on all IAFSS experts to get involved and inform the process.

Michael Woodrow, fire safety engineer at the London office of Fosters and Partners, also contributes a Featured Article on the role of creativity and technical knowledge in the design and engineering of fire safety in buildings.

Our readers attending the 11th IAFSS conference in Christchurch, New Zealand, can enjoy this issue printed in colour and included in the registration package thanks to the sponsorship of Arup.

I finish this editorial with a brief note calling your attention to the growing presence of the IAFSS in social media. Thanks to the initiative and work of the New Technologies Sub-Committee, we now also have a twitter account (@IAFSS) and a facebook group. Join us!

Pease bear in mind that the deadline for the submission of material for the next issue (No.37) is August 10, 2014. *Letters to the Editor* are most welcome in response to articles or on any other topic related to fire safety science. If you are interested to contribute, please contact me.

Signed: Guillermo Rein, Editor-in-Chief, Imperial College London.
g.rein@imperial.ac.uk

LETTER FROM THE CHAIR

Readers of this Newsletter, who will receive it in print at the 11th Symposium, will have an opportunity to make their own judgment on how successful were the efforts of the Organising Committee, considering much shorter amount of time that was available to prepare this conference. You might remember that the Christchurch earthquake of 2011 made the Organising Committee to face a dilemma of whether to hold the Symposium at the University of Canterbury, as it was decided in 2008, or whether to move it elsewhere in New Zealand, with Auckland often suggested as an alternative location. To remind us of the destruction suffered by the City, our banquet will be held in the Cardboard Cathedral, a transitional building of the Anglican Diocese of Christchurch. On behalf of all IAFSS members, I wish to thank Professor Charles Fleischmann and his team, for hosting us in Christchurch, and Professor W.K. Chow for chairing the 11th Symposium.

I take this opportunity to acknowledge to all IAFSS members the dedication and commitment of Dr Yaping He and Professor Arnaud Trouvé in preparing the technical program of the Symposium, and thank everyone who assisted Yaping and Arnaud in selection of the papers. This has not been an easy assignment, considering a large number of submissions and the rigour of the paper review process that underpins the focus on research excellence of our Association. The responsibility for the proceedings will now move to the volume editors, who are based at Lund University in Sweden. Likewise, I would like to express my appreciation to members organising the workshops, submission of posters and fire images, and many other activities that will take place at the Symposium. We also need to thank the IAFSS Awards Committee and everyone who has helped in its operation, including FORUM for the sponsorship of the student travel grants, proposers for preparing the nominations, and reviewers who, at the time of writing this letter, are still assisting the Awards Committee with the selection of the Best Thesis Awards "Excellence in Research".

The Nominating Committee, chaired by Dr Craig Beyler, spent a great deal of time examining the bylaws of the Association and have concluded that the regional balance for the IAFSS Committee membership should be included in the bylaws, and, in the same spirit, the size of the Nominating Committee should be increased to seven members, two per region and the Chair. The Nominating Committee recommends developing a guidance document to memorialise our processes and procedures, and to include non-mandatory goals and objectives. Items to be discussed comprise the goal of the Chairman position rotating among the regions, the nominating process for IAFSS Committee Officers, discipline diversity objective for the IAFSS Committee and symposium activities, goal of involvement of many countries in IAFSS activities and operation of the Nominating Committee. I look forward to a robust debate on the governance of the Association at the General Meeting, as we have done at several past Meetings.

From this perspective, our Association selects venues of its Symposia six years in advance; i.e., this year we will choose the location of the 2020 Symposium. This approach has served us well, but it tends to favour holding the Symposia by established fire research institutes in countries with long tradition of scholarship in fire research. We need to consider whether such early decisions are necessary. Could we decide on the location of the 2023 Symposium in 2020? Perhaps, such an approach could induce proposals to hold future symposia from countries in South America, Africa and parts of Asia that are now developing their capacity for fire research and have not yet hosted this event. With the advent of rapid email-based communication, a six-year advance selection of the host group may no longer be necessary.

I would like to share with you good news that the IAFSS and Elsevier have signed an agreement to continue publication of the *Fire Safety Journal* as the official research journal of the Association. The agreement follows the spirit of a similar agreement signed in 1993, by Professor James Quintiere, then the IAFSS Chairman. The new agreement offers free access to *Fire Safety Journal* to all IAFSS members. A similar access to *Fire Technology*, kindly provided by Springer, has been in place for over two years. The appointment of the Editor and Associate Editors will rest with Elsevier, and the selection of the Editorial Board with the IAFSS. It is planned that, there will be 18 members of the Editorial Board, six from each region of the Association, appointed for a two-year term. The rotation of Editorial Board will allow a larger number of the IAFSS members to have an impact on the profile of the Association research journal.

You have recently received an email message from Professor Michael Gollner, who, together with Mr Terry Fay, have been developing and maintaining the web pages of the Association. Michael's message describes how to gain access to *Fire Safety Journal* and *Fire Technology*, and to the proceedings from previous IAFSS Symposia, *Fire Research Notes* and the proceedings from the Asia-Oceania Symposia on Fire Science and

Technology. Dr Amanda Robbins and her team developed a consolidated search engine to search dozens of repositories and fire research collection of institutions around the world at once for relevant fire science literature; it is available at http://www.iafss.org/fire-research-engine. It was a massive effort that will enhance fire safety science research as well as the utilisation of research. The IAFSS website has other great resources, such as an upcoming conference/events calendar, archives of Fire Safety Science News, the official IAFSS newsletter, links to educational resources and much more!

Signed: Bogdan Dlugogorski, Chair IAFSS, Murdoch University, Australia.

NEWS FROM IAFSS

LAUNCH OF FEDERATED SEARCH TOOL FOR FIRE RESEARCH

The International Association for Fire Safety Science (IAFSS) website now features a federated online search tool "Fire ReSearch Engine", a specialized search tool for fire research resources from major fire research collections around the world. This tool will benefit fire scientists in their work and will aid the general fire safety community in using the existing fire science to solve fire safety problems. The search engine queries 32 fire research repositories around the world in a single search. "Fire ReSearch Engine" is freely available to the entire fire safety community at http://www.iafss.org/fire-research-engine.

This search tool has been under development for over six years. The IAFSS would like to thank Amanda Robbins for all her hard work on the project, as well as assistance from many others, especially Jason Averill, Dick Gann and Terry Fay. Amanda began work on the project as a visiting researcher at National Institute for Standards and Technology (NIST) in the United States and has continued work on the project on her return to BRANZ (New Zealand).

The search tool is a customized search engine based upon Google search technologies. The current version is primarily a text search and there are plans to expand the use of metadata in searches.

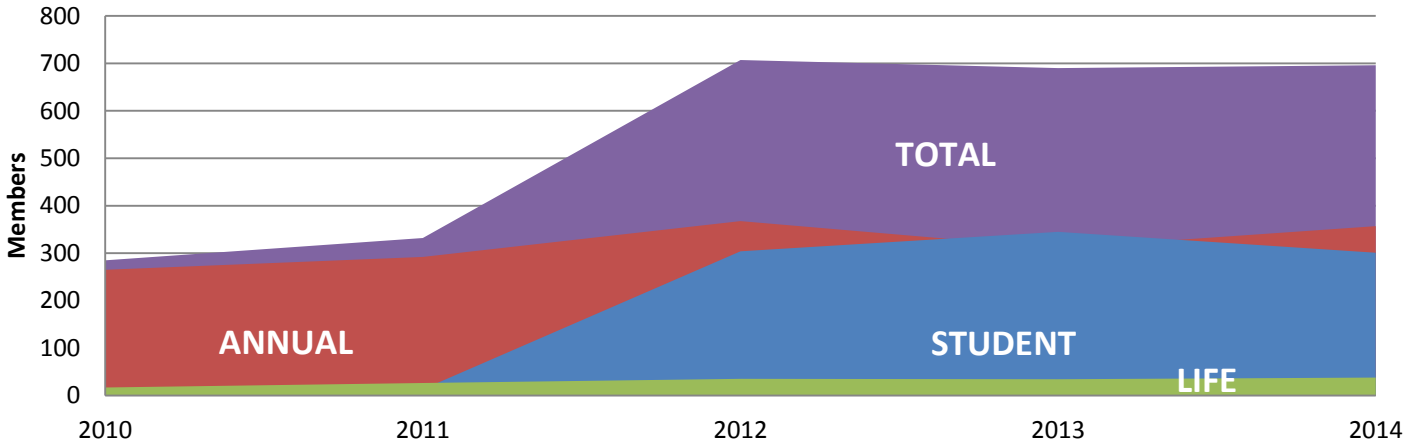
Prof. Michael Gollner (University of Maryland, USA), Chair of the IAFSS New Technologies Subcommittee Former Chair of IAFSS, noted that "*Launching Fire ReSearch Engine on the IAFSS website is a significant landmark in IAFSS's ongoing development of its online community. The search tool directly supports IAFSS's goal of encouraging and disseminating fire safety science research to address unsolved fire problems. It brings the fire safety community together like never before.*" Further development of IAFSS's online community is underway including our open-access publication repository, LinkedIn Group and other resources (http://www.iafss.org/committees/new-technologies-subcommittee). Questions concerning the Fire ReSearch Engine and ongoing new technologies at IAFSS can be addressed to webmaster@iafss.org. IAFSS welcomes links to the Fire ReSearch Engine by others as well as nomination of additional fire research repositories for inclusion in the search engine.

Note: The New Technologies Committee is also looking for interested IAFSS members to join the website team. We could use additional help, especially in the area of content editing and generation. Please email webmaster@iafss.org if are interested in contributing. Students and postdocs are especially encouraged to join the team!

Signed: Amanda Robbins at BRANZ, *Craig Beyler at Hughes Associates, Michael Gollner, University of Maryland*

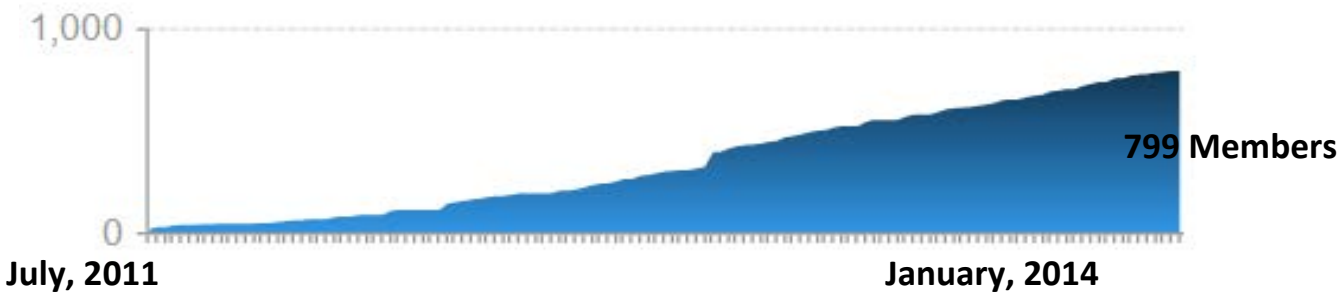
IAFSS TECH STATISTICS

Breakdown of members by type of membership



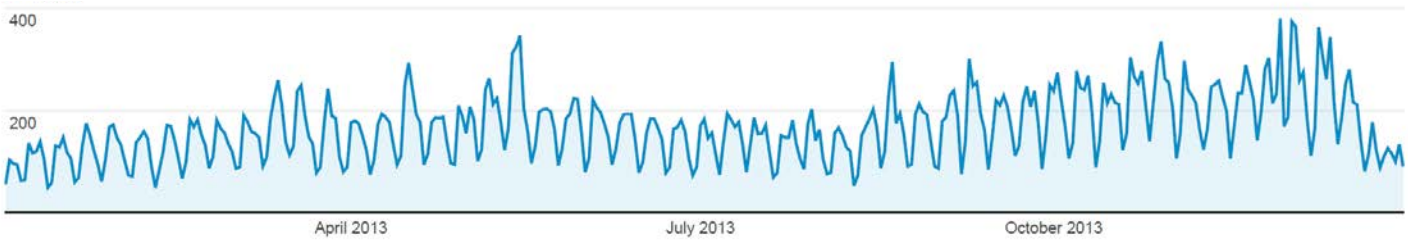
As of January, 2014 there were 696 registered members of the IAFSS

Members registered to the IAFSS Linked-In Group



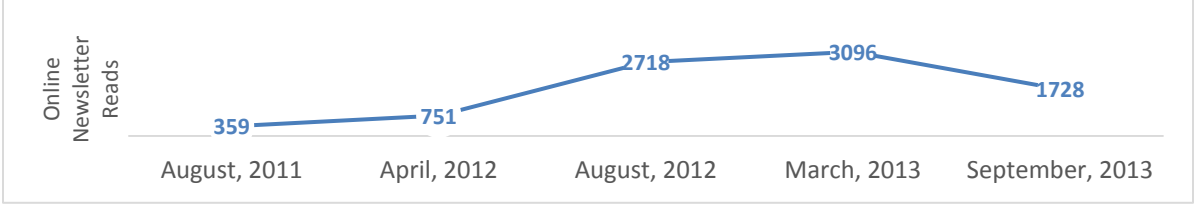
As of January, 2014 there were 794 members of the IAFSS Linked In Group

2013 IAFSS Website Visits



Between Jan 1, 2013 and Dec 31, 2014 the new IAFSS website was visited 60,927 times.

Online reads of Fire Safety Science News (per issue)



NEWS FROM MEMBERS

News from AECOM

COLLABORATION WITH BRANZ: Roger Harrison has been collaborating with BRANZ in the development of a new fire risk zone model, B-RISK, which has been developed by BRANZ in association with the University of Canterbury, New Zealand. Roger has specifically been involved in the development of a new spill plume entrainment model in B-RISK for the design of smoke management systems in buildings. The new model incorporates a suite of spill plume entrainment formulae developed as part of Roger's PhD research at the University of Canterbury. The performance of B-RISK in predicting both balcony and adhered spill plume entrainment has been assessed against reduced-scale and full-scale experimental data for validation purposes. The findings of this research have been recently published in a co-authored article with Colleen Wade and Mike Spearpoint in *Fire Technology* (doi:10.1007/s10694-013-0364-3).

COLLABORATION WITH UNIVERSITIES: AECOM have recently been invited to give lectures at a two Universities with world class Fire Engineering research groups. Kate Anderson spoke to the Fire Engineering students at the University of Edinburgh and Eoin O'Loughlin visited the Structural and Civil Engineering students at the University of Manchester. The focus of both lectures was performance-based fire safety strategies, with the objective being to demonstrate how fire safety engineering is applied in industry. AECOM have also provided support to the Quantitative Methods in Fire Safety Engineering course at The University of Edinburgh. AECOM attended presentations given by groups of undergraduate students who outlined their fire engineering recommendations for a proposed museum. Following the presentations, Kate Anderson acted as the approver by questioning some of the presented proposals and the well thought out answers provided by the students highlighted their excellent knowledge and understanding of the fundamental principles of fire safety engineering.

SCOTTISH FIRE AND RESCUE SERVICE: Kate Anderson, one of our engineers based in the Edinburgh Office, recently spent a week on secondment at the Scottish Fire and Rescue Service (SFRS) where she learnt about fire fighting procedures and the recent amalgamation of the fire service from 7 regional services into a single national one. A controlled fire was set in a shipping container and Kate tried to hold the fire back by gas cooling. Rather than successfully keeping the fire at bay, Kate's over enthusiastic use of water turned the box into a hot, smoky steam room. Fire fighting is definitely a task to leave to the experts! This time spent at the SFRS has given Kate a brief but invaluable insight into the challenges and dangers faced by fire fighters on a daily basis. She, and AECOM, would like to extend their thanks all of those at the SFRS for their hospitability.

TIMBER STRUCTURES: As part of AECOM's Innovation + Excellence scheme, a research and development project is being undertaken on the structural fire performance and design of massive timber construction such as cross-laminated timber (CLT) and glue-laminated timber (Glulam). The study is particularly focused on CLT floor system design, as a novel floor structure involving CLT panels on a steel frame is being explored on a large-scale project AECOM are involved on. An extensive literature review is being carried out to establish the current 'state-of-the-art' for CLT floor system design. The collation of information has involved engagement with academic and research institutions across the globe, liaison with CLT suppliers and steel fire protection providers, and cross-disciplinary discussions internally with AECOM's timber structures experts. Some of the issues that may need exploring are the relationships between charring rate and varying incident heat flux or fire temperatures, the ignition temperature at the surface of CLT panels and how this relates to smoke and gas temperatures remote from the fire location and the behaviour at the interface between CLT floor panels and the steel beams upon which they are supported or connected when those steel beams undergo deformation in fire.

AECOM TEAM DAY: In November 2013 all AECOM Fire Engineers from across the UK and Middle East gathered in St Albans, UK, for the annual team day. The team activity at the end of the day involved a lesson in Morris Dancing, a form of English folk dance involving wooden sticks, bells and handkerchiefs!

Signed: Roger Harrison, AECOM UK

News from the University of Cantabria

FULL-SCALE EVACUATION: Last July, the GIDAI Group participated in the development of a series of full-scale fire tests and evacuation experiments in a transportation station in Madrid (Spain). The tests were included in the Research and Development Project 'SEGTRANS' led by KV Consultores and also with Sacyr Concesiones, Euroestudios, Tapusa and University Politecnica de Madrid. This project has the objective to investigate, develop and validate various innovative technologies related to safety against deliberate explosions, fire and attacks that may affect transport terminals. A series of 24 experiments were developed and the tests were focused on the analysis of the fire and smoke generated after explosions in the transportation terminal facilities, and on the users' movement and behavior during the evacuation process. The tests were performed after hours of operation in a major transform exchange center of Madrid. For the full scale fire tests on post-explosion situations, a hot smoke machine was used. Meanwhile, the participants of the evacuation experiments were distributed in the terminal representing the routes used to reach the gates, and were subjected to different emergency scenarios. The results obtained allow supporting the development of fire and evacuation computer models.

HEALTHCARE FACILITIES: GIDAI Group is developing the research project "Evaluating occupant load factors for ambulatory healthcare facilities" in collaboration with the Fire Protection Research Foundation (NFPA). The NFPA Standards (NFPA 101, Life Safety Code and NFPA 5000 Building Construction and Safety Code) specify an occupant load factor of 100 square feet/person of floor area for Ambulatory Health Care Facilities. The goal of this project is to collect data "in situ" - through an extensive campaign- about the actual occupant load factor in Health Care Facilities (hospitals, day centers, clinics, emergency departments, etc..). For that purpose, the researchers are conducting several site surveys in different types of Heath Care Facilities (public administration and private sector companies) in the cities of Santander and Madrid (Spain). More than 20 Health Care Facilities will be analyzed from on-site surveys. Data regarding the real number of people and gross floor area will be collected. This work will provide data to the Technical Committee on Healthcare Occupancies to either support the current occupant load factor or to justify a change in this occupant load factor.

MIST SYSTEMS IN CABLE DUCTS: GIDAI Group has signed the second collaboration agreement with the company RG SYSTEMS (Komtes Group). The work entitled 'Development of a new Fire Protection System based on Water Mist for Cable Tunnels' is funded by the Government of Spain through CDTI. The project´s aim is the development of a completely new fire protection system for the protection of cable tunnels using water mist as the extinguishing agent. The developed product will consist of a system capable of protecting a cable tunnel or gallery which can be found in industrial plants, public infrastructures, urban area.

Signed: Mariano Lázaro, Universidad de Cantabria

News from DTU

EGRESS FOR VISUALLY IMPAIRED: PhD Student Janne Gress Sørensen spent the last five months as a visiting researcher at NFPA, Boston USA. An external research stay is a partial requirement of the PhD degree at DTU. During the stay Janne conducted a series of evacuation experiments with a group of blind and visually impaired people. The experiments were conducted in a governmental building in Washington D.C. and involved 11 persons with different degrees of visual impairments. Speeds for horizontal movement and for descending stairs were recorded, along with studies on human behavior and movement patterns. The experiments were prepared in collaboration with Robert Solomon, Rita Fahy, and Allan Fraser from NFPA and Marsha Mazz, from The US Access Board. Janne's stays was funded by the

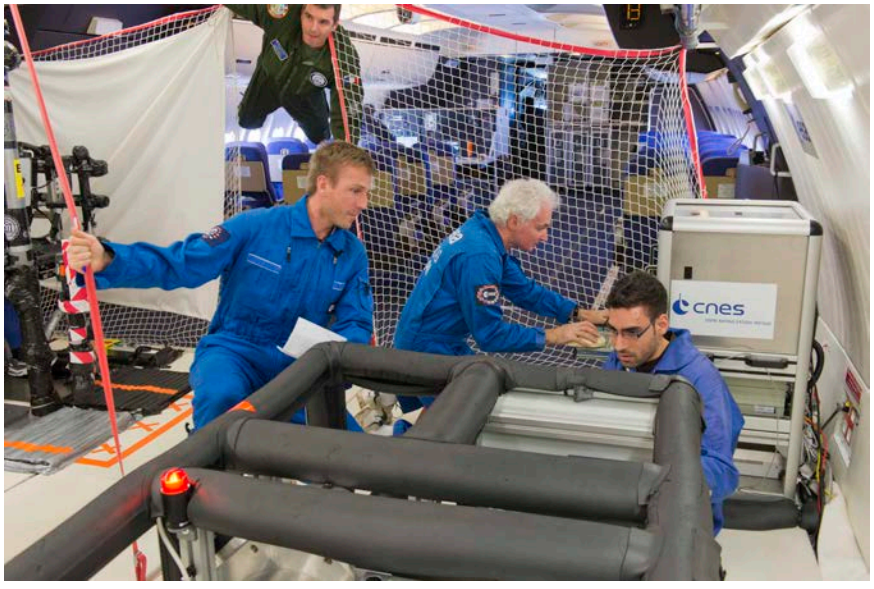
Danish foundation Østifterne. The results from the experiments will contribute to Janne's PhD dissertation.

EVACUATION OF CHILDREN: In spite of a storm shaking the whole of Scandinavia and UK and causing significant transportation problems, Aldís Rún Lárusdottir defended her PhD on December 6, 2013. The thesis was entitled: "Evacuation of children – focusing on daycare centers and elementary schools. The main supervisor was Anne S. Dederichs (DTU) and Daniel Nilsson (Lund University) was co-supervisor. The assessment committee consisted of Karen Boyce (University of Ulster), Steve M.V. Gwynne (University of Greenwich) and Poul G. Hjort (DTU), and they stated that "This thesis represents a substantial body of work related to a previously under-researched and little understood area of study – the evacuation of children. It is novel, certainly contributes to our understanding in this area, and provides a significant number of data sets that are of value to fire engineers and evacuation modelers. It also provides important information that is essential to the design and management of daycare centers and schools."

IN-SITU BURNING OF OILS: Laurens van Gelderen started as a Ph.D. student on the project entitled "In-Situ Burning of Crude Oils under Arctic Conditions" (www.isboil.dtu.dk) on January 6, 2014. He will be supervised by Grunde Jomaas (DTU). Janne Fritt-Rasmussen (Aarhus University, DCE) and Ali Rangwala (WPI) will act as external co-supervisors. The project is funded by the Danish Council for Independent Research and will run for the next 3½ years, and will also have a Ph.D. student employed at WPI. The project offers internship opportunities for BSc and MSc students.

COMPOSITE MATERIALS FOR SUPERSTRUCTURES: Pierrick Mindykowski will start as a post-doc on the project entitled "Composite Materials for Superstructures of Passenger Ships (COMPASS)" on February 15, 2014. The project is funded by the Danish Maritime Authority and the Danish Maritime Fund and the goal is to enable the use of lightweight materials for the superstructure of passenger ships, and fire safety is one of the main topics that will have to be addressed. The project is a collaboration between DTU Civil Engineering, DTU Mechanical Engineering and The Danish Institute of Fire and Security Technology (DBI), with the latter being the project leader. The project will run for the coming 2 years, and it has internship opportunities for BSc and MSc students.

SPACECRAFT FIRE SAFETY: For the past six months, Associate Professor Grunde Jomaas has been a visiting researcher at the University of Queensland, where Prof. José L. Torero hosted him. The main research topic has been spacecraft fire safety, as both researchers are involved with an ongoing international topical team funded by ESA and collaborate with NASA on an upcoming flight experiment on flammability in microgravity



(http://www.spacefiresafety.byg.dtu.dk). The European Space Agency (ESA) arranged their 59th Parabolic Flight Campaign, operated by Novespace, out of the Merignac airport (Bordeaux) in October/November 2013. Grunde Jomaas (DTU) was PI for one of the partaking projects, entitled "Instability Formation on Premixed, Outwardly Propagating Flames in Microgravity". Christian Chauveau (CNRS), Fabien Halter (Université d'Orléans) and Romain Thimothée (Université d'Orléans) were the other team members. The experiments went well, and the microgravity experience was memorable. The picture shows, from left to right (in blue jumpsuits), Grunde, Christian and Romain 13 seconds into the microgravity cycle. Grunde will also partake in the 60th Parabolic Flight Campaign as a member of an experiment entitled "Flame Spread over a Set of Electrical Wires in Microgravity" with Guillaume Legros (Université Pierre et Marie Curie) as PI.

EXCHANGE WITH EDINBURGH: Cristián Maluk, PhD candidate at The University of Edinburgh, received the John Moyes Lessells Travel Scholarship awarded by The Royal Society of Edinburgh (www.royalsoced.org.uk) and visited DTU between August and November 2013. Cristián's PhD research project, entitled "Development and Application of a Novel Test Method for Studying the Fire Behaviour of CFRP Pre-stressed Concrete Structural Elements" is co-funded by EMPA (Swiss Federal Laboratories for Materials Science and Technology). In a complementary exchange visit, Thomas Hulin, PhD candidate at DTU, is currently visiting The University of Edinburgh where he is undertaking experimental work as part of his PhD research project entitled "Advanced Sandwich Elements for Sustainable Buildings - Integrated Structural and Materials Modelling". Both projects are interested in using incident heat flux rather than temperature as a means of performing rational fire testing of structural materials.

Signed: Grunde Jomaas, DTU

News from University of Edinburgh

The 'Department of Fire Engineering' at the University of Edinburgh first opened its doors during the academic year 1973/74. Forty years later we are still going strong, and currently have the largest group of academics, research staff and postgraduate students that we have ever had. This is a cause for celebration, and we will be hosting a grand reunion in May 2014 for all former students and staff. If you ever studied fire at Edinburgh, please make sure you are on our mailing list by contacting Fire.Research@ed.ac.uk - and we hope to see you back in Edinburgh in May. Further details will be announced in due course.

Last month saw the 99th birthday of our oldest supporter and benefactor, Dr Frank Rushbrook (pictured, with Dr Rory Hadden), former Fire Master of Edinburgh, whose persistence and sponsorship were the primary drivers in starting our research group forty years ago.

Five students graduated with fire PhDs in the November 2013 graduations, congratulations to Dr Ahmad Al-Remal, Dr David Fox, Dr John Gales, Dr David Rush and Dr Michael Woodrow. We also recently welcomed six new PhD students, working on a diverse range of topics from wildland fire modelling and wind-blown fire dynamics to modelling the performance of contemporary reinforced concrete structures in fire conditions.

The University of Edinburgh are one of 17 UK-based partners who have just established the EPSRC-funded UK Consortium on Turbulent Reacting Flows (www.UKCTRF.co.uk). We are also one of eight European partners in the FireComp project on "Modelling the thermo-mechanical behaviour of high pressure vessels in composite materials when exposed to fire conditions" which was established in October 2013.

You can follow us on our Blog, Twitter, Facebook page and YouTube channel and atwww.eng.ed.ac.uk/fire.

Signed: Ricky Carvel, University of Edinburgh

News from Fire Protection Research Foundation

The Fire Protection Research Foundation has been invited by the National Institute of Standards and Technology to develop a research roadmap to establish the scientific and technical basis for achieving a vision for Smart Fire Fighting in the United States - creating, storing, exchanging, analyzing, and integrating information from a wide range of databases and sensor networks to assist emergency responders. The project will connect the world of cyber physical systems to fire safety and help ensure that our community is harnessing this new technology. More information at http://foundation.blog.nfpa.org

The Fire Protection Research Foundation is launching three new suppression projects:

- Sprinkler Protection for Cloud Ceilings - Ph.2 will seek to obtain an understanding of how cloud ceiling panels impact sprinkler actuation. The major focus of the project is small clouds with a specific objective to determine the maximum gap between walls and clouds to enable elimination of sprinklers at the structural ceiling level. This project will extend the work done in Phase 1.
- Evaluation of Water Additives for Fire Control and Vapor Mitigation - Ph.2 seeks to provide a repeatable and reproducible evaluation methodology of the performance characteristics of water additives used in fixed fire suppression systems for fire control and vapor mitigation, as compared to a baseline of water-only performance for Class B applications using 2- and 3-dimensional liquid fuel fires. Phase 1 of the project provided a test plan for this work.
- Obstructions and ESFR Sprinklers - Ph.1 will endeavor to develop a tool that can be used for providing reliable analysis of the impact of obstructions on ESFR sprinklers based on existing data and develop a technical basis to the NFPA 13 technical committees for new requirements and guidance.

Reports recently released by the Foundation include:

Evaluation of Intrinsic Safety for Emergency Responder Electronic Safety Equipment. The goal of this project is to use a hazard analysis approach to provide a synergistic evaluation of intrinsic safety requirements across all emergency responder ESE and anticipated hazard environments, and ultimately supports scientifically-based recommendations for the optimum ESE intrinsic safety requirements.

Fire Safety Challenges of Tall Wood Buildings. The Fire Protection Research Foundation initiated this project to gain an understanding of the performance of these buildings under credible fire scenarios to ensure the safety of the occupants to emissions and thermal hazards, as well as the property protection of the building and nearby structures. The goals of this first phase project was to gather information and data from relevant studies and analyze the knowledge gaps. In addition, a framework prioritization of research needs was produced.

Non-Fire Hazard Provisions in NFPA Codes and Standards. The main objective of this project was to develop a well-organized inventory of the life safety provisions in NFPA 101 and other NFPA codes and standards that related to hazards other than fire.

The Foundation presents a bimonthly webinar on selected recent research topics (http://www.nfpa.org/training/webinars). The series is sponsored by leading government and private sector organizations committed to fire safety technology transfer. Join us on February 11th at 12:30 for the first webinar on "Responding to Electric Vehicle Fires".

Signed: Rita Fahy, NFPA

News from US Forest Service

With all the devastating wildland fires igniting around the nation, everyone has been asking what can be done to combat them? A recent article in the New York Times, "Into the Wildfire" features work undertaken in collaboration between the US Forest Service's Missoula Fire Sciences Laboratory, University of Maryland, the University of Kentucky and others that seeks to provide some answers. The collaborative project is based on scaling the dynamics of large wildland fires to laboratory experiments conducted in Missoula, MT and at the Fire Laboratory at the University of Maryland,

College Park. This work is beginning to reveal new dynamics on the methods in which wildfires heat fuels during fire spread, leading to the development of new models for fire spread which can be used for planning, prevention and forecasting future wildfires.

In the United States, outdoor target shooting has been suspected as the source of numerous wildland fires. USFS researchers Dr. Mark Finney and Dr. Sara McAllister worked with collaborators from the San Dimas and Missoula Technology Development Centers to conduct experiments that examined the potential for rifle bullets to ignite organic matter after impacting a hard surface. The tests were performed using a variety of common cartridges and bullet materials (steel core, lead core, solid copper, steel jacket, and copper jacket). Bullets were fired at a steel plate that deflected fragments downward into a collection box containing oven-dried peat moss.

The results, published in a Forest Service publication (http://www.fs.fed.us/rm/pubs/rmrs_rp104.pdf), showed that bullets could reliably cause ignitions, specifically those containing steel components (core or jacket) and those made of solid copper. Ignitions of peat also occurred in a small set of tests using solid copper bullets and a granite target. Thermal infrared video and temperature sensitive paints suggested that the temperature of bullet fragments could exceed 800 °C. Bullet fragments from solid copper and steel core/jacketed bullets collected from a water tank were larger than that of lead core bullets. Prior to this study, there had been no scientific basis to inform policy concerning shooting on public lands. This research showed that ignition by commonly available ammunition was physically possible. The BLM in Utah and Nevada have already used this information to issue Fire Prevention Orders restricting the use of steel core/jacketed bullets during dry summer months. Further research will be directed toward testing under field conditions.

Signed: Sara McAllister, USFS

News from Ghent University

Prof. Bart Merci's group received two of the 2013 FireForum Awards. The first award concerns the collaboration with Brandweer Gent for the fire tests in the high-rise buildings 'Rabottoren' (http://multimedialab.elis.ugent.be/rabot2012), where also ELIS-iMinds was involved. In the photo, Prof. Bart Merci and Dr. Steven Verstockt are shown together with Cpt. Tom Van Esbroeck (Ghent Fire Brigade) when receiving the Fireforum Award from Lt.-Col. Chris Addiers (Chair Fire Service Flanders). The other award concerns the successful spin-off company Fire Engineered Solutions Ghent from his group, led by ir. Xavier Deckers.

Signed: Bart Merci, Ghent University

News from The Hong Kong Polytechnic University

An accidental fire occurred at a multi-use old highrise building on 29 Dec. 2013. The building is of age 51 years, containing guesthouses, subdivided flats and other normal residential flats. It is located in North Point, a district with old and new tall buildings used for both residential and commercial purposes. That district is one of the densest urban districts in Hong Kong started to develop in 1950s. 25 residents were hurt in the fire with 7 in critical condition. The fire lasted for 2 hr and was rated as a number 3 alarm fire by the local Fire Services Department using 37 fire engines.

This alerts the government and the public to the potential fire hazards in old highrise buildings used for multi-purposes, and gives a warning on the urgency to set up tighter fire regulations on passive protection and active engineering system, and more importantly, implementing tighter control to ensure more serious fire safety management in those old highrise buildings for mixed building uses. For example, the

security guards must be trained to ensure that fire doors are closed properly. Note that subdivided flat is a residential feature with fire safety concerns in Hong Kong now!

At least, but not limited to, the following fire safety science aspects should be explored more thoroughly for supporting the establishment of fire codes:

1. New fire phenomena such as under-ventilated fire in subdivided flats storing large amounts of combustibles with fire load density higher than 1135 MJ/m^2.

2. Fire spread to adjacent crowded areas of old districts with huge combustibles of different geometries.

3. Fire physics of room fires in tall buildings under wind action, including flashover.

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

News from International Master of Science in Fire Safety Engineering

The 3rd and 4th cohorts of our future MSc graduates are currently studying in one of the three participating universities. New since academic year 2013-2014 is the inclusion of the University of Queensland (Australia) as an Associated Partner, where the very first IMFSE student is currently performing thesis research. ETH Zürich (Switzerland) is also included as Associated Partner, with a foreseen first student mobility in 2014-2015. IMFSE is more than pleased to see the alumni's successes in the labour market. The former IMFSE students are working as consultants and researchers in a wide range of different institutions, implementing their fire safety expertise. More and more, they are presenting papers at conferences and symposia and thus give an extra international visibility to the programme.

In November 2013, IMFSE Alumnus Brecht Debrouwere won the VVBA-IFV Dutch National Fire Safety Engineering Award for his thesis on Fire behaviour in low-energy houses. Congratulations!
An overview of the alumni's professional success can be found http://www.imfse.ugent.be.

Signed: Elise Meerburg, IMFSE, Ghent University

News from Luleå Technical University

Luleå Technical University (LTU) educates and graduates annually about 25 fire protection engineers. Some of them add another two years of studies to also get a master in fire protection engineering.

LTU has awarded a doctoral degree to Tim Heistermann, and three licentiate degrees to Navid Iqbal, Alexandra Byström and Joakim Sandström. The thesis of Tim and Navid focused on the mechanical behavior of steel structures exposed to fire while the other two licentiate theses dealt with simple fire modeling and expressing of thermal exposure based on measurements and CFD calculations, respectively.

On the 5th of December last year so called licentiate seminar was held at LTU. Professor Björn Karlsson of Iceland was a discussion leader of the seminar of Alexandra Byström and Dr. Stephen Welch of University of Edinburgh of the seminar of Joakim Sandström.

Alexandra Byström showed in her thesis (Fire Temperature Development in Enclosures: Some Theoretical and Experimental Studies) how the temperature of flashed over fires could be modeled. She assumed uniform fire temperatures and made similar approximation as in the Swedish opening factor model once developed by Magnusson and Thelandersson and later modified by Wickström to become the parametric fire curves in Eurocode (EN 1991-1-2). By analyzing the mass and heat balance equation of a fire compartment she showed how the fire temperature as function of time could be solved analytically in some cases and thereby obtaining closed form solutions. I other cases when non-linear phenomena need be considered numerical approaches are required. She then used the finite element code TASEF but in general any temperature calculation software could be used. When using a numerical model the

compartment boundaries may be of any type that could be thermally modeled. Thus multilayer assemblies as well as assemblies containing voids, like walls consisting of bearing studs covered with gypsum boards, may be considered. The calculated fire temperatures matched very well with temperatures in standards when homogeneous surrounding structures were assumed as in the traditional opening factor model.

Alexandra reported also about a test series on a steel column exposed to a localized fire. She could then conclude that the measured steel temperatures are lower or the same as would be calculated according to Eurocode. She also showed that steel temperatures calculated based on plate thermometer measurements matched very well with corresponding measured steel temperatures.

Joakim Sandström showed in his thesis (Thermal Boundary Conditions Based on Field Modeling of Fires) how thermal boundary conditions can be extracted from FDS calculations by employing the concept of adiabatic surface temperature, AST. These temperatures can then be used as boundary conditions for calculating temperature in fire exposed structures by any temperature calculation software. The AST can be calculated at any point and in any direction. A post processor has been developed by which the AST can be obtained without having to model in FDS any physical body like a plate thermometer. As a case study, the temperature of a square hollow steel beam supporting a concrete slab was calculated in different ways and the results were compared. The highest temperatures were then obtained when assuming of uniform temperature applying the calculation procedure recommended in the Eurocode standard. Considerably lower steel temperatures were obtained when carrying out finite element calculations with TASEF considering heat losses to the concrete slab as well as the heat transfer inside the hollow section. Both Alexandra and Joakim will continue their studies towards doctor degrees. The all mentioned academic works may be downloaded from LTU publications database: http://pure.ltu.se/portal/en

Signed: Ulf Wickström, Luleå Technical University

News from Lund University

The Department of Fire Safety Engineering and System Safety has split into two new divisions within the faculty of engineering at Lund University. Professor Patrick van Hees will manage the new department of fire safety engineering and Ass. Professor Markus Abrahamson will manage the division of Societal Safety. The department of Fire Safety Engineering will keep the website: www.brand.lth.se. The Department of Fire Safety Engineering will be responsible for most of the courses on the bachelor program in Fire Safety Engineering and for the International Master in Fire Safety Engineering, while the division of Societal Safety will be responsible for a majority of the courses at the master program in Risk Management and Safety Engineering.

EDUCATION: In January 2014 we welcome the entire class of students from International Master Program in Fire Safety Engineering (IMFSE) to Lund. This is the fourth year we welcome students from this international program that we run jointly with the Universities in Gent and Edinburgh. The students are very well motivated and we are looking forward having them in our courses in Advanced Fire Dynamics, Simulation of Fires in Enclosures, Risk Assessment and Human Behaviour in Fire.

During the autumn we have had a record number of presentations of final thesis's for the students at the bachelor program in Fire Safety Engineering and the master program in Risk Management and Safety Engineering at two different occasions. Several of the thesis's are available in English at www.brand.lth.se/publications.

In January 2014, Ass. Professor Daniel Nilsson was appointed as Programme Director for the Fire Protection Engineering Program at Lund University. The program started in 1986 and is now in its 33 year. A total of 50 students are accepted to program each year.

RESEARCH: In December the department was granted a new four-year research project together with SP Fire Technology by the Swedish Contingency Agency (MSB). The project is dealing with determinates behind residential fires and the effectiveness of different technical systems that can be used to reduce or mitigate the consequences of residential fires. The overall budget is 10 MSEK.

The department has received funding from the Swedish Transport Administration for a project about evacuation design in road tunnels. The project, which started in summer 2013 and will end 31 December 2014, is linked to the large infrastructure project called Stockholm Bypass. The main goal of the project is to suggest evacuation systems, e.g., traffic information signs, fire alarms and exit portal designs that can be used in the Stockholm Bypass tunnel and in other future road tunnels. The systems will be tested in evacuation experiments in both Virtual Realty and physical tunnel environments. Dr. Enrico Ronchi was employed as a post-doc at the department in summer 2013, and he will be working full-time in the project.

The department also got financing during the autumn from the Swedish Fire Research Board (Brandforsk) in order to study the advantages and challenges of hypoxic air.

The department of Fire Safety Engineering has several interesting research projects currently on-going and the staff will expand during the spring with at least two new PhD students.

APPOINTMENTS AND AWARDS: In December Alexander Cedergren and Emmanuel Raju defended their PhD theses successfully. Dr. Cedergren thesis is titled Exploring the Railway System from a Risk Governance Perspective and it was defended on the 10th of December. Dr. Raju thesis is titled Exploring the Dimensions of Coordination for Sustainable Disaster Recovery and was defended on the 17th of December. Dr. Cedergren will continue to work at the division of Societal Safety as a researcher while Dr. Raju will start to work at the Danish Technical University (DTU).

Martin Nilsson and Nils Johansson presented their licentiate theses in December. Martin's thesis's is titled Fire Safety Evaluation of Multifunctional Buildings - Special Emphasis on Antagonistic Attacks and Protection of Sensitive Area. Nils' thesis is titled Numerical experiments - a research method in fire science. After his licentiate degree Martin will leave the department for work in the insurance industry while Nils will continue to pursue a PhD degree in Fire Safety Engineering at the department. Both doctoral and licentiate theses are available at the department webpage: www.brand.lth.se/publications.

UPCOMING EVENTS: Lund University will have a strong representation at IAFSS in Christchurch. A group of senior researchers and PhD students will attend the conference and several papers and posters will be presented. We hope to be inspired by the arrangements in Christchurch because the conference will be held in Lund in 2018 and the planning is well on the way. A two day Nordic CFD user seminar will be held in Lund on the 23rd and 24th of April 2014. For more information please contact bjarne.husted@brand.lth.se.

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

Signed: Nils Johansson, Lund University

News from NIST

SERVICE TO AMERICA MEDAL: Fire protection engineer Daniel Madrzykowski of NIST was honored on Oct. 3, 2013, with a Service to America Medal for research and outreach efforts that have "dramatically improved firefighting practices," saving firefighters' lives and protecting property across the nation. A 28-year NIST veteran, Madrzykowski is credited with advancing tactics for fighting fires ranging from high-rise blazes to house fires. Much of his research is conducted through fire experiments—or controlled burns—that he carries out with local fire departments in buildings that are planned for demolition. "Dan epitomizes the NIST mission to do science that advances the public interest," said NIST Director Patrick Gallagher, who also is acting deputy secretary of the Department of Commerce. "He's conducted top-notch fire-dynamics research that saves lives and dollars, and he's not content with just publishing the results. He spreads the word by teaching numerous courses, distributing tens of thousands of copies of educational videos, operating a popular website for the fire-service community and serving on many standards committees."

TEST OF BREATHING EQUIPMENT: As of Sept. 1, 2013, standard firefighter breathing equipment cannot be certified to National Fire Protection Association (NFPA) standards unless the facepiece lenses pass a

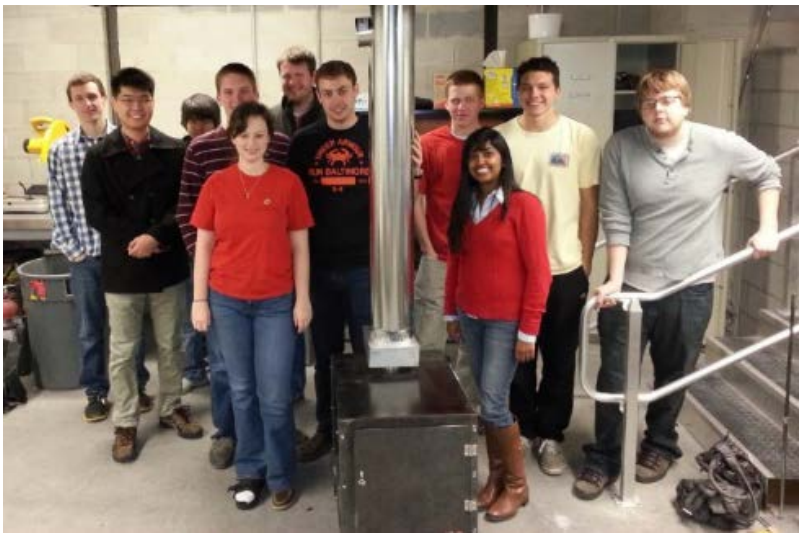
new rigorous test developed by NIST. The test is designed to reduce the degradation and possible failure of the facepiece lens in self-contained breathing apparatus (SCBA) under high-heat firefighting conditions. The 2013 version of NFPA's 1981 standard, published in January, 2013, contains a new "Elevated Temperature Heat and Flame Resistance Test." The new test and test conditions are important advances in improving the performance of what has been, perhaps, the most vulnerable component of a firefighter's protective gear in high-heat conditions. Failure of a lens can expose a firefighter to toxic gases and can result in burns to the respiratory tract as well as asphyxiation. Documented problems include holes and extensive crazing as well as bubbling and deforming of lenses. In several SCBA-related deaths, degraded masks were found affixed to the faces of victims who suffered thermal burns to their airways. More information is available at:

WUI HAZARD SCALE: A recent study of one of California's most devastating wildland fires by NIST and the U.S. Forest Service (USFS) strongly suggests that measures for reducing structural damage and property loss from wildland urban interface (WUI) fires are most effective when they are based on accurate assessments of exposure risks both for individual structures and the community as a whole. The report describes how the WUI Hazard Scale provides a state-of-the-art tool for making such assessments and how that data could be linked to improved building codes, standards and practices that will help communities better resist the threat of wildfires. The Witch Creek/Guejito WUI fire was the largest of a series of wildfires that began burning across Southern California on Oct. 20, 2007, burning some 80,000 hectares (nearly 200,000 acres), destroying more than 1,600 structures, causing an estimated $1.8 billion in property damages, and was responsible for two civilian deaths and 39 firefighter injuries. A NIST-USFS WUI team worked in collaboration with the California Department of Forestry and Fire Protection (CAL FIRE) and the City of San Diego to collect post-incident data within the Witch Fire perimeter. The team focused on The Trails development at Rancho Bernardo, north of San Diego which had 245 homes within the fire perimeter. Seventy-four homes were completely destroyed and 16 were partly damaged. Field measurements made by NIST included structure particulars, specifically roof type; proximity of combustibles to the structure; and damage to wildland and residential vegetation. Documentation included more than 11,000 photographs. The data collected and analyzed were used in two separate NIST-USFS reports. The first, issued in 2009, created a detailed timeline of the Witch Fire, tracked its impact on the community, and documented defensive actions taken by homeowners and first responders. The latest study evaluates the effectiveness of those mitigation techniques addressing exposure risks—as defined by the WUI Hazard Scale—associated with direct fire contact and ignition by embers. The researchers found that the majority of defensive strategies used by firefighters in The Trails were effective and that the level of effectiveness was correlated to fire and ember exposure. Damage and destruction were more prevalent in structures assessed by the WUI Hazard Scale as having been at highest risk from fire and embers. Accordingly, defensive actions were more than twice as effective in saving structures in low-exposure sections of the community as compared to high-risk areas.

FDS V6: Fire Dynamics Simulator Version 6 has recently been released. For more information, please see: http://www.nist.gov/el/fire_research/fds_smokeview.cfm

Signed: Anthony Hamins and Samuel Manzello, NIST

News from University of Maryland



TEAM MULCIBER: Team Mulciber, a group of students from the Department of Fire Protection Engineering competed in the Next Generation Wood Stove Design Challenge, an exciting international competition sponsored by the Alliance for Green Heat in Washington, D.C. The team was selected as a finalist and competed at the Wood Stove Decathlon on November 16-19 in Washington, D.C. and was awarded the lowest particulate emissions prize at the contest. Their design was featured in a Q&A by Popular Mechanics and a National Geographic Video. Team

Mulciber's wood stove design incorporates sensors to optimize performance. "By adding control systems with intelligent use of sensors, we were able to produce a stove that was cleaner, more efficient, and easier and more satisfying to use," said team captain Taylor Myers ('12; M.S. '13, Fire Protection Engineering). The team was advised by Dr. Stanislav Stoliarov, an assistant professor in Fire Protection Engineering.

WILDLAND FIRE COURSE: A new course, "Wildland Fires: Science and Applications" will be taught for the first time in Fall, 2014 here at the University of Maryland, College Park in the Department of Fire Protection Engineering by Prof. Michael Gollner. This course will present an introduction to the global problem of wildland fires with an overview of the social, political and environmental related issues. The course includes detailed coverage of the science, technology and applications used to predict, prevent and suppress wildland fires. Some specific topics covered will include relevant codes and standards, remote sensing, fire spread theory, risk mapping, research instrumentation, suppression, ignition sources and extreme fire behavior. Engineering analyses in many of these areas, as well as specific coverage of fire protection design in the wildland-urban interface will also be covered. The course will be taught as a dual senior-level undergraduate course and graduate course. See a flyer for the course along with an outline of topics covered here.

NSF CAREER AWARD: Assistant Professor of Fire Protection Engineering Stanislav I. Stoliarov was awarded a 5-year, $412,418 NSF CAREER Award for “Understanding Flammability of Charring Polymers.” His research project is focused on developing a quantitative understanding of burning for charring and intumescing polymeric systems. These systems represent one of the most promising and environmentally benign solutions to the hazards associated with polymer flammability. The mechanism of their flame resistance has not been well understood, hampering material development efforts. This project will produce an in-depth understanding of char growth dynamics in a wide range of polymeric systems including a new generation of biodegradable materials. This understanding is expected to transform the field of flame resistant material design and enable qualitative improvements in public safety.

GRANT ON GREEN BUILDINGS: The Department of Homeland Security has awarded a collaborative grant on the "Quantification of Green Building Features on Firefighter Safety" to Worcester Polytechnic Institute, the University of Maryland, College Park and others. This research effort will address needs identified by the National Association of State Fire Marshals, the Fire Protection Research Foundation and the National Fire Service Research Agenda to understand, quantify and address fire performance challenges of green or sustainable buildings as they impact firefighter safety. The University of Maryland will particularly contribute its expertise on smoke movement and buoyant flows to investigate the impact of natural ventilation systems on firefighter safety. The Principal Investigator is Brian Meacham (WPI) and co-investigators are Nicholas Dembsey (WPI), Michael Gollner (UMD) and Andre Marshall (UMD).

COVER OF APPLIED OPTICS: A paper from the Department of Fire Protection Engineering was featured on the cover of Applied Optics. The paper authors are Haiqing Guo (ME Ph.D. student), Jose Castillo (FPE MS 2012) and Peter Sunderland (FPE Associate Professor). The journal cover shows three images of a diffusion flame: a color image; an image at 650 nm; and a shadowgraph image at 632.8 nm. These images yield accurate measurements of temperature and soot volume fraction. The paper citation is: H. Guo, J.A. Castillo, P.B. Sunderland, Digital Camera Measurements of Soot Temperature and Soot Volume Fraction in Axisymmetric Flames, Applied Optics 52 (2013) 8040-8047.

REAL-TIME WILDFIRE MODELING: Profs. Gollner and Trouvé have been awarded a collaborative grant from the National Science Foundation with the University of California, San Diego to build an end-to-end cyberinfrastructure (CI), called WIFIRE, for real-time and data-driven simulation, prediction and visualization of wildfire behavior. The WIFIRE CI integrates networked observations, e.g., heterogeneous satellite data and real-time remote sensor data, with computational techniques in signal processing, visualization, modeling and data assimilation to provide a scalable, technological, and educational solution to monitor weather patterns to predict a wildfire’s Rate of Spread. More information may be found by reading the NSF Award Abstract or visiting the project website, WIFIRE.ucsd.edu.

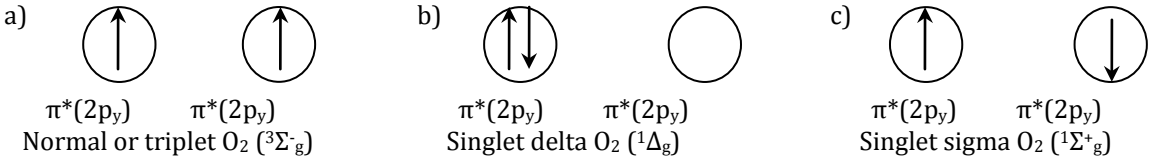
LEGACY CAMPAIGN FOR A PROFESSOR OF THE PRACTICE: Fire Protection Engineering graduates from the University of Maryland are rallying around their department to support the Legacy Campaign for a

Professor of the Practice to help ensure students stay current on the latest technologies used in the field. "Our graduates must be prepared to become practicing fire protection engineers," explains Fire Protection Engineering Department Chair James Milke. "The main purpose of the professorship is to preserve the connection of the department to the profession and to the applied side of the field." The department began to promote the fundraising effort last June with a public announcement in November. Already, it has raised close to $1 million of its $2.5 million goal. A naming opportunity for the professorship is still available. For more information on how you can contribute to the Legacy Campaign for a Professor of the Practice, contact Allison Corbett at 301-405-5841 or acc@umd.edu.

Signed: Michael Gollner, University of Maryland

News from Murdoch University

The Fire Chemistry research group headed by Prof Bogdan Dlugogorski is moving from the University of Newcastle in New South Wales to Murdoch University in Western Australia. Work is in progress to build a new laboratory to accommodate the group at Murdoch, to be completed in early 2014. Recently, the group has been awarded a prestigious Australian Research Council grant to investigate the initiation reactions that underpin the commencement of self-heating. The key to this project is the hypothesis that the initiation reactions of the self-heating process involve an electronically excited species of oxygen, the so-called oxygen singlet delta that forms spontaneously by photosensitisation in same materials (e.g., linseed oil with chlorophyll as a sensitiser present in pressed oil) or thermally in others (e.g., coal,via surface reaction on particles of silica, alumina and transition metals). Enhanced reactivity of singled oxyge arises due to its electrophylic nature and its high energy level of 94.1 kJ/mol above the ground state oxygen. Oxygen singlet delta induces low temperature initiation reactions with electron-rich chemical moieties in the structure of susceptible materials. At 25 °C, these reactions are slow but nonetheless, according to our estimates, proceed at sufficient rates to form first radical species, which then react further with the ground state oxygen resulting in the materials' self-heating and ignition, via relatively well known peroxy chemistry pathways.



Location of the last pair of electrons for normal ground state (a) and electronically excited species of oxygen (b and c).

Signed: Bogdan Dlugogorski, Murdoch University

News from P' institute Poitiers University

One of the priorities for P' Institute-Poitiers University-ISAE-ENSMA is to develop partnerships to create synergy and to pool the talents and skills of every actor managing fire safety. This includes researchers, industry, public institutions, fire-fighters and others. Our fire safety research group positions itself as a key player for the animation of French research on fire dynamics and security concerns. The present news are an illustration of those kinds of collaborations.

FIRECOMP EUROPEAN project title is "Modelling the thermo-mechanical behavior of high pressure vessel in composite materials when exposed to fire conditions". The main objective of the research program is to develop a model of thermal decomposition of hydrogen storages to describe their behaviour (decomposition, Mass Loss Rate, mechanical properties, etc.) when exposed to fire. When established and validated, this model will be coupled to a simulation modelling tool allowing to describe the evolution of mechanical properties, in order to represent numerically the global behaviour of storages in the case of a fire. This project includes different European partners as Air Liquide, CNRS, INERIS, University of Edinburgh, UK Health and Safety Executive and LMS Samtech.

COLLABORATION WITH FIREFIGHTERS: The work engaged with fire-fighters since more than one year from now and which consists in a formation exchange program, have ultimately led to the signing of a collaboration agreement. Thus, the group members offer to fire-fighters some formations on fundamentals of fire phenomena that allow them to better appreciate how a fire can grow and evolve. The aim of this type of formation is to provide knowledge to firefighters about thermal phenomena such as flashover. In exchange, firefighters provide access to their training facilities, and allow researchers to measure and evaluate various parameters related large scale fires. Recently, an experimental campaign have been led,

in association with LEMTA (Nancy University) and have permitted to evaluate the temperature and irradiance levels a fire-fighter can be exposed to, thanks to sensors placed on fire jackets. Moreover, this campaign was also important to improve health and safety of firefighters.

Figure 1: Members of Pprime Institute have experiment the firefighters' training

FIRE SAFETY SCIENCES EDUCATION: In order to train new valuables collaborators or interlocutors in industrial firms, the Poitiers University offered the workgroup the opportunity to develop a new formation on fire safety. This formation is supported by l'Institut des Risques Industriels Assurantiels et Financiers (IRIAF) which is an academic leader for the formation in the field of risk assessments and management. During one hundred and twenty hours, it allows Master students to learn more about fundamentals of fire phenomena and to develop a vision of fire safety based on risk assessment which is their speciality. This new formation had opened in September and the courses have finished in the end of December. We wish the students to be successful for their final exams.

SYMPOSIUM ON FIRE SAFETY SCIENCE: The P' Institute workgroup accesses new responsibilities in organising meetings in the field of fire safety. Next January, in IRIAF, will be held next "Groupe de Recherche" in Fire Safety from the C.N.R.S. (Group of research). This event allows French academic and industrial researchers to present their work to a large community which includes all the fire safety actors in France. This event will take place January 23rd, 24th in Niort. During the two days, speakers will tackle subjects like toxicity, visibility, thermal constraints, source term, up-scaling and needs and expectations in terms of evacuation. For more information, a new website was developed at http://gdrfeux.federation.univ-lorraine.fr. Moreover, another event on fire safety management will be held in the same place. The latter is called **FORUM** and it will be organised over two years by students from IRIAF on different subjects in connection with risk. More information on http://iriaf.univ-poitiers.fr

Signed: Thomas Rogaume, P' Institute

News from State Key Laboratory of Fire Science

On Dec. 16, 2013, the Members' Day of CAST (China Association for Science and Technology) and the award ceremony of 13th National Award for Youth in Science and Technology was held in the Great Hall of the People in Beijing. Professor Weiguo Song and other 98 researchers in China achieved this award. Prof. Song is a member of IAFSS, works at the State Key Laboratory of Fire Science of the University and Science and Technology of China.

The National Award for Youth in Science and Technology is oriented to the broad masses of young scientific and technological researchers in China. Its aim is to cultivate a group of young academic leaders in the frontiers of world science and technology, to praise and award their outstanding achievements in the national economic development, social progress, science and technology innovation, and to motivate them to make new continuous contributions. The award was issued every two years to no more than 100 winners. Totally 1297 researchers and 1 research group were awarded in the past 13 sessions since 1987. Among them, 40 winners have been elected as academicians of the Chinese Academy of Sciences and 28 winners have been elected as academicians of the Chinese Academy of Engineering.

In the past decade, Prof. Weiguo Song have been devoted to studies of evacuation models that reflect the fundamental forces of crowed evacuation under fire environment, evacuation analysis methods

considering both efficiency and accuracy. Some of his research results have been applied in dozens of large public buildings such as the Beijing Olympic Stadiums, Potala Palace and so on. His collaborative work with Dr. Jason Averail et al. at NIST on stairwell counterflow of pedestrians promoted the revision of the International Building Code. In the past years, Prof. Song has achieved the second-class National Award of Science and Technology Progress, Lu Jia Xi Youth Excellence Prize of Chinese Academy of Sciences, Science and Technology Award for Young Scientist of Anhui Province, first-class Huaxia Construction Award for Science and Technology, first prize of Science and Technology Award of the Ministry of Public Security and other awards.

Signed: NaiAn Liu, State Key Laboratory of Fire Science

News from SP Fire Research

SP Fire Technology and Sintef NBL, the Norwegian Fire Research Laboratory, have been working closely together since 2012. Starting January 2014, SP is the majority owner of NBL, and we are now taking further steps to strengthen our co-operation. One such activity is that both organisations are changing names to SP Fire Research. SP Fire Research is active in Fire Safety Engineering, support to national and international legislation, off-shore safety, risk analysis, testing, certification, inspection, to name but a few areas. The group works globally and both parts of SP Fire Research are expected to continue growing in 2014 and by the end of the year we plan to have a staff of approximately 130 people, including about 50-60 people dedicated entirely to research of which approximately 20 hold a PhD and 5-10 are working on their PhD thesis. For more information go to http://www.sp.se and http://www.sintef.no

Our research is typically divided into the following fields: the built environment, tunnel fire safety, industrial fire safety, transportation, fuel storage safety, shipping and offshore safety, and across the whole fire discipline from fire resistance to fire protection and reaction-to-fire. In recent years there has been a particular focus on expanding our expertise in modeling complex fire environments. Other research topics include: sustainability, risk assessment and resilience, tactical response and human behavior. Numerous EU projects are ongoing in several of these fields, i.e. Fire-Resist, DEROCA, SafePellets, Adam4Eve, SESBE, PolyGraph

One fast growing area is fire safety related to off-shore. We recently were awarded a large project (OffshoreVäst) aimed at supporting safety in developing energy production and production of raw material at sea. Further, the Norwegian arm of SP Fire Research has long experience of evaluating and assessing risks associated with off-shore activities. The new leader for SP Fire Research in Norway, Paul Halle Zahl Pedersen, has his background in leading positions within the off-shore industry and will be a valuable addition in this area

Recently SP Fire Research finalized an expansion of office and laboratory space in Borås. The increase is about 1000 m2 and comprises another 32 offices and a laboratory where laser measurements of flow fields for example water mist, PIV technology, can be conducted.

EDUCATION: SP Fire Research is increasingly involved in education which includes delivering university courses, tutoring PhDs, practical courses for fire investigation, CE-marking, EGOLF courses for testing etc. In Norway specific course packages are given for, e.g., the off-shore industry. We co-operate with Lund University, Luleå University of Technology and Mälardalen University giving courses in heat transfer, CFD, and fire dynamics for students taking courses in fire safety engineering. A textbook/handbook in fire dynamics for tunnels and underground constructions is about to be published. In support of this activity we hold four positions as professors at these universities. During 2013 Anders Lönnermark became

adjunct professor at Mälardalen University and Haukur Ingason moved position to become adjunct professor at Lund University. We are delighted to see that Luleå is advertising a full time position for a professor in Fire Technology. The plan is to expand the fire protection engineering course programme in Luleå.

FIRE SPALLING OF CONCRETE: In September, 2013, Robert Jansson presented his doctoral thesis "Fire Spalling of Concrete – Theoretical and Experimental Studies" at KTH Royal Institute of Technology in Stockholm, Sweden. One important conclusion of his work is that fire spalling of concrete cannot be regarded as a material property since it depends on many different factors such as the geometry of the fire exposed structure, how and to what extent the structure is mechanically loaded and the severity of the fire. Robert will continue to work in the field of fire and concrete within European standardization, i.e. the revision of the Eurocode, and as secretary in a newly formed RILEM committee with the aim to develop suitable test procedures for the evaluation of concrete exposed to fire, especially with respect to fire spalling.

RECENT PUBLICATIONS include SP Report 2013:61 "Thermal exposure from burning leaks on LNG hoses: experimental results" that summarises a series of tests aimed at estimating the thermal impact to surroundings from damaged Liquefied Natural Gas (LNG) hoses pressurized to approximately 10 bar. The report is part of ongoing work by the Swedish Gas Association to address a lack of guidance on how to design filling stations supplying liquefied natural gas (LNG) with respect to fire safety. The results of temperatures of insulated surfaces, incident heat flux and flame dimensions are reported.

Another recent report is SP report 2012:49 "Small-scale methods for assessment of risk for self-heating of biomass pellets". One major concern when it comes to storage of wood pellets is the risk for self-heating. This risk varies between different types of pellets and also depends upon how the pellets have been handled and on the storage conditions, e.g. the temperature and humidity. Within the framework of the research project "Large scale Utilization of Biopellets for Energy Applications –LUBA" different laboratory-scale methods have been used to study different thermal properties and the propensity for self-heating for different types of pellets. The different methods used include micro calorimetry (also called isothermal calorimetry), basket-heating tests and transient plane source (TPS). Comparing the reactivity rates from the basket-heating tests and those from the isothermal calorimetry tests with the same type of pellets, both methods give the same ranking of reactivity. It was shown that the TPS-method is applicable for the determination of thermal properties both for measurements on single pellets and for measurement on bulk pellet material. All reports by SP can be downloaded from www.sp.se. SP Fire Research also publishes the newsletter Brandposten twice annually in English, Swedish and Norwegian.

ISTSS 2014: SP is organising the 6th International Symposium on Tunnel Safety and Security (ISTSS) which will be held in Marseille, France, 12-14th March, 2014. We are proud to note that IAFSS is an Honorary Sponsor of this event. Tunnel safety and security is a challenge for both private and public sectors. ISTSS provides a forum over 2½ days to discuss current practice and emerging trends and research in the field of tunnel safety and security. Each day will be opened by invited Keynote Speakers, leaders in their field, providing an overview of their topic of expertise as an introduction to the themes of the day. For more information, visit http://istss.se

Signed: David Lange, Björn Sundström, Fredrik Rosén, Lars Boström and Jonatan Gehandler, SP

About *the* IAFSS

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IAFSS was founded 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. The International Association for Fire Safety Science perceives its role to lie in the scientific bases for achieving progress in unsolved fire problems. It will seek cooperation with other organizations, be they concerned with application or with the sciences that are fundamental to our interests in fire. It will seek to promote high standards, to encourage and stimulate scientists to address fire problems, to provide the necessary scientific foundations and means to facilitate applications aimed at reducing life and property loss. Since its inaugural meeting, the IAFSS has grown to more than four hundred members.

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FEATURED ARTICLE

A Guide to the Upholstered Furniture Fire Problem and TB 117

by John R. Hall, Jr.
National Fire Protection Association

Those of us in fire safety science try to 'solve' big parts of the fire problem, where 'solve' means a large reduction. Typically, a proposal for a new solution must overcome objections along the following lines:

- The solution won't work. It is unreliable or ineffective.
- The solution costs too much. The benefits of are smaller than the costs.
- Other solutions are better. Changing behavior or changing some other involved item (e.g., switching between heat source and item ignited) would be better.
- The solution creates bigger problems (other types of harm) than it removes.
- The targeted fire problem is not that big and/or is declining rapidly. It does not need a solution.

Sometimes objections like these are accurate and deserve to be factored into the societal decisions about a particular solution. However, accurate or not, they will always be raised by parties who prioritize other factors over fire losses.

We have been working on the upholstered furniture fire problem for half a century. Along the way, we have built a consensus on what solutions work, how well they work, how much they cost, how much they are needed, and what non-fire consequences they have. More recently, that consensus has come unstuck because of accumulating evidence that some of our "solutions" create serious non-fire problems.

The signal event marking this changing consensus was the 2013 decision in California to delete the small open flame portion of the requirements contained in Technical Bulletin 117. This is – or was – the only regulation in North America that addressed non-smoldering fires involving upholstered furniture. Because California is such a large part of the North American market, TB 117 had an impact far beyond the state of California. I will leave it to others to describe the growing concerns with flame retardant treatments of upholstered furniture and associated effects on people's health. In the limited space available here, I want to frame the discussion of what we should do next in terms of the size and characteristics of the fire problem. Our challenge is to develop a best estimate of the challenge we face, and then consider the pros and cons of alternative strategies to address that challenge.

From 1980-1984 to 2006-2010, estimated annual average home fires and losses involving upholstered furniture as the first item ignited declined substantially (see figure).

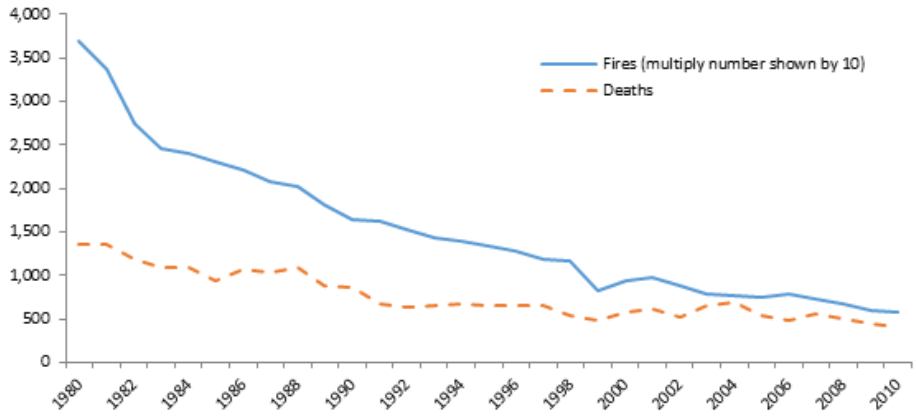


Figure: Number of US home fires and deaths with upholstered furniture as the first item ignited.

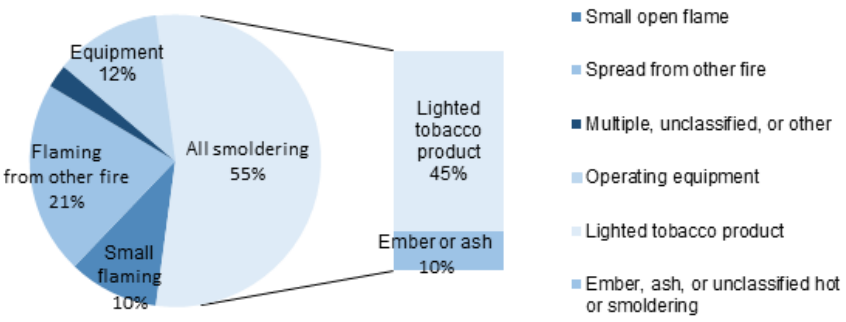
During this decline, civilian deaths declined by 61%, from 1,220 (25% of total home fire deaths) to 480 (19%), and fires declined by 77%, from 29,400 (4% of the total) to 6,700 (2%). Moreover, civilian injuries declined by 68%, from 2,630 (13% of the total) to 840 (7%), and direct property damage, after adjustment for inflation to 2010 dollars, declined by 17%, from $522 million (7% of the total) to $434 million (6%).

On the one hand, this is a story of great progress, with hundreds of lives saved each year. On the other hand, this remains one of the largest parts of the U.S. fire death problem.

U.S. fire statistics are based on the National Fire Incident Reporting System (NFIRS), dating back to 1980. Starting in about 2003, changes to NFIRS made it possible to estimate fires associated with a product in the role of the most important secondary item ignited. Using this new data (see 2nd row in the table below), NFPA constructed the following analysis considering all of the large pieces of data in the furniture fire problem.

	Fires	Civilian Deaths	Civilian Injuries	Direct Damage (in US$ millions)
Lighted tobacco product	1,900 (21%)	270 (45%)	320 (29%)	$97 (17%)
Open flame from other fire (secondary item)	2,200 (25%)	130 (21%)	280 (25%)	$138 (24%)
Operating equipment	1,500 (17%)	70 (12%)	140 (13%)	$81 (14%)
Small open flame	1,400 (16%)	60 (10%)	220 (20%)	$69 (12%)
Ember, ash or other or unclassified hot or smoldering object	1,300 (15%)	60 (10%)	130 (11%)	$150 (27%)
Unclassified, other or multiple heat source	600 (7%)	20 (3%)	30 (3%)	$31 (5%)
Total	8,900 (100%)	610 (100%)	1,120 (100%)	$566 (100%)

Table: Upholstered furniture home fire problem, 2006-2010 averages, by major scenario



The figure to the left shows upholstered furniture fire deaths by type of ignition source. This comprehensive overview tells us some useful things. Lighted tobacco products (principally cigarettes, cigars and pipes, but not including matches and lighters) account for 45% of upholstered furniture home fire deaths, dwarfing any other scenario but not dwarfing all other scenarios combined.

The 12% share for operating equipment and the 10% share for ember, ash or other or unclassified hot or smoldering object, both could be treated as likely smoldering ignitions, addressable by a smoldering fire test, but it is not clear that these fires are well represented by a lit cigarette applied to places where discarded cigarettes tend to land. The 31% of deaths associated with some kind of flaming ignition are numerous enough to justify our attention.

The question finally is what to do with this information. NFPA has been asked to develop a flaming-ignition test for upholstered furniture. In the process, we are considering not just small flaming ignitions but also ignitions by another burning object. Our goal is to be able to assess candidate technologies and designs for their effectiveness in addressing scenarios of importance. The question of when and whether to build binding requirements around any test is a separate question that involves other considerations.

I don't know anyone who wants to adopt a requirement that can be satisfied only by technologies that create more problems than they solve. I understand different parties have different opinions about the implications of the evidence for reliability, effectiveness, cost, and non-fire effects. I have a problem with anyone who wants to prejudge the debate by excluding certain fires or certain non-fire effects from the discussion. I know my employer, NFPA, is trying very hard to be a fair and honest broker in these discussions and to keep the discussion and the search for solutions comprehensive in every sense of the word. I hope readers of this piece will do likewise.

FEATURED ARTICLE

Effectiveness vs. Toxicity of Flame Retardants

by David Rich
Reax Engineering Inc

California's updated furniture flammability requirements specified in Technical Bulletin 117-2013 went into effect on January 1st, 2014 and new home furnishings meeting the updated requirements will reach consumers by the summer. Since nearly all furniture in the United States is manufactured to meet TB-117, the updated requirements are effectively a change at the National level.

My involvement as a fire scientist began several years ago when I was asked if I would volunteer time with an environmental NGO interested in balancing their concerns about fire retardant chemical toxicity with fire life safety concerns. In my work, I have noted that the fire science community is surprisingly unwilling to engage with this issue. It is surprising because of the potentially significant ramifications for life safety. Certainly this is not the first time that fire safety and chemical toxicity have intersected, e.g. certain Halons, asbestos, penta-BDE, chlorinated TRIS, etc.

In a recent, call for support on the issue, one colleague summarized his concerns in this way: "*I have opted for not getting involved in this matter because this debate is not founded on a proper understanding of the problem but only on shallow statements based on fractional understanding or on interests*." This statement nicely summarizes three dominant complaints from fire scientists on this issue; a lack of proper quantification of fire safety benefits, a lack of demonstrated adverse health effects, and the muddying of the issue with involvement of special interests. Space prohibits a complete review, but we can examine these complaints individually as follows:

Is there a fire safety benefit?

Summaries of important studies which compare standard polyurethane foam (no retardants) to that with flame retardants can be used to determine if the standard is effective. A handful of key studies are listed below which support the argument for a lack of a demonstrated fire safety benefit:

- Babrauskas, V. (1983) [1] This NBS study performed a quantitative assessment of the effect of fabric types, padding types (cotton batting, ordinary polyurethane foam, and California-requirements [TB117] foam), and frame types on furniture heat release rate. Conclusions: Comparable pieces of furniture containing ordinary polyurethane foam and TB117-compliant foam showed no measurable difference in peak heat release rates.
- Babrauskas, V., et.al (1988) [2]. This NBS study investigated the fire hazard of a wide array of fire-retardant (FR) containing products relative to non-fire-retarded (NFR), but otherwise substantially identical, products to evaluate bench scale methodologies in comparison to full scale tests. Conclusions: "The average available escape time was more than 15-fold greater" when all of the products in a room were highly flame retardant compared to a room containing non-flame retardant products. This statement has been misquoted by the flame retardant industry to imply that the use of TB117 compliant furniture alone would create such a difference in escape time. However, the study did not evaluate typical TB117 furniture with lower density foam and much lower levels of flame retardants. The flame retardant furniture was made with foam twice the density of typical furniture foam containing organochlorine, organobromine, and alumina trihydrate (35%) flame retardants. Typical furniture foam to meet TB117 contains ~5% of one organohalogen flame retardant.
- Talley, T. H. (1995) [3]. TB-117 type foam was evaluated to determine if there might be technical justification to add the TB-117 foam to the UFAC voluntary program. Conclusions: The treated foam made no significant, consistent difference in either ignition or flame spread.
- Ray, D. R. (1997) [4]. This CPSC study presented information and options based on CPSC research and testing for addressing the risk of upholstered furniture fires ignited by small open flame sources and smoking materials. Conclusions: The CPSC found that "The bench scale component test in TB117 did not predict full scale ignitability (pg. 11)". Based on these results, CPSC concluded that TB117 was not effective and that "TB117…would not, if federally mandated, ensure a substantial reduction in the risk of small open flame ignition of finished articles of furniture (pg. 41)". The data demonstrated that FR polyurethane foam, as used in either California or the U.K., will ignite and continue to burn when a small open flame ignites its cover fabric.

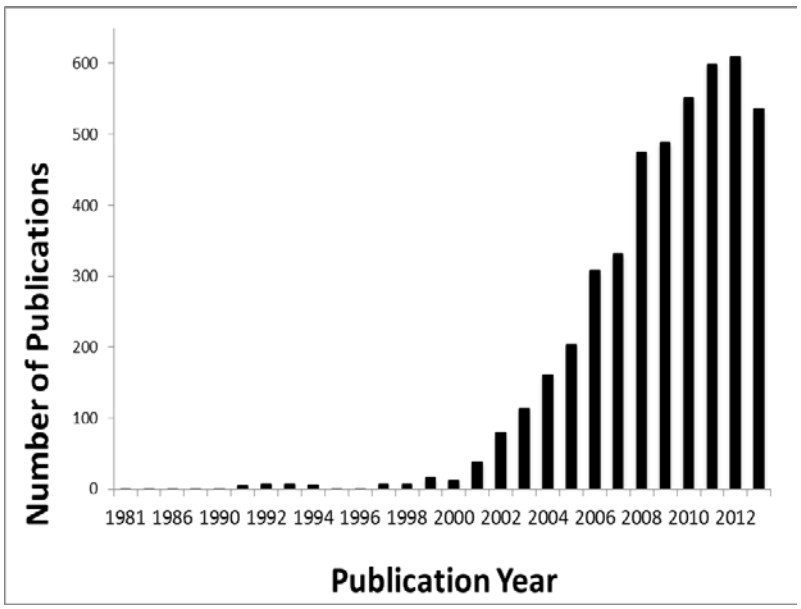
- Berkman, M., David, J., Liu, M., & Self, C. (2001) [5]. A study conducted at the request of the Upholstered Furniture Action Council (UFAC) which reviewed the CPSC's 1997 proposed small open flame standard for upholstered furniture flammability. Conclusions: "…the California standard (TB-117) does not appear to have had a measureable impact on the number of small open flame furniture fire fatalities (pg. 62)."
- Consumer Product Safety Commission. (2012) [6]. Following the 2008 notice of proposed rulemaking (16 CFR Part 1634), CPSC staff performed a series of tests to validate the methodology and to assess the potential effectiveness of the proposed standard. Conclusions: CPSC measured peak heat release rate and time to peak heat release rate and concluded that "…the fire-retardant foams did not offer a practically significant greater level of open- flame safety than did the untreated foams (pg. 26)."
- Blais, M. S. (2012) [7]. Blais analyzed data from the previous study Janssens, M. L. (2012) [8]. Conclusions: "The best conclusion that can be drawn from the data presented here is that the use of CA TB 117 foam increases the fire safety of home furnishings by delaying the onset of free burning conditions and reducing the total energy released by the event." Blais' conclusions were criticized for evaluating two samples which differed in their foam density and ignition location, both of which significantly affect time to peak heat release rate and peak heat release rate.

Most studies that compare standard polyurethane foam to that with flame retardants added find that TB117 foam is not effective at preventing ignition, decreasing peak heat release rate, or increasing time to peak heat release rate. This indicates that the TB117 regulation does not decrease fire hazard.

Are there demonstrated adverse environmental and health effects?

Flame retardant producers often state that there is no evidence that their chemicals are harmful. This argument is also made by some fire scientists who may acknowledge the limited benefit of fire retardants but who also see no evidence of harmful side effects or do not see the environmental side of the issue as relevant to fire safety decisions. This later point runs counter to the consensus approach which now includes environmental effects as a public concern. Regarding the former, establishing causality in toxicology is often a difficult process, especially when compounded by the manufacturer's ability to change chemical formulas in response to environmental concerns. In May 2012, A Chicago Tribune [9] investigative report on the fire retardant chemical issue quoted Deborah Rice, a former EPA toxicologist who works for the Maine Center for Disease Control and Prevention who said: "b*y the time the scientific community catches up to one chemical, industry moves on to another and they go back to their playbook of delay and denial*"

Linda Birnbaum, director of the National Institute of Environmental Health Sciences pointed out the difficulties of establishing causality with these chemicals "*This is not a case where we are looking for missing arms and legs,*" she said "*We're looking at reduced ability to learn, altered behaviors, decreased sperm count, premature ovarian failure — things that are more difficult to pick up in the standard studies*."



Nonetheless, studies in this area are numerous and increasing, with the ISI web of knowledge, reporting the total number of publications on one flame retardant family called PBDEs, currently at 4,562 (see bar chart). For a more detailed review of the conclusions of some of these papers documentation of these flame retardant's increasing levels and/or harm in humans, animals, and/or ecosystems, see Shaw et.al. [10].

Is the process tainted by special interests?

The chemical fire retardant issue has seen vigorous debate, primarily between scientists in human and environmental toxicology, and chemical industry representatives and scientists. In the run-up to their decision on the new TB-117, the state invited written comments and hosted several hearings

where there was strong representation from environmental, public health, industry and fire service organizations. But, in what is arguably the most important fire safety issue of the last two decades, regulatory action was approved without sufficient involvement from fire scientists. Yes, special interests cloud the debate with opinion and manipulation of facts, but the fear of a less than pristine, objective environment should not keep the valuable input of fire scientists from engaging in societies' important fire safety decisions. The fire retardant debate isn't over. In response to the California standard, NFPA's Standards Council has published a notice to solicit public comments on the need to establish a new test method to evaluate fire/ignition resistance of upholstered furniture subject to a flaming ignition source. In addition, interest groups in California are expected to sue the State Fire Marshall to overturn the updated TB-117 2013. Other vigorous debates are ongoing in areas of fire retardant use in electronics cases, printed circuit boards, and in commercial insulation systems. These debates will benefit from the involvement of our fire science community.

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FEATURED ARTICLE

Open Flame Testing of Upholstered Furniture and Fire Safety

by Marcelo M. Hirschler
GBH International

California has just eliminated the requirements - in effect since 1975 - that foams within upholstered furniture must pass an open flame test. It did this by replacing the traditional California TB117 standard by one that requires only testing for smoldering (cigarette) ignition, with the emphasis on fabrics. This action was supposedly prompted by two false reasons: i) flame retardants are toxic and ii) addressing smoldering ignition of upholstery fabrics will ensure fire safety. Both will be addressed here.

The assertion that flame retardants are toxic ignores much scientific work, primarily: i) a National Academy of Sciences study [1] that showed a lack of health or environmental effects by most flame retardants, ii) the comparison between the toxicity of the polycyclic aromatic hydrocarbons (especially benzo(a) pyrene or BAP) produced in all fires as a result of the soot and smoke released [2], which is orders of magnitude higher than that of any combustion product from a flame retarded material and iii) the vital benefit found in life cycle analyses of flame retarded products versus non flame retarded products conducted on TV sets, upholstered furniture and cables (mainly at SP in Sweden) [3].

Any blanket assertion such as "*flame retardants are toxic*" is equivalent to the discredited theory that vaccines are associated with autism. There have been hundreds of flame retardants in commercial use (since the first one patented in 1735). Out of this large number, a total of three materials have been shown to be associated with potential health issues and withdrawn from the market. They are: tris (2,3-dibromopropyl) phosphate (used for a short time in the 1970s for pajamas), pentabromobiphenyl oxide and octabromobiphenyl oxide (withdrawn in the early 20th century). In December 2009 all manufacturers started a voluntary phase-out of production (now complete) of a flame retardant in the same family as the last two, decabromobiphenyl oxide, in spite of the lack of proven health effects. Flame retardants are typically made with bromine (like the four above and many others) or with many other chemical components, especially chlorine, phosphorus, nitrogen, aluminum, boron and antimony. Some flame retardants are also used in household applications unrelated to fire safety. Therefore, any scientifically-based ban of flame retardants needs to address the specific material of potential concern and cannot be a generic catch-all.

Since the new regulation covers smoldering only it does not properly address the fire safety of upholstered furniture. Fires starting with upholstered furniture cause 19% of US home fire deaths (NFPA [4, 5, 6]. Smoldering fires and smoking materials fires will become deadly virtually only after their transition into flaming, at which point the heat release rate of upholstered furniture will play a key role and the smoldering potential will be a moot point. The key to low heat release rate from upholstered furniture is to ensure that the paddings don't release much heat. The fraction of upholstered furniture home fires that started with smoldering ignitions is only slightly higher (28% vs. 22%) in the US in 2005-2009 (latest available) than those which started with open flames. It is incorrect, therefore, to concentrate regulation only on a small added fraction while ignoring the effects from almost as many flaming fires as well as the effects of transition from smoldering to the much more dangerous flaming. Also, the percentage of upholstered furniture open flame fires in the US has increased slightly over the last 30 years (from 19% in 1980 to 20% in 2009) while the percentage of upholstered furniture fires that started with smoking materials has decreased dramatically (from 63% in 1980 to 27% in 2009). Therefore, fires starting with small open flames are still a very serious (and growing) problem, while fires starting with smoking materials are steadily decreasing. There were 16 times fewer such fires in 2009 than in 1980. Furthermore, NFPA statistics also show that, although smoking materials remain the leading cause of fire deaths in homes, all fire deaths in unintentional fires occurred when the fire was not confined (i.e. went

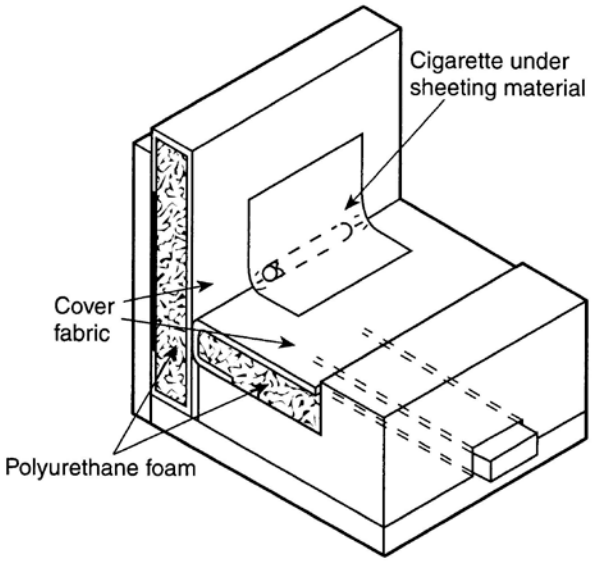
beyond the original item on fire). Details: in 2006-2010 there were 1,890 fire fatalities in home fires, including 620 fire fatalities from smoking materials in those home fires, but there were no fire fatalities from confined fires [6].

Regulation regarding fire must address not just fire hazard but also the probability of fire, or fire risk. The probability that fires starting with smoldering ignition sources transition into flaming is very large (work showed [3] that 64% of furniture items subjected to smoldering ignition eventually burnt with open flames while only 32% burned up partially or completely without erupting into flames). Therefore, the risk is large that serious fires (with high heat release) will occur if nothing is done to ensure resistance to open flame or to have materials that will generate very low heat release. Regulation that addresses smoldering only is severely deficient in that regard.

In its action on flaming ignition of upholstered furniture testing, California ignored the abundant benefits shown in the United Kingdom where fire losses and fire fatalities decreased dramatically after the laws associated with fire safety of upholstered furniture (BS5852) went into effect in 1988 and independent studies showed that 710 lives (and over £5 billion) were saved over the 10 year period following the introduction of the law [7]. Moreover, fire fatalities have decreased in the UK much faster than in the US.

It is clear that the open flame ignition test in the traditional CA TB117 is not a good enough solution, since it will not prevent upholstered furniture from reaching flashover, once ignited. However, studies show that it offers two great benefits: i) it prevents ignition from a match or equivalent and ii) when ignition actually occurs (following the use of a larger ignition source, such as BS5852 source), it delays the occurrence of a large fire by over a minute, providing additional time for escape and rescue [8, 9]. Moreover, fire losses have decreased faster in California than in the remainder of the US, probably, at least partially, due to CA TB117.

Recent research at Southwest Research Institute for the National Institute of Justice (NIJ) [10] has demonstrated the importance of open flame testing and has also shown that the combination of a flame retarded (using flame retardants to meet CA TB117) and a flame retarded fabric results in upholstered furniture with a much higher degree of fire safety. The furniture is not ignited by a severe ignition source (such as that in CA TB133) (the comparative video can be found in youtube). The NIJ study also showed that using CA TB117 foam decreases peak heat release rate, delays time to flashover and requires using a larger ignition source to achieve ignition providing increased times available for escape or for response by firefighters. State of the art flame retardant technologies can meet stringent open flame test challenges without inhibiting the smoldering performance of the polyurethane foam.



Furthermore, the new CA TB117 will reduce fire safety by leading to expanded use of synthetic fabrics which pass smoldering tests easily but cause severe flaming fires. It is well-known that virtually any fabric composed exclusively of synthetic materials (non-cellulosic) will pass a smoldering ignition even if it burns vigorously. Studies have shown that polypropylene fabrics (which always pass the smoldering test) almost invariably lead to large fires when used as furniture covers and subjected to even small open flame ignition sources [11, 12]. It has been shown that standard (non-flame retarded) polyurethane foam is one of the most easily ignitable polymers in common use [13] and that well flame-retarded polyurethane foams can be considered excellent fire performers [8, 14]. Thus, when polyurethane foam is appropriately treated with flame retardants, its fire performance can be enhanced considerably. That will happen only if open flame ignition of the foam is required to be assessed; the new CA TB117 ignores open flame testing of the foam.

It is possible to have an adequate level of upholstered furniture fire safety. Two simple solutions exist: i) adopting a test such as BS5852 crib 5 (with proven efficacy) or ii) adopting the test drafted in California in 2002 (known as CA TB117 Plus), but never implemented because of outside influences. CA TB117 Plus

allows for a higher level of fire safety in furniture without requiring the use of flame retardants and without requiring any specific technique for providing fire safety. An Alliance for the Polyurethane Industry [15] study, involving over 150 combinations of materials, showed that the test is suitable over a wide range of fire performance (from excellent to very poor), with repeatability similar to that of other fire tests. In the key approach of the test a laboratory-scale upholstered furniture mock-up is prepared from a selected fabric, interliner (if used), batting (if used) and flexible foam on a metal frame test rig and ignited with a small ignition source. Upholstered furniture can comply with CA TB117 Plus using barriers instead of flame retardants. An open flame ignition fire test such as this is a needed complement to a smoldering test for fire safety.

In conclusion, California's elimination of open flame testing for upholstered furniture composites or components will lower fire safety and unnecessarily cause higher fire losses.

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FEATURED ARTICLE

Purpose, Autonomy and Structure in Fire Safety Engineering Education

by Michael Woodrow
Foster + Partners, UK

There is a fundamental question in fire safety engineering education: *How much knowledge do fire engineering students need before they are able to work autonomously?*

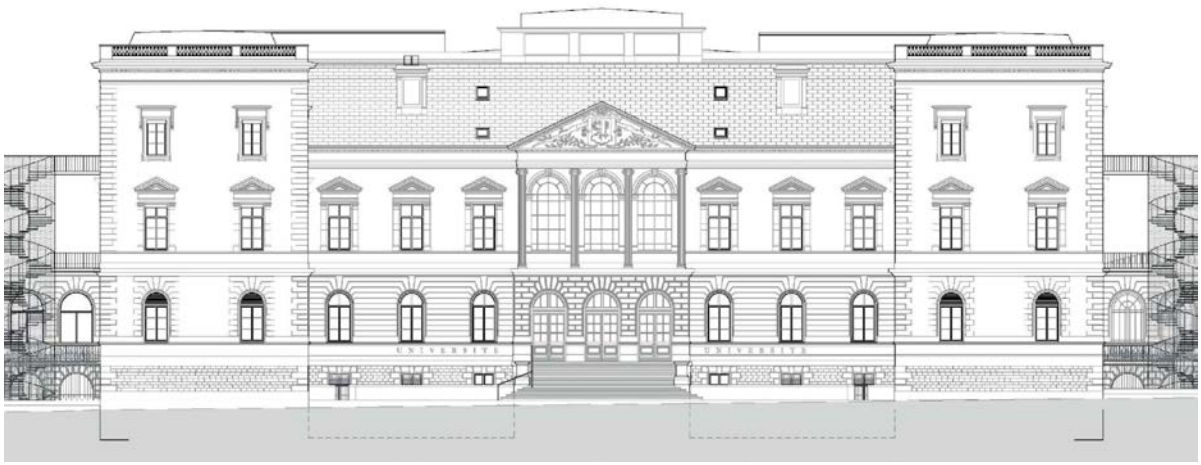
Several documents in the literature– including a recent report by SFPE [1] – explain what to teach in university [1, 2, 3]. The nature of fire safety engineering means that professionals working on unique building designs cannot simply follow a set of rules to achieve fire safety. A certain element of autonomous thinking is required.

One of the aims of my recently completed PhD study [4] was to find out how autonomous learning could be incorporated into a technical fire engineering course, and to try and answer the question posed above. During the study, various forms of teaching were trialled at the University of Edinburgh, with students from a range of backgrounds and degree programmes. It was found, somewhat unsurprisingly, that students only completed their university work if there was a perceived reason to do so i.e. a purpose.

This purpose could be either intrinsically motivating or extrinsically motivating. People are intrinsically motivated by tasks they find interesting and/or relevant; while people are extrinsically motivated by the promise of reward or the fear of punishment. A comprehensive literature review revealed that intrinsic motivation is a pre-requisite to creativity, innovation and autonomous learning. Traditional courses in contrast rely almost exclusively on extrinsic motivation (rewards and punishments) as a means to motivate students.

It is the responsibility of the educator to develop tasks that have an intrinsically motivating purpose – one that is likely to be interesting and relevant to any student wishing to pursue a career in fire engineering. Purpose was therefore established as the first step in education; but is merely understanding the goal enough to guarantee it will be achieved? The question still remains, how much can students do on their own and how much do they need to be taught?

To find the answer, a course was created at L'Ecole Polytechnic de Lausanne (EPFL). Sixteen second-year engineering and architecture students were tasked with fire-engineering a listed building in Geneva, Switzerland (see figure). On the first day of the week-long course they were given a tour of the existing building by the architect in charge of the renovation. During the tour the architect outlined the design brief, which formed the overall, intrinsically-motivating purpose for the course. On the second day the students were asked to form four groups. They were then asked to narrow their focus and to define one specific problem associated with the building's design. One group for example identified a lecture theatre positioned at the end of a corridor, effectively giving occupants only one means of escape. Each group identified a different problem that they deemed to be the most significant, and therefore the most interesting. The final three days were focused on developing solutions to these defined problems, and supporting these solutions with scientific evidence.



Two academic tutors with extensive knowledge of fire science and engineering supervised the students throughout the week. The tutors encouraged the students to work autonomously and worked to improve students' confidence in their own ability. There was no set content to the course. Instead, the tutors only gave information in response to questions asked by the students. The students were able to do the vast majority of the work autonomously by relying on their own reasoning and gaining information from a range of sources, including library books and the Internet.

The students thoroughly enjoyed the course, worked hard and were very complementary of the tutors. Furthermore they created solutions that were assessed by a panel of building design professionals – including the project architect, local building regulator and a professional fire engineer – all of whom deemed the work to be of very high quality.

The course showed that students, without being taught any fire science or engineering principles beforehand, could produce fire safety solutions to unique problems. Furthermore, they could support their solutions using fundamental, discipline-specific knowledge.

Thus the answer to the question of how much information needs to be taught appeared to be this: Each student is unique, with a unique set of skills, knowledge and interests, therefore a group of students will require different amounts of information from educators to complete the same task. Some will require everything, others will require nothing. If the students are to be innovative and extrinsic motivation is to be preserved however, then the students must first have a clear, interesting purpose and then be supported to work autonomously, make mistakes and learn. The short study described above found that the vast majority of students did not need to be taught anything before they were able to complete the task autonomously (they had a clear purpose); however some did require information periodically to improve their solution – to improve its technical accuracy. The crucial conclusion from the above study was that information should only be offered once students have indicated a clear need for it; and if the purpose is clear then they will simply ask for it.

The study helped develop a methodology for fire safety engineering education. An educator wishing to encourage creativity and critical thinking as well as the acquisition of technical knowledge in context should provide the following, in order: Purpose, Autonomy and Structure. Purpose is the reason to learn, and it can be either intrinsically motivating or extrinsically motivating; Autonomy is the act of thinking and working independently and can be supported by improving students' confidence in their own ability; Structure is the substance of the course – the schedule and the provision of useful information in a descriptive (not prescriptive) way.

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CONFERENCE REPORTS

4th Fire Behavior and Fuels Conference, Raleigh and St Petersburg

The 4th Fire Behavior and Fuels Conference, an conference of the International Association of Wildland Fires (IAWF), was co-organized by Tomsk State University, Worcester Polytechnic Institute and IAFSS.

This edition was quite peculiar as in order to extend its international outreach and create more opportunities around fire research, a second edition was held in St Petersburg, Russia on 1-4 July 2013, in addition to the US edition held in Raleigh on 18-22 February 2013. The US edition has been mentioned earlier in the previous issue of this newsletter (No. 35), so let us focus on the Russian edition and on the awards.

The Russian edition was a success, with around 150 attendees from all around the world with a large participations of our colleagues from Russia, 7 keynote presentations, including Prof. Jose Torero for IAFSS, plus 75 oral presentations and over 40 posters representing the last research developments in fire behavior and fuels (see the program at www.iawfonline.org/2013FuelsConference). The three days of parallel sessions were preceded by a day with 5 workshops to present new applications developed in research and now available to end-users. Among those, a half-day workshop was organized by *International Journal of Wildland Fires*, the official journal of IAWF, to train non-native speakers to publish in scientific journals in English.

In addition to the technical part, a boat trip was organized along the Neva river. The excellent weather and the period of the year, the famous white nights, made it a memorable evening for all the participants (nothing related to the free pizza, beer and wine). The conference dinner was held in a nice restaurant on a beach along the Baltic Sea. The traditional Russian band set the tone of a decadent dinner (food but also many toasts and some dancing too) that the participants will remember for a long time. The sunset on the Gulf of Finland was also pretty amazing. Finally, a field trip was offered to the participants at the end of the conference in a nearby forest that was damaged by a recent wildfire. It was funny to see all the ecologists amazed by little plants and fungi, and all the fire scientists walking carelessly around and only looking at the destruction caused by the fire.

IAFSS, as co-organizer of the conference sponsored several awards for the two editions that included $500 prizes. The awarded papers are the following.

Raleigh:

- Best paper. "First Look at Smoke Emissions from Prescribed Burns in Long-unburned Longleaf Pine Forests" by Timothy Johnson, Sheryl Akagi, Robert Yokelson, Ian Burling, David Weise, James Reardon and Shawn Urbanski.
- Best applied paper: "Fire behaviour prediction tools for fire managers - lessons learned from tools development in New Zealand" by H. Grant Perce and Veronica R. Clifford.
- Best student paper: "Observations of fire behavior on a grass slope during a wind reversal" by Diane Hall, Allison Charland, Craig Clements, Daisuke Seto, Jon Contezac and Braniff Davis.

St. Petersburg:

- Best paper: “Mathematical Modeling of Crown Forest Fires with Fire breaks” by Valeriy Perminov.
- Best student paper: “Relating Vertical Wind Profiles to Vegetation Structure for Fire Behaviour Prediction” by Kangmin Moon, Thomas Duff and Kevin Tolhurst.

- Best applied paper: “Multi-scale Simulation of a Very Large Fire Incident. Computation from the Combustion to the Atmospheric Meso-Scale” by Jean-Baptiste Filippi, Celine Mari C. and Frédéric Bosseur.

Two special issues are in preparation in *International Journal of Wildland Fire* and *Fire Safety Journal* that will present a selection of the best contributions presented during the US and Russian editions.

Signed: Albert Simeoni, University of Edinburgh

3rd International Workshop on Concrete Spalling due to Fire Exposure, Paris

After the two first successful workshops in Leipzig in 2009 and Delft in 2011, the 3rd International Workshop on Concrete Spalling due to Fire Exposure was held in Paris from 25 to 27 September 2013. This event was co-organized by Centre Scientifique et Technique du Bâtiment (CSTB) and Institut National des Sciences Appliquées (INSA) de Rennes and supported by Fédération Internationale du Béton (*fib)* and The International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM).

Controlling the sensitivity of concrete to its spalling behavior during fire exposure is one of today's major issues in the design and construction of concrete structures. Fire scenarios – as for instance the Channel tunnel fire in early 1996 – have demonstrated that spalling of concrete can have serious structural and economic consequences and is a phenomenon that should be taken into account when designing concrete structures against fire. Developments in concrete mix design have led to new types of concrete - such as high strength, ultra-high strength and self-compacting concrete – which, despite an increased structural performance, have also shown a different sensitivity to spalling due to fire exposure. However, until now, this sensitivity to spalling of concrete as a structural material is not fully understood. More research is needed to understand the mechanisms governing spalling of concrete in order to be able to quantify the risk as well as the consequences of spalling in a given fire situation.

The workshop aims were to establish the current state of the art, to exchange results and to stimulate discussion. The workshop was attended by more than 90 participants coming from 20 countries. The technical program featured 33 oral presentations and 7 posters with short oral presentations. The proceedings are available online on the RILEM and MATEC websites.

The main topics that have been selected for the workshop were based on recent achievements and advancements in both theoretical and experimental research. Progresses made in the field of fire design of concrete structures were also included. Therefore, contributions were addressing the understanding of underlying processes, key properties and global behaviour of spalling under various conditions. As a post event, attendees visited the new modular large size furnace VULCAIN (9 m x 3 m) in CSTB near Paris.

Next workshop will be organized in Leipzig by MFPA and Delft University of Technology on October 8th and 9th, 2015. It will be combined with the 4th International Conference on Concrete Repair, Rehabilition and Retrofitting (ICCRRR).

Signed: Pierre Pimienta, CSTB, and Fekri Meftah, INSA de Rennes.

1st International Seminar for Fire Safety of Facades, Paris

The 1st International Seminar for Fire Safety of Façades (FSF2013) was successfully held on November 14-15 2013 in Paris, France. The event was organized by CSTB and aimed at bringing together international engineers, scientists, practitioners, manufacturers and regulators in all areas related to fire safety for facades to share the knowledge acquired through research results and studies, to hear about the latest state of the art papers and to exchange and develop ideas with peers in a friendly atmosphere.

The scientific committee received about 50 submissions which led to 38 papers published in the proceedings that are available for free on the website of Matec Web of Conference. Topics of the seminar included test and assessment methods, fire safety engineering, façade systems, standardization and regulation, case studies, products and material. About 190 participants coming 32 countries attended the seminar and listened to 23 oral presentations and 15 posters.

The next edition of the seminar is planned in Sweden for 2015 or 2016.

Signed: Stéphanie Vallerent, CSTB

Fire Safe Use of Wood Network, Stockholm

November the 21st and 22nd saw the most recent meeting of the Fire Safe Use of Wood network, hosted by SP Wood Technology in Stockholm. The network continues to grow, and this meeting was attended by 22 persons in total, representing 14 different countries and 4 continents including North America, Australia, Asia and Europe. Comprising experts in fire safety in timber buildings and representatives of the forest industries, the timber industries, research institutes and regulatory bodies, the objective of the network is to promote the use of wood in buildings by addressing issues related to the perceived fire risk in timber buildings and achieving harmonisation in regulation of timber buildings globally.

During the meeting the current regulatory situation in different countries was discussed, as well as other news on standardisation; coming conferences and potential opportunities in Horizon 2020. Koji Kagiya of the Building Research Institute in Japan gave a presentation on a series of full scale fire tests of timber school buildings recently completed outside of Tokyo. Andrew Dunn, CEO of the timber development association in Australia gave an overview of timber fire research in New Zealand and Australia. Robert Gerard of Arup in the US presented details of a survey conducted by Arup on behalf of the fire protection research foundation entitled “Fire Safety Challenges of Tall Wood Buildings”.

The next meeting is scheduled for 8th and 9th of May in Stockholm. For more information contact Birgit Östman or Joachim Schmid (Birgit.Ostman@sp.se, Joachim.Schmid@sp.se).

Signed: Birgit Östman and David Lange SP

Automatic Sprinklers in Domestic Buildings, Hong Kong

A Continuous Professional Development Lecture on fire protection by residential sprinklers was organized on 9 January 2014 at The Hong Kong Polytechnic University with over 200 participants in the fire engineering profession. Results of preliminary experiments were reported and the necessity of having a sprinkler system in residential buildings was pointed out. The experiments were carried out with the support from the Hong Kong Fire Services Department, the Hong Kong Institution of Engineers - Fire Division, a local testing laboratory and of course, Research Centre for Fire Engineering, Department of Building Services Engineering, The Hong Kong Polytechnic University.

Most of the domestic units in Hong Kong are located in highrise buildings in urban areas. Starting from 1960s, many domestic buildings were built up to 6 storeys high. In 1970s to 1990s, most of the domestic buildings were built with at least 20 storeys. Nowadays, domestic buildings with 40 storeys to 70 storeys or even more are very common. It was reported two years ago that such residential buildings have fire load densities over 1400 MJm^{-2}, much higher than the local limit of 1135 MJm^{-2} imposed by the regulations. Consequently, more than half of the fires occurred in domestic premises. Without any active fire suppression systems in residential buildings, particularly those small flats with open kitchens, an accidental fire could only be tackled by firefighters after the fire had been discovered and reported. Those tragedies can be avoided or alleviated by improving or enhancing the local fire safety requirements.

This lecture was held at the new PolyU campus Block Z housing the Faculty of Construction and Environment, where Department of Building Services Engineering is one of the four departments in the faculty. A Fire Engineering laboratory will be established with a new cone calorimeter, water suppression research rigs and other bench-scale equipment for supporting quality teaching of fire engineering students at PolyU in mid-2014.

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

CALL FOR PAPERS

New publication, Case Studies in Fire Safety

The new publication, *Case Studies in Fire Safety* provides a forum for the rapid publication of short, structured *Case Studies in Fire Safety* and related short communications, and will provide an essential compendium of case studies for fire protection engineers, designers , researchers and other practitioners in the field of fire safety who are interested in all aspects of fire safety.

Alongside high quality theory-based research, insights into and sharing of practical design solutions is needed to address many problems relating to fire safety. *Case Studies in Fire Safety* provides a resource for the sharing of such insights and solutions. It will offer a valuable resource for practitioners and researchers working in all fields of fire safety. Published papers will be short and technically focused, rapidly reviewed and disseminated in an Open Access forum. All authors will be given feedback on the number of times their paper has been downloaded with information on the geographical distribution of the downloads.

The list of topics *Case Studies in Fire Safety* will cover is wide, and will include (but not be limited to): fire chemistry and physics, fire dynamics (including gas explosions), active fire protection systems (including detection and suppression), fire performance of structures, passive fire protection methods, people/fire interactions (physical, physiological and psychological), fire safety management, assessment and quantification of fire risk (including acceptability of risk), fire investigation, fire safety design (including consumer items, industrial plant, transportation, buildings), fire safety legislation, and fire safety education.

With this in mind, I would like to welcome you to Case Studies in Fire Safety.

Signed: Peter Johnson, Arup, Editor-in-Chief of Case Studies in Fire Safety.

Data Mining Competition: Key risk factors for Fire Service

AAIA'14 Data Mining Competition: Key risk factors for Polish State Fire Service is organized within the framework of the 9th International Symposium on Advances in Artificial Intelligence and Applications, and is an integral part of the 1st Complex Events and Information Modelling workshop (CEIM'14 https://fedcsis.org/ceim) devoted to the fire protection engeneering. The task is related to the problem of extracting useful knowledge from incident reports obtained from The State Fire Service of Poland. Prizes worth over 3,000 USD will be awarded to the most successful teams. Details at http://challenge.mimuw.edu.pl/contest/view.php?id=83

Signed: Adam Krasuski, Polish State Fire Service

Call for Student Posters at NFPA 2014 Conference and Expo

The NFPA Research Section Executive Board invites current students to submit an abstract of their research poster for a networking reception at NFPA's 2014 Conference and Expo in Las Vegas on Sunday, June 8, from 5:30-7:30 pm at the Luxor Hotel. The abstract should address a topic in the area of fire and life safety related research, testing, analysis, applications or science. Preference will be given to work for credit toward a degree.

The submitted abstract should be informative, and must contain the following: a. A short, specific title. b. Names of author(s), faculty advisor/supervisor, university, and any project sponsors. c. Degree being sought. d. Contact information for both the main student author and the research advisor/supervisor. e. A one-sentence statement describing the student's work hypothesis or proposition. f. A brief synopsis of the content, summary of the results obtained and a general statement of conclusion, if possible. A minimum of ½ page, to maximum of one full page in length, single-spaced, using 10-point type size. The abstract should be approximately 500 to 700 words in length.

Students will submit abstract via email to rfahy@nfpa.org by March 14, 2014. Notice of acceptance /non-acceptance and poster instructions sent out by April 14, 2014. Students will provide written confirmation to present poster by May 2, 2014.

Fire Science Review Published its 10th Review Paper

Fire Science Reviews, the open access online review journal, has now published ten review papers. The review papers are proving to be very visible in the community. Collectively, the papers are being accessed by nearly 5000 readers per month.

"Flammability behaviour of wood and a review of the methods for its reduction" by Laura Lowden and Terence Hull (Fire Science Reviews 2013, 2:4) was accessed 1502 times in the past month. Since its publication "Low temperature oxidation of linseed oil: a review" by Juita, Bogdan Z Dlugogorski, Eric M Kennedy, and John C Mackie (Fire Science Reviews 2012, 1:3) has been accessed 5361 times. This is the kind of research impact that publication in Fire Science Reviews can provide.

You can access all the review papers and can sign up for email alerts of newly published reviews by visiting the journal website (http://www.firesciencereviews.com). Review papers are sought in all areas of fire safety science. Manuscripts can be submitted via the website. Potential authors are encouraged to contact the editor before preparation of the manuscript. Currently, all review papers are indexed by Google Scholar, Scirus, and Scopus. SpringerOpen is working closely with Thomson Reuters (ISI) to in Fire Science Reviews will be available.

Fire Technology: special issue on Fire Hazards in Energy Systems

Paper submission deadline: 1st April, 2014

Given recent fire disasters like the oil train at Lac-Megantic or the 25th anniversary of Piper Alpha, the ongoing acceleration in energy demand and the new range of technologies introduced call for an in-depth examination of fire safety engineering in the production, storage and distribution of power.

Papers are invited as part of a special issue of Fire Technology devoted to the state of the art in fire science and technology related to energy systems. Of interest are research studies (experimental, computational, theoretical) and case studies that may contribute towards the understanding or the solution of engineering problems. The range of topics of interest is broad and interdisciplinary, and includes: Renewable energies (eg, biomass, wind, solar), Oil and gas (eg, LNG, onshore and offshore), Nuclear plants, Energy storage (eg, batteries, hydrogen), Electrical and other distribution networks (eg, pipelines, rail, shipping), New technologies (eg, oxyfuel, tar sands, shale gas, sustainable buildings). Editors of this issue are Dr Guillermo Rein, Imperial College London, UK and Dr George Boustras, European University Cyprus. Manuscripts should be submitted to: http://fire.edmgr.com.

Fire Technology: special issue on Validation and Fire Modeling

Paper submission deadline: 15th Aug, 2014

Validation remains an essential activity for the continuous improvement of computational fire modelling skills. By validation, we refer to the determination of the expected level of accuracy and the range of applicability of a given fire model by means of comparison to experiments (or higher hierarchy models).

Papers are invited as part of a special issue of Fire Technology devoted to validation studies of modelling of any fire phenomena (eg, pyrolysis, flames, compartment fires, wildfires, structural response, toxicity, evacuation). Of interest are topics that contribute towards the understanding of its strengths and weaknesses, and include among others: Validation techniques, High-fidelity modeling, Benchmark experiments, Multi-model comparison, A priori vs. a posteriori, Round robin studies, etc. Editors of this issue are Dr Guillermo Rein, Imperial College London, UK and Dr Randall J McDermott, NIST, USA. Manuscripts should be submitted to: http://fire.edmgr.com.

UPCOMING EVENTS

11th International Symposium on Fire Safety Science, Feb 10 – 14, 2014, New Zealand. http://www.iafss.org/symposium/11th-symposium

SUPDET 2014, Fire Suppression, Detection and Signaling Research and Applications Conference, March 4 - 7, 2014, Orlando, Florida. nfpa.org. Including a half-day workshop on "SMART Buildings and Fire Safety."

6th International Symposium on Tunnel Safety and Security, Marseille, France, 12-14 March, 2014. www.istss.se

Fire at Sea, The Royal Institution of Naval Architects, 26-27 March 2014, London, UK www.rina.org.uk/fire-at-sea.html

Royal Society of Chemistry's Fire Retardant Technologies (FRT 14), 14- 16 Apr, 2014, Preston, UK. http://www.rscspecialitychemicals.org.uk

Workshop on 'Flammability Regulation for Upholstered Furniture' immediately after FRT14, 17 April 2014

2nd Annual Tunnels Fire & Safety Forum, Amsterdam, 15 - 16 April 2014, Netherlands, http://hse.flemingeurope.com/tunnels-fire-safety-forum

AMI Fire Retardants in Plastics, May 13-14, 2014, Denver, Colorado

6th FM Global Open Source CFD Fire Modeling Workshop, Norwood MA, May 15-16, 2014. https://sites.google.com/site/firemodelingworkshop

Global Research Update – High Challenge Storage Protection, FPRF, May 22, 2014, London, http://www.nfpa.org

Structures in Fire (SiF) 2014, Shanghai, China, Jun 11 to 13 2014. http://www.structuresinfire.com

NFPA's 2014 Conference and Expo, 9-12 June 2014, Las Vegas USA. http://www.nfpa.org/training/nfpa-conference-and-expo

Fire Safety Days, 12 June 2014, DTU Lyngby, Denmark. http://www.conferencemanager.dk/FSD14/fire-safety-day-2014.html

35th International Symposium on Combustion, Aug 2014, San Francisco, California. (submission deadline Dec 5, 2013) https://www.combustioninstitute.org

Complex Events and Information Modelling (CEIM'14), 7-10 September 2014, Warsaw, Poland, http://fedcsis.org/2014/ceim

FIVE (Fire in Vehicles) Conference, Berlin, 1-2 Oct 2014, http://www.firesinvehicles.com

15th International Conference on Automatic Fire Detection, AUBE '14, October 14th - 16th, 2014 at University Duisburg Essen, http://nts.uni-due.de/aube/aube14/aube14.html

2014 SFPE Annual Meeting: Professional Development Conference & Exposition, 12-17 October 2014, Long Beach, CA. http://www.sfpe.org

10th International Conference on Performance-Based Codes and Fire Safety Design Methods, Brisbane, Australia, 12-14 Nov 2014. http://www.sfpe.org

7th International Conference on Forest Fire Research, November 17-20, 2014, Coimbra, Portugal. http://icffr2014.wordpress.com

14th Fire and Materials 2015, 2- 4 February 2015, San Francisco, USA. http://www.intersciencecomms.co.uk

Symposium on Structure Ignition in Wildland-Urban Interface (WUI) Fires, 18-19 June 2015, Anaheim, CA, USA http://www.astm.org

JOB OFFERS

Fire Analysis and Research Division Director, NFPA, USA

NFPA´s Fire Analysis and Research Division supports the international fire community by providing analysis, reports, and statistics on the loss of life and property from fires. The Division Director (replacing Dr. John Hall upon his retirement in April of this year) will set strategy, objectives and priorities, plans and programs for the division and participate in the Association's advocacy and policy planning and implementation in support of our mission to reduce the worldwide burden of fire. The ideal candidate will have academic credentials and leadership experience in policy analysis and analytical methods research in the safety field. Details on applying for the position can be found here.

Graduate Fire Engineers, Arup, UK

Arup is currently recruiting for Graduate Fire Engineering vacancies UK Wide. The vacancy is open for application to the following Arup offices: London, Bristol, Campus, Manchester, Sheffield, Leeds, Edinburgh and Glasgow.

You will join Arup as a Graduate Fire Engineer. You will be working in a multi-disciplinary design office. Your role will be to develop expertise as a fire engineering consultant and deal with all aspects of fire safety engineering. This will cover preparing fire strategies in co-ordination with the engineering design team to the auditing of fire safety management and protection measures in existing buildings/facilities. You will liaise with external designers and other construction and building professionals on a wide range of projects. You will gain a thorough understanding of the role of a fire engineering consultant; experience the use of software design programmes and visit sites to monitor the implementation of fire strategies. You will be mentored with the aim of attaining the goal of becoming a Chartered Engineer.

If interested, send query to Ilona Drozd Ilona.Drozd@arup.com

PhD Studentship at Glasgow Caledonian University, UK

Opportunity for a PhD Studentship in: Fire Analysis and Design of Tall Timber Buildings. Applications are invited for a full-time PhD research studentship within the School of Engineering and Built Environment at Glasgow Caledonian University. The studentship is for a period of three years, subject to satisfactory progress, and provides payment of tuition fees at the UK/EU rate plus an annual stipend of £14,600 [note that students from outside the EU are required to pay the difference between International and EU fees, currently this would amount to £7,100 per annum].

Based on the expertise on timber engineering and fire safety at Glasgow Caledonian University in collaboration with Edinburgh University, this research programme aims to develop performance-based fire engineered solutions for tall timber buildings through current design practice review, experimental examinations of engineered timber materials and connections, and performance-based fire safety modelling. Experimental tests include flammability, flame spread, charring rates, mechanical properties and structural integrity of timber materials and engineered timber products, including CLT, LVL and Glulam. Project Lead: Dr. Binsheng (Ben) Zhang (Ben.Zhang@gcu.ac.uk)

The candidate should possess a 1st or 2.1 Honours degree in Civil and Structural Engineering, Fire Engineering or equivalent. Having MSc or research record related to this field can be an advantage.

Application forms are available via the 'Apply' button below. State the Project Title on the completed application form and return to researchapplications@gcu.ac.uk

Closing date for applications is Friday 14th February 2014.

OBITUARY

Professor Philip H. Thomas (1927-2014)

It is with the great sadness that we have learnt of the sudden death on 14th January 2014 of Professor Philip Thomas, aged 87.

Philip was the founding father of the IAFSS. It was he, along with like-minded researchers from across the world, who made the first moves in 1983 to establish a new international association for fire researchers. They had recognised that, whilst there were several organisations then in existence that embraced some special aspects of fire there was no single institution that covered the full diversity of topics that constituted fire safety science.

Phil drove the initiative forward, establishing the IAFSS at the very successful First International Symposium on Fire Safety Science hosted in the US in 1985 by NIST (then the National Bureau of Standards). At that Symposium he was elected the Association's first Chairman and served in that capacity from 1985 to 1991.

Phil was uniquely positioned to achieve this objective because of the authority and enormous respect he enjoyed throughout the world. In addition to this new role as first Chairman of the IAFSS, he was also Chairman of the International Standards body ISO TC92 from 1976 to 1995 and Co-ordinator of CIB W14 from 1974-1994, which he used to establish research agendas in support of standards development .

In the early 1980's the world was far more fragmented than it is now but Phil's insistence on a truly international body ensured the continuing success of the Association. His appetite for international cooperation had been particularly strengthened by a year's sabbatical spent at the Japanese Building Research Institute in 1966 following Professor Kunio Kawagoe's stay at the Fire Research Station. He enjoyed Visiting Professor status at the University of California, Berkeley in 1980, the Science University of Tokyo in 1982 and the Technical University of Denmark in 1987 and for six years from 1984 to 1990 at the University of Lund in Sweden.

Philip had graduated with First Class Honours in Mechanical Engineering from Cambridge University in 1945 obtaining in 1950 a PhD from research on Rubbing Solids in the Physical Chemistry Department. After a year as a special research trainee at the Metropolitan Vickers Company in Manchester he joined the Fire Research Station (FRS) in 1951.

Throughout a long career at the Fire Research Station he published much of the key seminal scientific research that has provided us with our understanding of fire. Ranging through contributions on self-heating, thermal explosion theory, through fire extinction and buoyant diffusion flame theory to the modelling of forest and building fires, his name is dominant in author citation indexes in the field. He continued to contribute well after his retirement from FRS in 1986 and was still publishing in the Fire Safety Journal as late as 2010.

He was particularly animated about the need for high standards in fire research and it is particularly fitting that the IAFSS now names its award for best paper at its Symposia as the Philip Thomas award.

Phil will be sadly missed by many friends and colleagues from across the world not only for his unique contribution to our field but for his warmth, wisdom and his analytical insight.

Signed: Geoff Cox

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, letter 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-in-Chief (Guillermo Rein, g.rein@imperial.ac.uk).

For the next issue (No. 37), the deadline for submissions is August 10, 2014.

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