International Association for Fire Safety Science

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Fire Safety Science News

http://www.iafss.org

August 2012, Newsletter No 33 Editor-in-Chief: Guillermo Rein

First cohort of graduates from the EU MSc. in Fire Safety Engineering celebrate in Ghent, June 2012

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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Disclaimer: the opinions expressed in Fire Safety Science News are those of the signing authors, and they do not reflect those of the IAFSS, the Editorial Board or any other affiliated institution.

Our Aims

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

EDITORIAL

Cover Image

The cover of this issue is illustrated with a photo taken on the 25th of June 2012. It shows the very first cohort of students graduating from the International Master of Science in Fire Safety Engineering (IMFSE) program (joint degree from Ghent, Lund and Edinburgh). They celebrate in company of academics and members of staff in front of *Het Pand*, a former Dominican Monastery from 1240 situated in the historic center of Ghent, Belgium.

Remember that the *Cover Image* is open to submissions from IAFSS members. Send your photo to the Editor-in-Chief. For the next issue, I am most interested in images on evacuation, toxicity, risk, or structures.

Featured Articles

This issue publishes three *Featured Articles* on the topic of toxicity and effectiveness of fire retardants. My invitation to these experts (and others who declined) was prompted by the widespread attention paid to the recent series of articles published in *The Chicago Tribune.* As it happens often when media agitates complex topics, I felt that science was becoming the first casualty. As Prof. Hull and Dr. Stec say in their article "*The fire retardant debate has little input from fire safety professionals*". Why does fire science not have a larger role on this debate? For the future wellbeing of the field, this could improve. IAFSS members are encouraged to take even more active roles in not only researching fire retardants but most notably in communicating the research output.

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

Search for a New Name

After the call published in the previous issue, I have received more than 35 nominations for the new name of the newsletter. The Editorial Board voted and decided that the new name shall be *Fire Safety Science News.* This name was proposed by John Hall. It won with 11 votes from the Board, followed by *The Phlogiston* (7 votes) and *Ardens Fama* (6 votes).

Renovating the Editorial Board

We are looking for dynamic, information seeking and motivated individuals from the IAFSS to join the Editorial Board. Send an email to Editor-in-Chief if you are interested with a very brief statement on your interests and strengths related to the aims of *Fire Safety Science News.*

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

LETTER FROM THE CHAIR

The IAFSS Committee has met last month at the 34th International Combustion Symposium in Warsaw, and I would like to give you an update on what was discussed at the meeting.

As our next Symposium in New Zealand is only 18 months away, work has started on its preparation. Dr. Yaping He (Australia) and Prof. Arnaud Trouvé (USA), who chair the Program Committee, have finalized the list of topics and the Committee membership. I am thankful to those who have accepted invitations from Yaping and Arnaud to join the Programme Committe. Our host will be the University of Canterbury, with the Arrangements Committee chaired by Prof. Charles Fleischmann. As mentioned in my last letter, the Proceedings' editors, based in Sweden, will include Dr. Daniel Nilsson, Dr. Robert Jansson and Prof. Patrick van Hees from Lund University. I expect that the dates of the Symposium will be confirmed early next month, with the call for papers issues shortly afterwards.

The 2014 IAFSS Awards Committee will be chaired by Dieter Brein (Germany) and will include Dr. Craig Beyler (USA), Prof. Michael Delichatsios (UK), Dr. Michael Spearpoint (New Zealand) and Prof. Takeyoshi Tanaka (Japan). The Awards Committee will select the recipients of the Kunio Kawagoe Gold Medal for Outstanding Lifelong Contributions to Fire Safety Science, Philip Thomas Silver Medal of Excellence for the Best Paper of the Previous Symposium, IAFSS Best Thesis Award "Excellence in Research" for the Best Masters and PhD Theses, and it will assist FORUM of Fire Research Directors in the selection of Student Travel Awards for the Best Student Papers Accepted for the Symposium. For the first time in 2014, the Committee will also select a recipient of the Howard W Emmons Lectureship Award for Distinguished Achievement in Fire Safety.

I am happy to share with you good news that *Fire Safety Journal* (FSJ), the official research journal of the Association, is booming with a record number of submissions. FSJ enjoys an impact factor of 1.6, well above other fire research journals. FSJ provides faster turn-around time for paper review than in the past. My thanks go to Prof. José Torero, the Editor-in-Chief, his editorial team and to a large number of specialist reviewers whose work has led to this success. Likewise, I need to congratulate the Editor-in-Chief of this Newsletter, Dr. Guillermo Rein, and his editorial team for inserting more technical content into the newsletter and for providing comprehensive cover of involvement of the IAFSS members in fire-safety activities around the world.

New exciting developments have been taking place in the regions. The 9th Asia Oceania Symposium on Fire Science and Technology, to be held at the University of Science and Technology of China in Hefei, is just around the corner. It will be the largest Asia-Oceania Symposium ever held, with 121 accepted papers selected from 172 submissions in a peer-review process (55 % of the papers from Mainland China, and 45 % from other countries), and with 14 plenary and invited presentations. For the first time, the Proceedings will be published in Elsevier's *Procedia Engineering* as open access, with the copyright held by IAFSS. In Europe, the University of Cyprus, in Nicosia, has proposed to resurrect and host 2015 regional IAFSS Symposium for Europe: 2nd European Symposium in Fire Safety Science (ESFSS). I hope that this initiative will develop into a European Symposium series as the one in Asia-Oceania.

You have probably noticed that IAFSS has now a LinkedIn Group, created in 2011 by Dr. Guillermo Rein. Plans are under way to merge the old email listserv-based Discussion Group hosted by the University of Newcastle, Australia with the LinkedIn Group. I would like to encourage you to subscribe to the LinkedIn group, post your questions, job offers, and answers to queries of other Group members. As with the old listserv-based Group, the posts will need to be relevant to the science and technology of fire safety, should not constitute commercial promotion, with authors accepting responsibility for the content of their postings.

May I conclude this letter by encouraging you to contact me directly (on Bogdan.Dlugogorski@newcastle.edu.au) with your suggestions and advice, or if you wish to have anything raised and discussed at the next meeting of the Committee, to be held in October at the 9th Asia-Oceania Symposium in Hefei.

Signed: Bogdan Dlugogorski, Chair IAFSS and University of Newcastle, Australia

NEWS FROM IAFSS

11th IAFSS Symposium 2014 in Canterbury

Campus of the University of Canterbury, New Zealand

The 11th IAFSS Symposium will be held at the University of Canterbury, New Zealand in February, 2014. We are looking forward to hosting delegates from around the world at the University during the southern hemisphere summer. We plan to host a technical program that is as good as those that have taken place at previous Symposia and also have a range of social events that will give people a chance to sample some local food and world famous New Zealand wine. We hope delegates will also take the opportunity to spend some time traveling around our corner of the world. New Zealand has much to offer in terms of scenery, native flora and fauna, and a mixture of Maori, European and Asian cultures. The more adventurous might like to try bungee jumping, jet boat rides or mountaineering while others might be more content with whale watching or less challenging day walks.

Signed: Michael Spearpoint, University of Canterbury

NEWS FROM OTHER INSTITUTIONS

News from the University of Cantabria

Data Collection on Human Behaviour

Most of the current egress models have the capability to represent heterogeneous populations and different scenarios. However, these are not equally supported by empirical data. For this reason, the GIDAI Group at Universidad de Cantabria has carried out data collection in passenger trains and school buildings. In both scenarios, data about human behaviour during evacuation processes are very limited.

Data collection in passenger trains has recently been completed on a three year project funded by the Spanish Government. This multidisciplinary project was developed by five institutions whose aim was the development of a DSS (Decision Support System) for emergency situations in High Speed Trains. The data collected is to be used for the EvacTrain model. This is a stochastic evacuation model designed specifically for passenger trains which are integrated in the DSS.

There is very little data in the literature about the performance of children during evacuations. For this reason, empirical data from two evacuation drills (announced and unannounced) in the same children school building have been collected. The challenge comes from the need to provide adequate data to simulate children-specific

attributes and performance capabilities. The research project "Evacuation movement and behaviour of vulnerable populations" has been granted by the company IRTECH Ingeniería y Suministros, S.L.

Full Scale Fire Tests in High Speed Trains

Between February 23-24, new full-scale fire tests were developed in order to improve the fire safety conditions in high-speed trains. While a previous phase of full-scale tests focused on the study of the early stages of a fire and spread inside the car of a passenger train, in this case, we have studied some sophisticated systems for early detection and extinguishing of the fire.

These activities are conducted within the research project entitled 'Analysis and Experimental Validation of a Systems Approach to Safety in case of Passenger Train Fire in High Speed', under a grant from the Ministry of Development. The research project is developed by a consortium of four entities: Direccion General de Fabricacion y Mantenimiento- Integria - Renfe Operadora, GIDAI Group - University of Cantabria, the Aeronautical Technologies Center, CTA, and Modelado y Simulacion Computacional SL.

After intensive research work in which we analyzed several fire safety systems and the characteristics of the high speed trains, we developed an integrated system for fire safety in the passenger car of high speed trains, and finally, during these full-scale tests, the performance of the system was experimentally evaluated. The test results were very satisfactory and a large amount of data has been collected. The analysis of these results will prove which of the configurations tested had better performance during real operating conditions, and thus could help improve passenger safety in the future.

20th Anniversary of TECNIFUEGO-AESPI

The Spanish Association of Fire Protection (TECNIFUEGO-AESPI) celebrates its 20th anniversary. This is a professional, non-profit association that brings together companies engaged in fire protection.. To mark its anniversary, the June issue of its magazine *Revista Tecnifuego* reviews the fire safety developments of the last 20 years.

International Congress on 'Fire Computer Modeling'. Santander (Spain). October 2012

The International Congress on Fire Computer Modeling will take place in Santander on October 18 - 19, 2012. The preliminary program is available on the website of the International Congress and includes the participation of speakers from16 different countries. For more information visit http://www.fcm2012.unican.es or contact fcm2012@unican.es.

Signed: Mariano Lázaro, Universidad de Cantabria

News from University of Canterbury

PhD Completions

Jeong-Ki Min completed his research on numerical prediction of structural fire performance of precast prestressed concrete flooring systems early this year (2012). The study employed the nonlinear finite element software SAFIR to predict the fire performance of precast prestressed concrete floors. An improved numerical model was developed in order to investigate the effects of surrounding structure on the behaviour of heated hollowcore slabs. The model was further used to investigate the fire performance of multi-bay prestressed hollowcore floors under different scenarios as well as single-tee slabs and flat slabs. The research was conducted under the Future Building Systems (FBS) Project, funded by the Foundation for Research, Science and Technology (FRST), and supervised by Prof. Buchanan, Dr. Moss, Dr. Dhakal and Dr. Abu.

Awards

Assoc. Prof. Charley Fleischmann was presented with the Arthur B. Guise Medal at the Annual Meeting and Professional Development Conference of the Society of Fire Protection Engineers (SFPE) in October 2011. The award recognizes achievement in the advancement of the science and technology of fire protection engineering. For full details of the award, go to http://blog.sfpe.org. Charley was also the recipient of the University of Canterbury Teaching Award in 2010, in recognition of his excellence in teaching.

Prof. Andy Buchanan was elected a Distinguished Fellow of the Institution of Professional Engineers New Zealand (IPENZ), in recognition of his immense contribution to the engineering discipline in New Zealand.

Kevin Frank (pictured to the left), one of current University of Canterbury PhD students, received the NFPA David B Gratz award for his scholarly achievements, volunteerism and contribution to national and international fire safety activities. Kevin's research is on uncertainty in fire safety system efficiency, and he is a volunteer fire fighter in New Zealand and in his home country (Canada).

BRANZ Post-Earthquake Fire Seminar Series

More research into the design of fire protection systems is needed to ensure they provide some measure of life safety and property protection (especially for critical buildings) post-earthquake. This was the major feedback from a series of seminars by BRANZ to share observations of the performance of fire protection systems post-Canterbury-earthquakes. The research that led to the seminars was a collaborative effort among FPANZ, BRANZ and the University of Canterbury. The seminar series, which covered personal insights in the aftermath of the earthquakes, active and passive fire protection systems and a survey of building evacuations in some major buildings, visited Dunedin, Christchurch, Wellington, Napier, Tauranga and Auckland.

Signed: Michael Spearpoint, University of Canterbury

Seminar presenters (left to right; Charley Fleishmann, Peter Collier, Tony Abu, Greg Baker & Brent Houston) stop at the world famous L&P landmark in Paeroa for a pose, enroute to Auckland.

News from Case Western Reserve University

Case Western Reserve University (CWRU) has recently completed a three-year study on the thermal response characteristics and performance of fire blankets sponsored by the Federal Emergency Management Agency of the US Department of Homeland Security. The investigations of fire blankets have two distinct applications:
(1) protection of building structures from wildland-urban interface fires, and
(2) suppression of liquid fuel pool/spill fires.

The laboratory tests determined the transient and steady thermal response characteristics of over 50 single-layer fire blanket materials and over 20 multiple-layered materials using both convective heat flux (Meker burner) and radiative heat flux (radiant cone heater). A computational model including heat conduction and in-depth radiation emission and absorption were also established. Field experiments for wall-and-roof wooden structure protection in prescribed burns were carried out in New Jersey and California. Suppression tests using fire blankets for liquid pool/spill fires were also field tested. The liquids included kerosene, Jet-A fuel and cooking oil. The principal investigator of the project is Prof. Fumi Takahashi. Prof. James T'ien and Dr. Sandra Olson of NASA Glenn Research Center are the co-investigators.

CWRU is also participating in a microgravity experiment aboard the International Space Station currently under way. These purely forced flow tests are being conducted inside a small wind tunnel which can impose air flow speeds up to 40 cm/s. The wind tunnel was installed in the Microgravity Science Glovebox which supplied power, imaging, and a level of containment. Several different solid materials are used: a cotton-fiberglass blend fabric, PMMA spheres and slabs, Nomex fabric, Ultem slab and paraffin and Japanese candles. The main objectives are to investigate the flame response of different materials and geometries to low-speed forced flow without gravity and the implication to spacecraft fire safety. Despite the small scales of the experiment, the long-duration tests have so far provided very valuable information. The principal investigator of the project is Dr. Paul Ferkul from the National Center for Space Exploration Research. Drs. Sandra Olson, Fumi Takahashi and James T'ien are the co-investigators.

Fire blanket testing in a prescribed burn in New Jersey Pine Barrens.

Case Western Reserve University has recently started a collaborative effort on fire research with Underwriters Laboratories (UL). With UL's support, the University seeks to expand the fire research activities and to enhance the capability to train fire engineers and researchers. We hope to report more on these activities at a later time.

Signed: James T'ien, Case Western Reserve University

News from Technical University of Denmark

In April 2012, the second Fire Safety Day, which is a collaboration between the Fire Safety Group at the Technical University of Denmark (DTU) and the Department of Fire Safety Engineering and Systems Safety at Lund University, was held at Lund University. The day was a success with more than 70 participants from Scandinavia, Germany and Scotland. The next Fire Safety Day will be held on April 17, 2013 at the Technical University of Denmark. Information can be found at www.brand.dtu.dk.

In May 2012, a large tunnel experiment on evacuation was undertaken at the tunnel in Korsør, west of Copenhagen. The goal of the experiment was to study the evacuation characteristics of different populations. 106 participants were recruited. The experiment was part of the KESØ project and was co-funded by the Danish TrygFonden.

In spring 2012, Filippo Gentili from Università degli Studi di Roma "La Sapienza" spent a semester here as guest Ph.D. student. During his stay, he was supervised by Luisa Giuliani and worked with Josephine Voigt Carstensen on the finite element modeling of concrete slabs in fire. Josephine, who worked as research assistant, is now starting her Ph.D. at Johns Hopkins University in Baltimore with Jamie Guest as her advisor.

In June 2012, Annemarie Poulsen defended her PhD thesis entitled *Fire Models and Design Fires. An Experimental Investigation on the Influence of Thermal Feedback on Pre-Flashover Fires*. She is currently working as a post-doctoral researcher with focus on evacuation of mixed populations in the KESØ project.

The next admission of new students for the education Master of Fire Safety (www.brand.dtu.dk) starts at the end of this year. The education is an accredited part-time education for people with a bachelor and at least two-year working experience. The education is taken part time over two years, where the students are taught at DTU three times 1.5 days for each course. The DTU web tool CampusNet is used for the teaching and communication between the on-campus meetings.

Signed: Anne Dederichs, DTU

Are you a member of the IAFSS? If not, you should be!

Student Membership is now FREE

International Association for Fire Safety Science

You are invited to be a member of a professional association that is committed to facilitating communication and providing leadership for the Fire Science and Engineering Community.

Membership of the IAFSS provides international networking opportunities.

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- Discount off conference registration fees
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- Eligibility for Student Awards
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News from FORUM

The International Forum of Fire Research Directors has selected the FDS Development Team to receive the Sjölin Award for 2012. The following individuals have been identified as contributors to the team:

Kevin McGrattan (NIST), Howard Baum (NIST), Glenn Forney (NIST), Randall McDermott (NIST), Ronald Rehm (NIST), Jason Floyd (Hughes Associates Inc.), Simo Hostikka (VTT), Timo Korhonen (VTT), and William Mell (U.S. Forest Service).

The Sjölin Award recognizes an outstanding contribution to fire science or an advance in the state of the art in fire safety engineering practice of extraordinary significance. It is presented each year to the individual or group of individuals whose efforts are primarily responsible for or traceable to the specific advance.

In this case, the Forum is recognizing the outstanding contributions over the past number of years of the FDS Development Team and the resulting impact of the team's work on the advancement of fire engineering around the world. The team has developed, maintained and extended the functionality of a software program that has become the tool of choice by both the fire research and fire engineering communities. FDS represents the most widely used computational fire engineering tool in both research and industry. Through its use and application many new insights have emerged, further extending our understanding of the behavior of fire phenomena.

For 2012, the Sjölin Award will consist of an honorarium of $2,250 to be divided amongst the nine recipients and a plaque that will be handed out at the next symposium of the International Association of Fire Safety Science.

Signed: Russ Thomas, National Research Council Canada

News from Hong Kong Polytechnic University

The Department of Building Services Engineering of The Hong Kong Polytechnic University (PolyU) invited three fire experts to deliver CPD lectures at the PolyU campus on 19, 22 and 25 June 2012.

Smoke management: State-of-the-Art and Areas for Improvement by Professor James A. Milke

Smoke management design practice has changed significantly in the last 40 years. Computational methods available in 2012 include algebraic equations, network computer models and CFD simulations. Challenges include policy-needed decisions, design parameters and input data for calculations. The policy-needed decisions include the variability of acceptance test requirements and tenability limits. Design parameters include estimates of smoke production for an array of plume geometries, number and placement of fans and response time aspects of hardware. Improved input data sources for the computations are needed for leakage, smoke composition and visibility through smoke.

Professor James A. Milke is the Chair of the Department of Fire Protection Engineering, University of Maryland, USA. He is the President and a Fellow of the Society of Fire Protection Engineers (SFPE) and is a member of the Standards Council of the National Fire Protection Association (NFPA). He was the Chair of the NFPA Technical Committee on Smoke Management Systems from 1997-2007. He is a member of the International Association of Fire Safety Science (IAFSS).

What is Flashover? by Professor James G. Quintiere

The presentation focused on explaining the stages of fire growth in a room, and in particular, "flashover". Flashover was investigated in terms of a mathematical instability governed by radiation feedback from the heated smoke layer of a room. It is not defined in terms of one smoke temperature, and for the common ventilation-limited fully developed fire, it does not lead to all objects suddenly in flames. A video was shown to

illustrate the rapid growth rate that accompanies flashover, and how the flames seek air in the room, eventually, they reach the vents of the room.

Professor James G. Quintiere has just retired from the Department of Fire Protection Engineering at the University of Maryland, College Park. He is now an Emeritus Professor. He is a fellow of the American Society of Mechanical Engineers (ASME) and the SFPE. He received the David Rasbash Medal from the Institution of Fire Engineers, UK in 2008; and the Kawagoe Gold Medal from the IAFSS in 2011.

Building Bridges: Collaboration in Fire Science, Engineering and the Fire Service by Professor Beth Weckman

Fire protection of occupants and buildings is a key part of fire safety engineering, but the safety of firefighters must also be addressed. Addressing fire safety concerns requires a multidisciplinary, multi-stakeholder approach to research and education that blends science, technology and experience. In this lecture, a history of joint initiatives between university researchers, industry, government and fire service partners were highlighted. Thoughts were provided, from a Canadian perspective, on how to work with world partners to build a strong international fire safety presence for the future.

Professor Beth Weckman is a Professor of Mechanical and Mechatronics Engineering at the University of Waterloo, Canada. She is an active member in several fire safety and research organizations such as IAFSS, SFPE, NFPA, American Society for Testing and Materials, and is past Chair of the Canadian Section of The International Combustion Institute.

Signed: W.K. Chow, Hong Kong Polytechnic University

News from EU International Master of Science in Fire Safety Engineering

On the 25th of June 2012, the first cohort of students in the International Master of Science in Fire Safety Engineering graduated. When the Master's programme was first launched in 2010, these students were the first to be admitted. During the occasion of the Graduation Ceremony, the students were given the opportunity to present their theses in the presence of academics from Ghent, Lund and Edinburgh, experts from industry, colleagues, family and friends. The day was concluded by a touristic and culinary guided tour in the old centre of Ghent. The great majority of the IMFSE Alumni has started to work already as a Fire Safety Engineer in companies worldwide such as Hughes Associates (US), Inti (Argentina), Cegelec (Belgium), Fire Engineered Solutions (Belgium) or Basler & Hofmann (Switzerland).

Dear cohort of 2010-2012, we wish you all the best in your further professional endeavours!

Prof. Bart Merci from Ghent University hands the diploma to MSc student Parinaz Hemmati.

The application forms for the student intake of the IMFSE edition 2013-2015 will be available from September onwards on the webpage: http://www.imfse.ugent.be. The deadline to apply is 10 January 2013.

Signed: Elise Meerburg, IMFSE, Ghent University

News from Imperial College London

With the arrival of Dr. Guillermo Rein to his new academic home in downtown London, a new fire research group has been created: the *Imperial Haze Lab*. The Haze Lab starts small, with one PhD student, Xinyan Huang from China, and four MSc students, Oriol Rios i Rubiras from Spain, Eva Urbán from Hungary, Solomon Uadiale from Nigeria and Mohammad Heidari from Iran (all four IMFSE students from University of Edinburgh). The team expects to gather pace and size in the coming years with topics of research on fire dynamics and reactive solids in both the built or natural environments. Experimental and computational approached will be combined. Some examples of planned research are forecasting fire dynamic (applications both to buildings and to wildland), pyrolysis modelling, travelling fires for structural design, fire threats to renewables energies, smouldering wildfires (the largest fires on Earth) and carbon sequestration in char. We also look forward to extensive collaborations with the world-renowned combustion expertise already existing at Imperial.

Signed: Guillermo Rein, Imperial College London

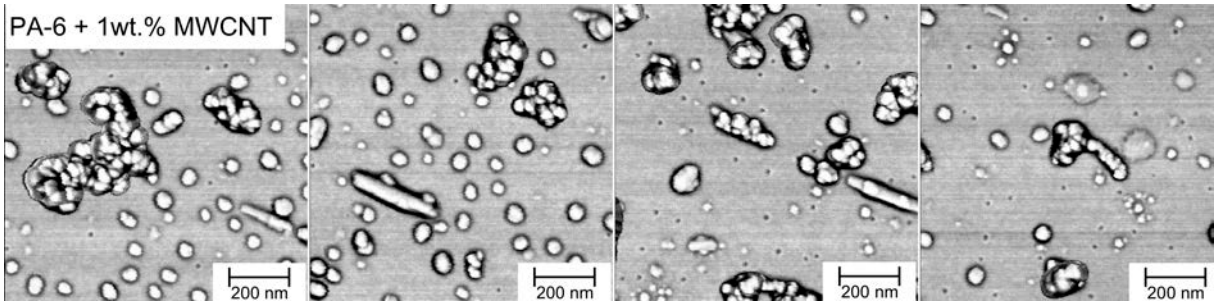
News from LNE

Work on under ventilated fire conditions

The under ventilated stage of a fire is a crucial research topic studied in the Fire behaviour and Fire safety Department at LNE (Laboratoire National de métrologie et d'Essais, French national laboratory of testing and metrology). The aim of this research is to understand the effects of lower oxygen concentrations on the reaction-to-fire of condensed phase fuels and on the production of toxic gases. One of the significant bench-scale instruments for fire testing is the controlled-atmosphere cone calorimeter, which allows studying the phenomena. Due to the lack of international standards on this test apparatus, it is important to note that the design may fully change from one testing laboratory to another. Standardization of the controlled atmosphere cone calorimeter is currently under preliminary discussion within the international committees ISO TC92/SC1/WG5 and ISO TC92/SC3/WG1. Work performed at LNE to study the design influence on the measurement accuracy will be presented at the next AOSFST symposium in Hefei, China (17-20 October 2012). Results show that design affect only the behaviour in gas phase. These results could help to the standardization of this device.

Work on emission of nanoparticles from nanofilled polymer fires

The major development of nanotechnologies results in the multiplication of nanomaterial-based products. This type of products is designed to offer new functionalities or to modify specific properties (mechanical, optical, magnetic, thermal, etc.). Nevertheless, the environment and human health could be affected by unintended release of nano-object from these products. Accidental thermal degradation by exposure to a heat source or a fire and combustion of nanocomposites are particularly potential sources of ultrafine particles and nanoparticles emission.



Example of aerosols emitted by Carbon-nanotube filled polyamide in cone calorimeter

At LNE, two national projects called NANOFEU (2008-2011) and INNANODEP (2012-2015) are particularly designed to fill this knowledge gap by using various fire scenarios as well as original couplings between the cone calorimeter, the low pressure impactor and characterization devices, such as the FTIR, Condensation Nuclei Counter and SMPS. From the results yet obtained in the NANOFEU project, it can be noticed that the presence of nanoparticles (nano-oxides) in PMMA entails paradoxically a decrease in the number concentration (particles/cm3) of the emitted submicronic particles in comparison with the pure polymer. The mechanisms of combinations of nanoparticles, possibly modified by the combustion atmosphere (oxidation, reaction with acids) with soot or other ultrafine particles during thermal degradation have to be scrutinized for various scenarios and types of nanocomposites, since they could have direct effects on human health by penetration route and deposition in the respiratory tract. Further investigations carried out in the INNANODEP project using Atomic Force Microscopy (AFM) and Electronic Microscopy coupled with EDX, will be essential to highlight knowledge on morphology and composition of the released nano-objects and ultrafine particles.

Dr. Lucas Bustamante-Valencia during this PhD defense in 2009.

Combustion Award

Dr. Lucas Bustamante-Valencia received the 2011 Paul Laffitte award for his PhD Thesis "*Experimental and numerical investigation of the thermal decomposition of materials at three scales: application to polyether polyurethane foam used in upholstered furniture*" (see open access version here). The work was conducted at LNE and CNRS/Institut Pprime in collaboration with the University of Edinburgh. The Paul Laffitte award is given every 2 years to the best French thesis in combustion (in general, not only fire) by the *Groupement Français de Combustion* (French Section of The Combustion Institute).

Signed: Eric Guillaume, LNE

News from Lund University

On June 15th Johan Bergström defended successfully his PhD titled "*Explorative Studies of High-risk Situations from the Theoretical Perspectives of Complexity and Joint Cognitive Systems*". Faculty opponent was Prof. Erik Hollnagel, DTU Denmark. The PhD thesis can be downloaded from the Lund website www.brand.lth.se. Here you can also find previous PhD dissertations as well as research reports, licentiate theses and master theses by the department and students.

Daniel Nilsson just returned from a two-month post doc at NFPA in Boston USA, where he worked on a new SFPE Handbook chapter together with Rita Fahy.

Kristin Andrée became a PhD student during the spring of 2012. She will work 50% at Lund University and 50% as fire consultant. She will work on evacuation in high-rise buildings within the KESØ project.

From May 1st, Dr. Haukur Ingason from SP Fire Technology became Adj. Professor at Lund University for a period of three years. His appointment will strengthen the cooperation between Lund University and SP.

Robert Jönsson of Lund University received the John L. Bryan Award from the Society of Fire Protection Engineers. See **News from SFPE** in this issue for more information.

Together with DBI, Danish Institute for Fire and Security technology, Lund University obtained a Marie Curie EU project within the area Industrial PhDs called FIRE TOOLS. The FIRE TOOLS project aims at providing a training

network for five Early-Stage Researchers (ESRs) i.e. PhD students who will carry out research with a focus on creating computing simulation methodologies, tools and models to increase the usability of fire tests conducted on building materials, products and construction elements which act as building linings, building content or fire barriers by using fire simulations. More specifically, they will address the determination of the fire properties of building products, content and barriers, in order to assist companies, based on advanced computational models and predictions, to simulate and predict the fire performance of materials, products and structures earlier in their product development processes and more on a continuous scale instead of traditional fire classes. The project already involves a number of associate partners from universities and industry. For more information see the **Job Offers** section in this issue, or contact the project leaders Fanny Guay at DBI (fgu@dbi-net.dk) and Patrick van Hees at Lund University. The scheduled start of the project is January 1st 2013, also start time for the PhD students.

20% of the presentations at the recent 9th SFPE International Conference on Performance-Based Codes and Fire Safety Design Methods held in Hong Kong 22-22 June were co-authored by people educated from Lund University, Sweden. Among the eight case studies presented people educated from Lund University participated in three of them.

Signed: Patrick van Hees and Robert Jönsson, Lund University

News from University of Maryland

The Department of Fire Protection Engineering is pleased to announce that Dr. Michael Gollner (left) will join the department this fall as Assistant Professor. He recently graduated from the University of California, San Diego with a PhD in Mechanical Engineering, majoring in Combustion and minoring in Fluid Dynamics. His previous research, working with his adviser Prof. Forman A. Williams, investigated an approach to commodity flammability ranking in warehouses and the propagation of fires through industrial, wildland and built environments. This work was performed in collaboration with Prof. Ali Rangwala from Worcester Polytechnic Institute, utilizing facilities from both institutions. Michael's current research interests include material flammability, flame spread, boundary layer combustion and sustainability in the built environment. He investigates these topics using experimental and theoretical techniques to elucidate important physics in these problems, applying these results to practical applications relevant to wildfires and fires in the built environment. Michael recently received the IAFSS best poster and best fire science image awards and the 2010 Chancellor's Award for Sustainability from the University of California, San Diego.

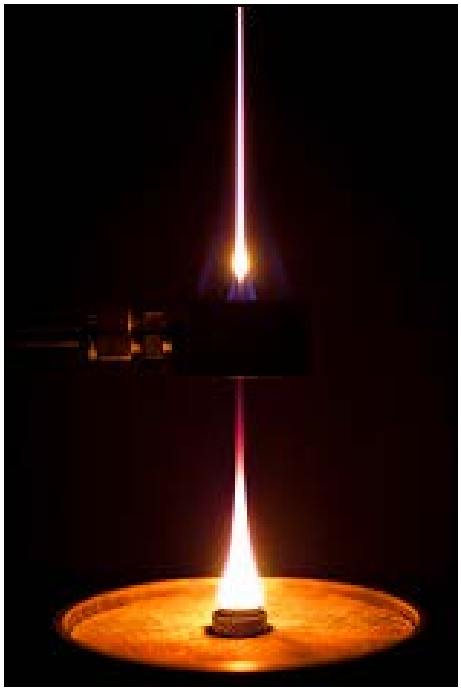
Glenn L. Martin Professor Howard Baum was selected to receive the Sjölin Award for 2012 from International Forum of Fire Research Directors for his outstanding contributions over the years to the NIST FDS Development Team. Baum, a member of the National Academy of Engineering since 2000, is retired from the National Institute of Standards and Technology, where he was research physicist and fellow. See **News from NIST** in this issue for more information.

Alumnus James P. Begley (B.S. ’96) has been recognized by Consulting-Specifying Engineer as one of the 2012 “40 Under 40 Program Winners.” This award is given to 40 building industry professionals age 40 and younger who stand out in all aspects of their lives. Begley founded TERPconsulting in 2010 after almost 20 years in fire protection engineering. He is dedicated to his profession and his community.

The Automatic Fire Alarm Association’s (AFAA) Board of Directors has selected Professor and Chair James A. Milke as the AFAA Person of the Year for 2011 in recognition of his research on smoke detectors and sprinklers. His work is being used as the basis for many proposed changes to the codes.

Students from the Department of Fire Protection Engineering were recognized at the annual Engineering Honors and Awards Ceremony. Kenneth A. Hamburger, B.S. ’12, received the Society of Fire Protection Engineers (SFPE) Outstanding Senior Award. Sponsored by the SFPE Chesapeake Chapter, this award is presented to the FPE senior with the highest grade point average (GPA). Chad Lannon, B.S. ’13, received the Robert J. Taylor Academic Achievement Award. This award is presented by the Salamander FPE Honorary Society Beta Chapter to the

department junior with the highest GPA. Stephen J. Jordan, B.S. '12, received the Department of Fire Protection Engineering Chair's Award, presented to the student who made the most significant contribution during the year. The Society of Fire Protection Engineers (SFPE) Chesapeake Chapter presented its Outstanding Sophomore Award to Philip Smith, B.S. '14.



Ph.D. students Haiqing Guo and Paul M. Anderson, along with their advisor Peter B. Sunderland, were awarded first place for their poster in the Art Image Competition at the Central States Section of the Combustion Institute in Dayton, Ohio. The image, right, is entitled Ternary Flame Art Image and shows a ternary flame system with a Santoro burner below a ring burner. The steady soot column generated by the acetylene diffusion flame passes into the hydrogen ring flame, where it is oxidized. This allows soot oxidation to be studied in the absence of soot formation. The camera is a Nikon D100 digital still camera at 6.1 megapixels. This research is supported by the National Science Foundation.

The Department of Fire Protection Engineering is raising funds for a new Professor of the Practice position within the department. FPE alumnus Bob Andrews '80 committed a lead gift of $100k towards the professorship and an additional $275k has been raised toward a goal of $2.5 million. This permanent faculty position will enable future generations of fire protection engineering students to benefit from contact with practitioners in the field. The department hopes to attract an individual who will serve as a mentor for students interested in entering the profession and assist faculty members with the technology transfer process. In addition to supporting a professorship, the interest generated from the endowment fund will support one teaching assistantship to provide additional student support and mentoring.

The Fire Testing and Evaluation Center (FireTEC) in the Department of Fire Protection Engineering has launched FireTEC UMD – the Official Blog of Fire Exploration and Discovery at the University of Maryland. See http://firetecumd.wordpress.com. The blog, moderated by Andre Marshall, highlights laboratory activities and welcomes undergraduates, graduate students, faculty, staff, alumni, friends and laboratory stakeholders to participate. You may visit the blog or choose to subscribe. FireTEC UMD offered interesting stories and updates on activities in the fire laboratories at the University of Maryland. Laboratory activities range from simple demonstrations of fire phenomena to cutting-edge government-funded research.

The Department of Fire Protection Engineering hosted its annual Pump Day on the College Park campus on April 13, 2012. This activity is required for students enrolled in ENFP 310, Water Based Fire Protection Systems Design. The morning session included a presentation and discussion on pumping fundamentals by Kenneth E. Isman, B.S. '86, P.E., F.S.F.P.E. Isman is vice president of engineering for the National Fire Sprinkler Association. The afternoon session included a live fire pump test and an analysis of the pump's performance.

Michael Bustamante (M.S. '12, see photo in previous page) had the unique opportunity to participate in microgravity testing at Ellington Field, TX. The testing was part of research headed by James G. Quintiere and Peter B. Sunderland. The experiment was secured onto a plane run by the Zero-G Corporation which flies in parabolas in order to simulate 0-g for up to 20 seconds. Bustamante investigated ethanol fueled flames. The results are believed to be the first 0-g results where a steady state, condensed fuel flame has been established in a quiescent environment.

A group of students, research staff and faculty members teamed up to prepare a video response to the question "What is a flame?" The question was asked by Alan Alda, actor, director, writer and science popularizer and was to be answered in a way that an 11-year-old would find intelligible and maybe even fun. The FPE team was composed of Paul Marcus Anderson, Luis Bravo, Haiwen Ding, Haiqing Guo, Vivien Lecoustre, Isaac Leventon, and Rosalie Wills. The team was advised by Arnaud Trouvé, Stanislav Stoliarov, and Peter Sunderland.

Signed: Peter Sunderland, University of Maryland

News from NIOSH

Fires and Explosions Branch at the National Institute for Occupational Safety and Health (NIOSH), Office of Mine Safety and Health Research (OMSHR), Pittsburgh, PA.

Since the early 1900s when the Pittsburgh Research Laboratory was operated by the U.S. Bureau of Mines, the Fires and Explosions Branch has had a storied history of excellence in research related to fires, explosions, and combustion in general. In the mid-1900s, researchers at the laboratory included Bernard Lewis, Guenther von Elbe, and others who were instrumental in the founding of the Combustion Institute, the headquarters of which still reside in Pittsburgh. It was also during this period that significant advances were made in the development of explosives by such historical figures as George Kistiakowski.

Fire gallery testing at NIOSH and personnel (from left to right: Dave Litton, John Soles and Dr. Inoka Eranda Perera)

Today, the Fires and Explosions Branch at NIOSH continues to conduct cutting-edge fire and explosion research that includes theoretical and experimental studies of fire and explosion safety issues. Transferred from the U.S. Bureau of Mines to the National Institute for Occupational Safety and Health in 1996, Branch research continues to explore the fundamental mechanisms of dust explosions and the development of improved techniques and instruments for determining the inert content of coal dust/rock dust samples. Large-scale experiments of flame spread and fire growth are conducted for validation of improved models while in the laboratory, work continues in order to understand a combustible material's response to external heat flux and/or high temperatures and the resultant mechanisms of ignition and fire growth.

Laboratory studies are also being conducted to quantify the levels of toxic gases and smoke that are produced both during the non-flaming, thermal decomposition stages as well as the active flaming stages of fires for a wide range of combustible materials. The optical and physical properties of combustion-generated aerosols are being quantified in order to improve our ability to detect and measure their levels for improved and more efficient detection of developing fires as well as to understand their toxicological effects.

Within the Branch, Computational Fluid Dynamics (CFD) is utilized to model spontaneous combustion fires in sealed or weakly ventilated areas of underground mines and to model the interaction of a forced convective airflow with the buoyancy-driven flows from developing fires in underground tunnels of various sizes and configurations. In addition to the use of CFD, complex algorithms have been developed to describe a developing fire within an underground mine complex, the impact of the fire on the underground forced ventilation system, and the transport of combustion product gases and smoke throughout the underground complex. Gas and smoke sensors, as well as air velocimeters, are strategically located throughout this underground complex as part of an atmospheric monitoring system to provide real-time data on the spread of hazardous gases and smoke.

The Fires and Explosions Branch welcomes any inquiries from persons/groups/organizations interested in this research or potential offers of collaboration on aspects of the research that can be mutually beneficial. If additional information is needed, please contact Dr. Gerrit V.R. Goodman, Branch Chief, Fires and Explosions Branch, NIOSH/OMSHR, 626 Cochrans Mill Road, PO Box 18070, Pittsburgh, PA 15236. GGoodman@cdc.gov or (412) 386-4455.

Signed: Dave Litton, NIOSH/OMSHR.

News from NIST

Awards

NIST fire research staff received a number of recognitions this year for their contributions to the field of fire protection:

The FDS Development Team including current NIST staff members Kevin McGrattan, Glenn Forney, Randy McDermott, and former NIST staff members, emeritus scientist Howard Baum and guest scientist Ron Rehm, were selected to receive the Sjölin Award for 2012 by the International Forum of Fire Research Directors. See **FORUM section** for details.

Daniel Madrzykowski was named Honorary Battalion Chief by the Fire Department of New York for his contributions to the safety of fire fighters. This is a highly unusual honor for a researcher. Madrzykowski and NIST colleagues have been collaborating with the Fire Department of New York City (FDNY) on research that determined how wind affects fires in high-rise buildings. The results confirmed that conditions created by wind can push hot gases and smoke from the apartment of origin into the public corridors and stairwells. A set of instructional videos based on the research is available for firefighter training to improve safety for civilians and firefighters. Since the study was completed, Madrzykowski has continued to work with FDNY to improve their firefighting tactics, incorporating the latest research findings. New York Fire Commissioner Salvatore Cassano appointed Madrzykowski to the rank of honorary battalion chief at a ceremony on May 31, 2012.

Gregory T. Linteris was named the recipient of the 2012 Harry C. Bigglestone Award for Excellence in Communication of Fire Protection Concepts by the Journal of Fire Technology for his paper, "*Clean Agent Suppression of Energized Electrical Equipment Fires*." The paper reviews the role of energy augmentation in the suppression of fires over condensed phase materials. A test protocol is suggested which can quantify the effects of added energy on the suppression process in Class C fires. The Harry C. Bigglestone award is presented annually to the author of the most outstanding paper submitted to *Fire Technology* during the previous calendar year, as voted by its International Editorial Board. See News from FPRF and NFPA in this issue for more information.

A number of NIST fire researchers including Dan Madrzykowski, Kelly Opert, Adam Barowy, and Nelson Bryner, were named the recipient of the 2012 Outstanding Accomplishment Award by the International Association of Arson Investigators (IAAI) for research activities in the fight against arson. The award was given for NIST's role in helping to organize and provide instructional support for training and certifications programs for federal, state and local fire investigators and for collaboration on the development of the CFITrainer.net program and DVD on the "Charleston Sofa Super Store Fire" based on NIST's technical investigation of the 2007 Charleston, SC fire. IAAI has a membership of more than 5,000 fire investigation professionals from around the world. The award was presented at its annual meeting on April 25 in Dover, Delaware.

Daniel Madrzykowski received the Dr. John Granito Excellence in Fire Leadership Award for his contributions to fire leadership and management research by the Fire Protection Publications and the International Fire Service Journal of Leadership and Management (IFSJLM) headquartered on the campus of Oklahoma State University. The award was presented in Tulsa, Oklahoma, on July 14, 2012 at the annual IFSJLM Research Symposium which is part of the International Fire Service Training Association Conference. The award honors Dr. John Granito, one of the premier fire and public safety consultants in the United States.

Kevin McGrattan was named the recipient of the Society of Fire Protection Engineers 2012 Rolf Jensen Award for unselfish, extraordinary, and unusual service on a Society of Fire Protection Engineers committee. Rolf H. Jensen was a leading authority on fire protection engineering who dedicated his life to advancing the art and science of fire protection.

International Workshop on Fire Resistance of Structures

NIST in collaboration with interested members of CIB, the FORUM of Fire Research Directors, the North American Fire Testing Laboratories (NAFTL), and other international R&D and testing organizations is beginning to plan a Workshop to develop an International R & D Roadmap for Fire Resistance of Structures. The workshop will emphasize a multi-year multi-institution large-scale experimental program to support performance-based engineering. This effort will be carried out under the umbrella of CIB with the intent to include key international organizations, including the International FORUM of Fire Research Directors, the North American Fire Testing Laboratories (NAFTL), and other appropriate U.S. and international R&D and testing organizations. NIST will host the workshop on its Gaithersburg campus in Maryland, USA. The workshop is planned as a two-day event and tentatively scheduled for the spring of 2013. The workshop will focus on the following issues:

1. identifying research and development needs for large-scale experiments on fire resistance of structures to support performance-based engineering and structure-fire model validation;

2. prioritizing those needs in order of importance to performance-based engineering;
3. phasing the needed research in terms of a timeline, i.e. near term (less than 3 years), medium term (3 to 6 years) and long term;
4. identifying the most appropriate international laboratory facilities available to address each need;
5. identifying the potential collaborators and sponsors for each need;
6. identifying the primary means to transfer the results from each series of tests to industry through specific national and international standards, predictive tools for use in practice, and comprehensive research reports; and
7. identifying the means for the coalition of international partners to review progress and exchange information on a regular basis.

Following the workshop, a roadmap will be developed based on the workshop discussions. The primary organizations overseeing the roadmap development (CIB, FORUM, NAFTL, and NIST) will form an international steering committee (to be chaired by NIST). CIB representation on the steering committee will be designated from the CIB W014 Commission. The roadmap will form an international basis to advance performance-based engineering design of structures. For further information, please contact Jiann Yang, Director, National Fire Research Laboratory, Engineering Laboratory, National Institute of Standards and Technology (jiann.yang@nist.gov).

Signed: Anthony Hamins, NIST

News from SFPE

Robert Jönsson of Lund University Receives the John L. Bryan Award from the Society of Fire Protection Engineers. The award, established in 2007, is in recognition of John L. Bryan and his more than fifty years of commitment and dedication to educating and mentoring students and practicing fire protection engineers. This award is presented to an individual who exemplifies commitment and dedication to educating, training and advising fire protection engineers. The recipients are recognized for freely and unselfishly providing their expertise to other individuals in order to assist them in enhancing their education, advancing their careers, and expanding their experience and knowledge in fire protection engineering.

Robert Jönsson is the recipient of this distinguished award in light of the following accomplishments. 2011 was the 25th anniversary of the Fire Safety Engineering Program at Lund University. This significant anniversary would not have happened without the leadership of Robert Jonsson. During this period, 722 students graduated from the Lund program, under Robert's mentorship. This includes graduates at the BSc., MSc. and PhD. levels.

Under Robert's leadership, the Fire Protection Program at Lund has garnished a reputation not only throughout Sweden but internationally as one of the top fire safety engineering institutions in the world. Additionally, Robert played an instrumental role in starting the International Master in Fire Safety Engineering. This program that is already into its first successful year was organized by Ghent University (Belgium), Lund University (Sweden) and the University of Edinburgh (UK). And it will open the door for students throughout the world the opportunity to study fire safety engineering.

But it is being a mentor that is one of Robert's strong points and a role that he clearly enjoys. For example, when you ask any of his students, they would will gladly tell you that they would not be where they are today in their careers with-out Robert's support. He has unselfishly offered both his expertise and friendship to the students. For example, Robert knows the names of all students at the program since the start in 1986, which in itself is an amazing accomplishment. This close relationship with the students has meant that Robert has not only been the Dean of Studies, but also a mentor and close friend. Listening to the students and putting that extra effort in is part of the reputation of the Lund University fire protection engineering program today – and Robert led by example."

SFPE Educational & Scientific Foundation

Johan Andersson and Axel Jönsson from Lund University were selected for the SFPE Educational and Scientific Foundation Student Scholar Award for 2012. Johan Andersson and Axel Jönsson were selected for this award for their research entitled "A Risk Perception Analysis of Elevator Evacuation in High-Rise Buildings". The award includes a $1,000 (US) honorarium. They will give a 30 minute presentation based on their work at the SFPE Annual Meeting on Tuesday, October 16, 2012. The meeting will be held in Savannah, Georgia (USA.) More details about the meeting can be found on the SFPE web page.

Call for proposal for Chief Donald J. Burns Memorial Grant

Grant applications now being accepted for the Chief Donald J. Burns Memorial Grant. The purpose of the Chief Donald J. Burns Memorial Research Grant is to utilize information modeling as a means of improving infrastructure safety and fire service preparedness. Application deadline is September 30, 2012, see details in here.

Signed: Robert Jönsson, Lund University, and Allan Freedman, SFPE

News from SP Fire Technology

SP Fire Technology also publishes its bi-annual newsletter which is available at http://www.sp.se

Ethanol fire tests in Borlänge, Sweden

SP Fire Technology recently undertook two fire tests on 20,000 l each of denaturized ethanol and E85, respectively, in Borlänge. The tests were part of the ETANKFIRE project, the main goal of which is to provide a platform of knowledge ensuring proper investment in fire protection of ethanol storage facilities.

The goal with the tests was to obtain full scale measuring data on burning rate, flame height and heat radiation at various distances for the most common ethanol fuels handled and stored in large volumes. The tests were performed at the end of August at the Dala Mitt Fire Brigade training Centre in Borlänge, Sweden. The burning rate was measured in the center of the pool by the use of a staple of thermocouples. The heat radiation was measured at various distances from the rim of the fire up to 30 m in four directions from the pool center. The overall fire development and the flame height were measured using several video cameras located in different directions. As a complement to the heat radiation measurements, the flames were also recorded using a thermal imaging camera.

Both tests were very successful with about the same weather conditions with no precipitation and moderate wind. All measuring data will now be carefully evaluated and compared with various test data and computer calculations of similar gasoline tests. The results will also be extremely valuable to validate heat radiation calculations and thereby to improve the accuracy of risk assessments in fuel storage facilities. Information about the project and about becoming a partner is available from the ETANKFIRE website: www.sp.se

Fires in Vehicles

The 2nd FIVE conference will be September 27-28, 2012 in Chicago, USA. For more information visit: www.firesinvehicles.com. The objective of this conference is to exchange knowledge of fires in vehicles, including both road and rail vehicles. In recognition of the fact that many of the fire problems faced by these vehicles are the same, the solutions to them can also be similar.

Signed: David Lange, SP

FEATURED ARTICLE

Fire Retardants and Fire Safety

by T Richard Hull and Anna A Stec

University of Central Lancashire, UK

To fire safety engineers, adding fire retardants (FRs) to plastics is frequently dismissed as a dark art, practiced by chemists to help materials pass regulatory tests; to environmental scientists, fire retardants are an unnecessary evil, polluting the planet; to the chemical industry producing 1.9 M tonnes of FRs per year, they represent a lucrative $5.1 bn dollar business. In Europe and North America, debate is currently focussed on whether these additives are effective, and if they should be banned. The recent series of articles in *The Chicago Tribune* brought the debate to a wider audience of politicians, regulators and the general public.

The history of fire retardants goes back to Egyptian times when solutions of alum were used to treat timber. Gay-Lussac protected theatre fabrics from fire by treatment with mixtures of ammonium phosphate, ammonium chloride and borax which formed a glassy layer on heating [1]. The widespread emergence of synthetic polymer products in the 1960s and 70s was followed by the development of a FR industry; fires became more common and more severe, and there was a shift from burn fatalities and injuries to harm caused by toxic gas inhalation.

The main class of fire retardants currently under scrutiny are the halogenated flame retardants, which interfere with gas-phase free radical reactions, typically producing more carbon monoxide, hydrogen cyanide, smoke and other products of incomplete combustion. In contrast, modern, halogen-free fire retardants prevent fuel from escaping to the gas phase, often by formation of a protective barrier or char layer, acting as a radiation shield, and inhibiting the flow of fuel and oxygen.

Many halogenated flame retardants are persistent and bioaccumulative, and are now ubiquitous throughout the built and natural environment [2,3]. In 2010, a group of over 100 eminent environmental scientists signed the San Antonio statement on halogenated flame retardants [4] condemning their continued use and requesting urgent remedial action. As persistent organic pollutants (POPs) they take several years to break down in the environment, are bioaccumulative (they accumulate in plants and animals, becoming more concentrated as they move up the food chain), and are toxic. All of the 22 chemicals currently designated as POPs by the Stockholm Convention [5] are organohalogens, where carbon is bonded to fluorine, chlorine or bromine. Studies have shown higher levels of halogenated flame retardants in house dust in California and the UK, where the most stringent furniture flammability regulations operate [6]; at lower levels they have been detected in flora and fauna, from the developed world to the Himalayan and Arctic regions. The most detailed studies of health effects have concentrated on polybromodiphenyl ethers (PBDEs), proven endocrine disruptors in both experimental animals and humans. Elevated levels have been found in human blood serum in Californian children at 5 times the US average, and 10-100 times the European and Mexican averages. These elevated levels have been linked to infertility, and hyperactivity and attention disorders in children etc. [3].

Several of the most widely used halogenated flame retardants, including PBDEs and polybromobiphenyls (PBBs), have already been banned in Europe and the US. In many cases they have been replaced by similar organohalogen compounds with unknown eco- and human toxicity. The release of flame retardant from a product, during, or at the end of life, its stability and transport through the environment, uptake and bioaccumulation by humans and other living organisms, and the resultant toxic effects, are very difficult to predict; it took nearly 40 years of exposure to PBDEs to accumulate sufficient evidence for action to be taken, and it may take as long for environmental levels to return to safe levels.

The fire retardant debate is polarised between the “Green” and “Industry” lobbies, with little input from fire safety professionals, or fire retardant developers (who have spent the last 20 years identifying suitable alternatives to halogenated flame retardants). It was argued [7] in a report commissioned by the flame retardant industry that “the introduction of fire-safe furniture [in the UK] from 1988 onwards is estimated to have resulted in at least 50% of the estimated 2002 savings in injuries and domestic fire deaths”, the other 50% being attributed to low cost smoke detectors. It seems unlikely that this often quoted estimate would stand up to serious scrutiny. Factors such as changes in cigarette smoking habits, the change from exposed flame heating sources and a general improvement in standard of living were disregarded. More recently, a detailed study

produced for the European Commission [8] on the risks and benefits of fire retardants analysed the fire fatality data from individual European countries with different levels of flammability regulation. While they acknowledged the difficulty in comparing statistics from different countries, they concluded that "in some instances, drops in the number of fire deaths coincide with the introduction of non-flammability requirements for domestic consumer products. In other instances, however, there is no change in the on-going trend of fire deaths. This suggests that these numbers do not reflect the stringency of non-flammability requirements, respectively that non-flammability requirements do not visibly decrease the number of fire deaths." Since most FRs are designed to suppress ignition (not to reduce the fire growth or peak heat release rate) based on the requirements of regulatory tests, and since most successful suppressions of ignition will never be reported (an accident leaving a scorch mark on a couch is unlikely to be recorded in statistics, though it may trigger purchase of a replacement), it seems inevitable that any benefits from incorporation of fire retardants will not be easily quantifiable.

Country	Source	Period	Domestic fire deaths per million inhabitants			
			High period	Low period	Evolution over period	Mean last 3 years period
Spain	WHO	1999-2005	1.87	0.73	0.1569	1.55
Romania	WHO	1999-2008	3.25	1.29	-0.1432	1.84
France	WHO	2000-2007	3.14	1.43	-0.1432	2.05
Austria	WHO	2002-2008	4.67	1.93	-0.1548	2.37
Netherlands	Questionnaire	1988-2009	5.40	1.53	-0.0419	2.60
Slovakia	WHO	1994-2005	4.83	1.67	0.0349	2.85
Germany	Questionnaire	1985-2007	7.84	3.77	-0.0474	4.30
Slovenia	Questionnaire	1993-2007	8.01	3.02	0.0561	5.66
United Kingdom	Questionnaire	1980-2008	14.60	5.45	-0.3091	5.69
Czech Republic	Questionnaire	1983-2009	8.04	4.25	0.0089	6.01
Ireland	Questionnaire	1980-2008	18.29	7.04	-0.2838	8.06
Sweden	Questionnaire	1999-2008	12.46	5.57	-0.2441	8.37
Poland	Questionnaire	1995-2009	12.83	8.45	0.1229	11.74
Hungary	Questionnaire	1993-2009	35.21	10.17	-1.2864	12.24
Denmark	Questionnaire	1996-2008	15.71	8.57	0.1608	13.08
Finland	Questionnaire	1985-2008	20.03	9.07	-0.2191	15.67
Lithuania	WHO	1998-2007	36.49	19.20	-0.5294	30.12
Estonia	Questionnaire	2001-2009	98.16	31.33	-5.6333	53.42
Latvia	WHO	1996-2007	93.36	46.22	1.2996	75.84

Ranking of the EU member states according to the number of domestic fire deaths, data from [8].

The well-researched articles in the Chicago Tribune, which cited more evidence than a typical newspaper investigation (http://media.apps.chicagotribune.com/flames/index.html), showed that despite the power of corporate America, its press were able to investigate the links between the tobacco lobby, the flame retardant industry lobby and the legislature. Unfortunately, in so doing, they attempted to victimise a well-respected fire scientist, Dr. Margaret Simonson McNamee (N.E: *see her Featured Article in this same issue*), precisely because she had provided a full audit trail showing how she had obtained her data, and what assumptions had been made. While there is insufficient data to unequivocally state that the risks or benefits of fire retardants outweigh one another, as scientists, we need to distance ourselves from the tangled web of ignorance, deceit and misreporting that often typifies public decision making – without our objectivity we have no tool for distinguishing right from wrong.

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FEATURED ARTICLE

Toxic Chemicals and Toxic Money: The Science and Politics of Flammability Standards

by Vyto Babrauskas[1],David Rich[2], Veena Singla[2], and Arlene Blum[2]

On Sunday May 6, 2012, the Chicago Tribune, a major U.S. newspaper, began a series of front page articles investigating the flame retardant chemical industry entitled *Playing with Fire* with the headline: "A deceptive campaign by industry brought toxic flame retardants into our homes and bodies. And the chemicals don't even work as promised" (1). The series continued with "Tobacco's Clout," "Distorting Science," "Toxic Roulette," and thirteen additional articles to date. The New York Times asked: *Are you safe on that sofa?* (2), which was one of the most frequently emailed articles on Sunday, May 20, 2012 while a Tribune editorial stated "You have been sold a false sense of security about the risk of your furniture burning, and you've been exposed to dangerous chemicals you didn't know about. If you're not angry, you ought to be."

Illinois Senator Dick Durbin, the Majority Whip in the U.S. Senate, was very angry. Senate hearings were held in July, during which the flame retardant industry faced scathing criticism from senators outraged by the industry's "misuse of science, misleading testimony and creation of a phony consumer group that stoked the public's fear of furniture fires." In California, home to the flammability standard which has led to the use of flame retardants in furniture and baby products, the Governor issued a directive to change the standard to reduce the use of flame retardant chemicals while ensuring fire safety.

Controversies about chemicals used for fire safety are not new to the fire science community. Halons, asbestos, PCBs, and Tris flame retardants in children's pajamas are all compounds with a known fire safety benefit that are no longer used due to their adverse impacts. Similarly, for flammability standards that lead to the use of added flame retardant chemicals, a question to consider is: Does the standard provide a net fire safety benefit that outweighs the potential health and ecological harm?

The primary flammability standard discussed in the Tribune series is the contentious 1975 California Technical Bulletin 117 (TB117) (3) which requires the filling materials inside furniture to withstand exposure to a small open flame for 12 seconds when tested without fabric covering. The most effective and economical way to meet this standard is by adding flame retardant chemicals to polyurethane foam at levels of three to five percent of the weight of the foam. California is the only state in the U.S. with a furniture flammability standard, but most furniture and baby product manufacturers follow TB117 across the United States and Canada to avoid maintaining a double inventory and for defense against liability claims. Since 1975 a series of flame retardant additives have been used to meet TB117, banned, and replaced with other flame retardants, in each case lacking adequate toxicity and ecotoxicity information.

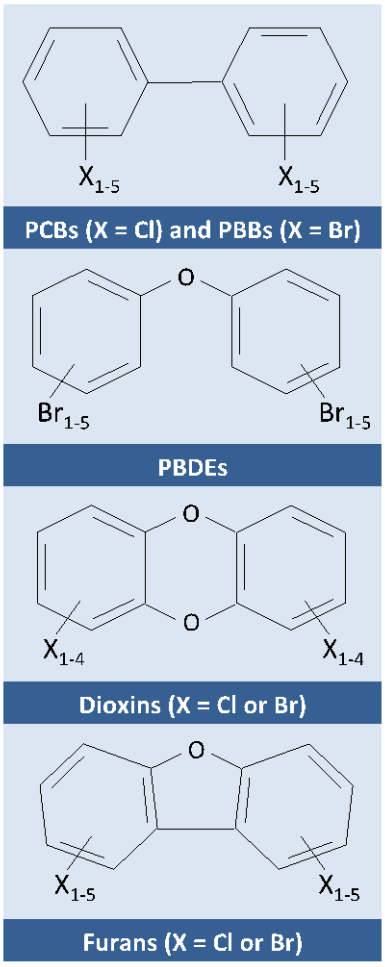

Figure 1: Related structures. Polybrominated diphenyl ethers (PBDEs) are similar in structure and biological properties to the known human toxicants PBBs, PCBs, dioxins, and furans.

For example, pentaBDE, was used as the primary flame retardant in furniture and baby product foam until its phase-out in 2005. PentaBDE is structurally similar to the known human toxicants PBBs, PCBs, dioxins, and furans (Figure 1). These compounds all have related mechanisms of toxicity in animal studies and will bioaccumulate and persist in both humans and animals(4). There are over 2,000 peer-reviewed scientific research articles documenting the toxicity, human and animal exposure of PBDEs and other furniture flame retardants. Some flame retardant additives primarily used to meet TB117, have been globally banned due to their toxicity. Nonetheless, they are found in air, water,

soil and the bodies of humans around the world (5). Therefore, an important question is "Does the TB117 standard provide a fire safety benefit?"

As discussed in our 2011 IAFSS paper (6), TB117 foam compared to non-flame retarded foam does not serve to prevent furniture ignitions from small open flame sources. This is because in real furniture fires, the outer fabric will ignite first. Once the fabric is burning, the foam is presented with a flame challenge many times larger than the original small flame, and will ignite whether or not flame retardants are present. Also, treated foam does not reduce the severity of a fire as measured by peak heat release rate or the time to reach peak heat release rate in normal residential furniture construction. This is in agreement with the Tribune's reports from the CPSC and UL of "no significant protection from flame retardants in foam." In addition, data in Figure 2 from a 2011 NFPA report (7) shows no appreciable change in the number of deaths from furniture fires that started from small open flames like candles, lighters and matches, during the years that TB117 has been followed. These data all indicate that TB117 does not provide a meaningful fire safety benefit.

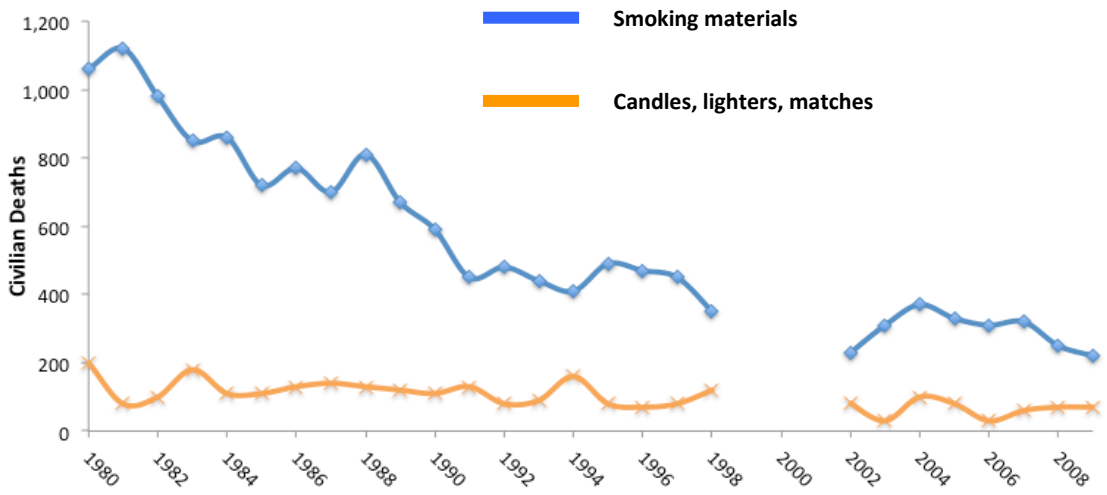

Figure 2: Civilian deaths from home upholstered furniture fires, 1980-2009 (7). The TB117 standard addresses furniture fires started by small open flames (candles, lighters, and matches). There has not been a significant change in the number of deaths in this category during the years TB117 has been followed.

To meet TB117, a home or office can contain a pound or more of flame retardants that are similar in structure and properties to banned substances such as PCBs and DDT. Many are semi-volatile organic compounds (SVOCs) which continuously migrate out of products into air, settle into dust, and are ingested by humans, at the highest levels by toddlers who frequently put their hands into their mouths. Flame retardants are associated with reduced IQ in children, reduced fertility, thyroid problems, hormonal changes, and cancer (5). A recent UC Berkeley study found that California children have seven times higher amounts of the furniture flame retardant pentaBDE in their bodies compared to children in Mexico where there is no such requirement (8). American women have the highest levels of flame retardants in their breast milk in the world.

Pregnant women have particular cause for concern because animal studies show harm to brain development of offspring when mothers are exposed during pregnancy. These persistent and bio-accumulating retardants can stay in the human body for decades (4).

If the potential for harm is so great and the CPSC, UL, and fire scientists find no significant fire safety benefit from TB117, why hasn't this standard been updated? One reason is that the flame retardant producers, Albemarle, Chemtura and Israel Chemicals Ltd., spent 23.2 million dollars in California since 2007 lobbying against legislation that would change the standard to reduce the use of toxic flame retardant chemicals while ensuring fire safety. (9) In spite of support from firefighters, physicians, scientists, furniture and foam manufacturers, and citizens' groups, four attempts at California legislation were defeated due to chemical industry lobbying.

The profitability of flame retardants likely has contributed to the strong chemical industry defense of flammability standards leading to their use, even when there is evidence that the standards are not effective. In 2010, Albemarle reported a 377% gain in profits from the previous year due to an increase in brominated flame retardant sales. In addition these three companies control much of the global market and can raise prices at will: "Chemtura Corporation will increase prices in all regions on bromine-based products by up to 25 percent …to secure global supply, product stewardship and continued advocacy efforts." (10)

The New Standard TB117-2012

TB117 is in the process of being updated, in spite of the chemical industry's advocacy. In July 2012 the California Bureau that implements TB117 announced a new draft regulation, TB117-2012 (11), which differs from the old standard in several ways:

The standard would require a cigarette smolder test on the cover material of products which is where fires actually begin—in fabric rather than in foam.

The new standard will address fires started by smoking materials which cause a greater number of fire deaths than fires started by small open flames (Figure 2).

TB117-2012 can readily be met without the use of flame retardant chemicals and should improve both fire safety and human health impacts.

The Bureau's current draft plan would implement the new standard within a year after which consumers will be able to buy furniture and baby products with greater fire safety and without added flame retardants. Nonetheless, toxic retardants have been used in furniture foam for 37 years and will persist in older furniture, our bodies and the environment for years to come, harming human and environmental health—apparently without ever having increased fire safety!

What can the Fire Science Community Learn?

What lessons can we learn from this situation? Given the history of adverse impacts from a variety of fire safety interventions, the process of designing flammability standards and regulations could benefit from revision. Fire scientists should consider the big picture, including the health and ecological effects of materials that will be used to meet fire standards. A more interdisciplinary approach could help, for example collaboration with toxicologists and other scientists who can provide information on implications for human health.

Evaluation of a standard's efficacy before implementation is also important. TB117 was originally issued without the benefit of systematic study, and the process was bereft of statistical considerations. Further research and increased understanding of standards such as TB117 and alternatives to the addition of flame retardant chemicals by the fire science community could lead to improved fire safety as well as a healthier environment.

It is also important that the fire safety science field not be unduly influenced by chemical manufacturers. Vigilance is required, given that the funds the flame retardant chemical industry spent on lobbying against changes to one regulation in one state is more than the total revenues of IAFSS over the entire history of its existence.

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FEATURED ARTICLE

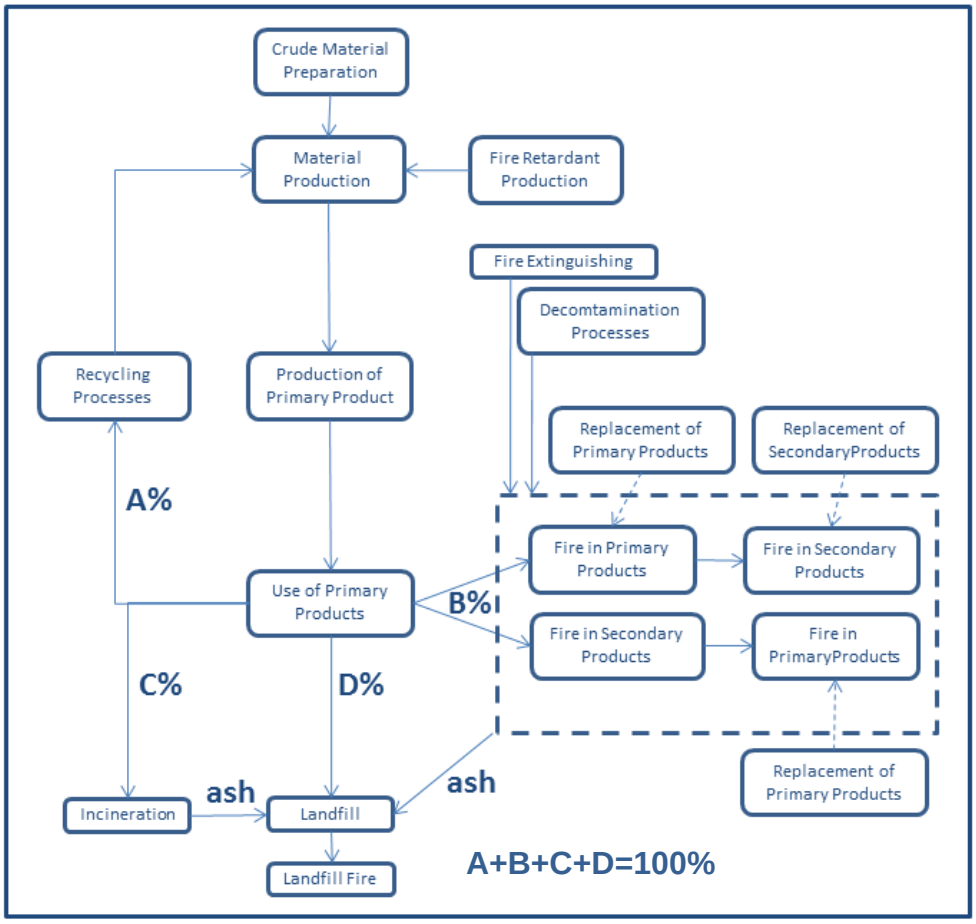
Fires and the Environment – a Burning Issue!

by Margaret Simonson McNamee

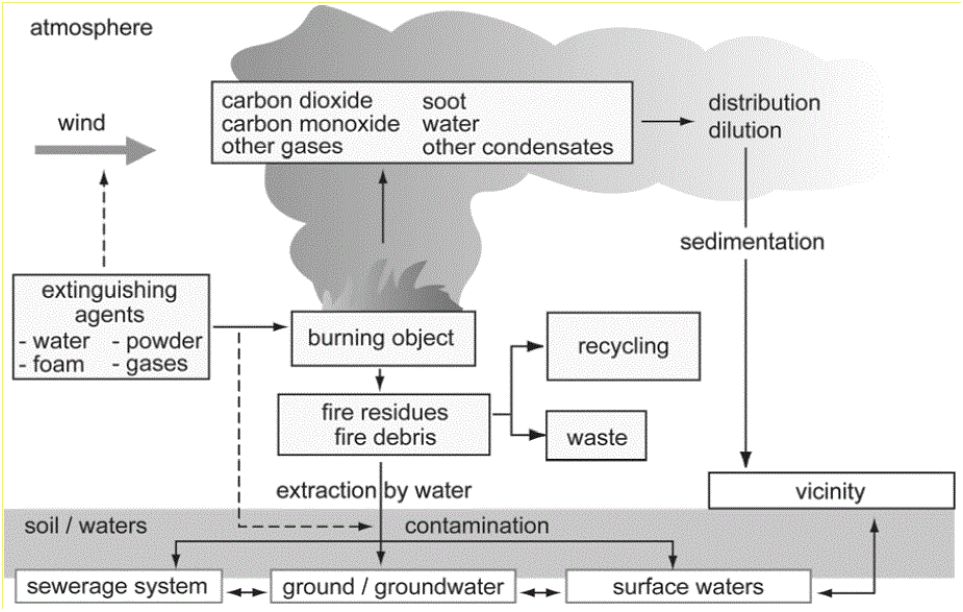
SP Technical Research Institute, Sweden

Recently a series of articles was published in the Chicago Tribune questioning the use of flame retardants (FRs). Research begun over a decade ago by SP Fire Technology, was criticized in one of the articles, in part because it was funded by industry, and in part because it was deemed unscientific. The work concerned the development of the first Life-Cycle Assessment (LCA) based model to incorporate unwanted fire as one end-of-life scenario – the so-called Fire-LCA model [1].

The model, developed initially around a notional 1 million TV sets, compared the life cycles of non-flame retarded (typical in Europe) and flame retarded (typical in the US) TV sets. Specific statistical data was required for the number and severity of fires caused by TV sets. The SP research cited was conducted using the best information available at the time. The peer reviewed articles presenting the work clearly show that a Swedish statistical model was used as the basis of a generic model for 1 million non-flame retarded TV sets [2, 3] as this contained the most detailed information. The model was based on work conducted by the Swedish Electrical Safety Board (the regulatory authority for electrical safety in Sweden) and discussed thoroughly with them at the time. The model included a small number of actual events but had been extrapolated to the whole of Sweden by the Electrical Safety Board and it was this extrapolated data that was used in the SP research. The limitations of the model were exemplified and readers, both then and now – most recently at a Keynote paper at the 10th IAFSS in Maryland [4], have been invited to develop alternative models and present alternative results.



Schematic representation of the fire and life-cycle assessment model



Environmental problems caused by fires and fire-fighting agents (based on Hölemann 1994, Fire Safety Science 4: 61-77, doi: 10.3801/IAFSS.FSS.4-61).

In my mind, the Chicago Tribune article series holds two main messages, one significantly more important than the other. The lesser of the messages was that investigative reporting may not be balanced despite good intentions. Numerous telephone interviews and email correspondence were insufficient to ensure that the SP work was presented correctly. This may be an unavoidable consequence of the complexity of many issues dealt with by the media, the short amount of space available to explore that complexity coupled to the need for a compelling story.

The greater message was that the environmental impact of fires is an important, but often ignored topic that is no less controversial today than it was when SP Fire Technology first began working on the subject almost 20 years ago [5]. The impact of flame retardants released into the environment is only one piece of the puzzle.

Our interest in this field continues and SP Fire Technology has recently received some seed funding from the Swedish Fire Research Board to review the existing predictive models and sampling and analysis methods for the fate and concentrations of eco-toxicants expected to be produced by fire, given new developments in fire protection technologies, fire resistant materials, and firefighting tactics and suppression media. This project is in support of international standardization in the field of the environmental impact of fires and will provide important insight into this difficult issue. Continued industry funding of research is also important in this field as in others. Partnering with independent research organizations, like SP Fire Technology, and Universities is one way to ensure that such research is independent and objective. The research organization and not the funding source has traditionally been an indication of the quality of the research and should continue to be so. I look forward to continued scientific debate in this important field, through peer reviewed articles and at conferences.

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ARTICLE

A Sound Experiment

by Jack Watts
Fire Safety Institute, USA,
and Associate Editor of Fire Safety Science News

Defense Advanced Research Projects Agency (DARPA) is showing off a new system that can put out flames using only sound [1]. It's part of the U.S. defense agency's *Instant Fire Suppression* program. Using two speakers arranged on either side of a pool fire, an acoustic field was emitted and engulfed the flame. The sound increases air velocity, which thins the boundary layer of the flame, making it weak and much easier to douse. "*We have shown that the physics of combustion still has surprises in store for us*" commented DARPA manager Matthew Goodman in a statement. "*Perhaps these results will spur new ideas and applications in combustion research*".

Lest you think this is really surprising, here are a couple of earlier mentions of the concept.

First, a Google search leads quickly to the Wikipedia entry for Charles Kellog [2] which cites the following from a 1926 newspaper article:

> *"In The Sydney Morning Herald, Thursday, February 4, année 1926: Sound vibration - Extinguishes Fire: New-York, Feb. 2. 1926: Mr Charles Kellogg, a Californian scientist, give firemen here a demonstration of extinguishing a gas flame two feet high by tonal vibration. Mr Kellogg passed a bow, like an enlarged violin bow, swiftly across an aluminium tuning fork, producing a screech like an intense radio static. Instantly the yellow flame subsided to six inches and became a sputtering blue flare. Another movement of the bow completely extinguished the flame. Mr Kellogg claimed that in future buildings would have a scientifically-determined pitch, with a screech for extinguishing fires tuned in from a central firehouse, where it would be produced by a much larger bow. He said that the General Electric Company was experimenting with the matter".*

Second, from a book *The Theory of Sound* published in 1896 by Lord Rayleigh, 1904 Nobel Prize winner for Physics [3]:

> "*Singing flames may sometimes replace electrically maintained tuning-forks for the production of pure tones, when absolute constancy of pitch is not insisted upon. In order to avoid progressive deterioration of the air, it is advisable to use a resonator open above as well as below. A bulbous chimney, such as are often used with paraffin lamps, meets this requirement, and at the same time emits a pure tone. Or an otherwise cylindrical pipe may be blocked in the middle by a loosely fitting plug (Phil. Mag. vol. vii. p. 149, 1879).*
>
> *Vibrations capable of being maintained are not always self-starting. The initial impulse may be given by a blow administered to the resonator, or by a gentle blast directed across the mouth. In the striking experiments of Schaff'gotsch and Tyndall (Sound, 3rd edition, p. 224, 1875) a flame, previously silent, responds to a sound in unison with its own. In some cases the vibrations thus initiated rise to such intensity as to extinguish the flame.*"

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CONFERENCE REPORTS

Young Researchers Training School, Malta

It is with great pleasure that we report to you on our experiences at the Young Researchers Training School for integrated fire engineering (COST TU0904) which occurred in April 2012 in Malta. This training school had been intended to broaden the research background of the participants and provide them a chance to network outside their normal studies through the exchange of information and opinion. The training school was a valuable five day experience for the careers of the students in fire engineering selected from across Europe. This conference involved two parts: lecture and brainstorming sessions.

Some of the participants at the Young Researchers Conference training school for fire engineering research in Malta, April 2012. Photo is courtesy of Prof Ian Burgess.

The lecture session was led by various practitioners and academics in fire engineering focusing on topics of fire behavior, integrity design, life and structural safety. Presentations by Prof. Jean Marc Franssen and Prof. Paulo Vila Real summarized the development of research and design methods of structural fire engineering; structural robustness in fire was summarized by Prof. Ian Burgess; Dr. Florian Block presented the application of performance-based design in practice from the view of an engineer; Dr. Guillermo Rein gave an introduction of fire dynamics to structural engineers emphasizing the importance of research on travelling fires; Dr. Luke Bisby reviewed the past, current and future status of structural testing in fire; Dr. Yong Wang presented the properties of protection material with special reference to intumescing coatings research; and Jim Marsden shared the fire service's view on fire engineering. See group photo above. All lecture presentation slides can be viewed at http://fire.fsv.cvut.cz/ifer/2012-Training_school.

For us students in attendance these presentations gave a unique opportunity to hear from various academics and those in the industry about their research and consulting experiences. The topics covered a wide range of themes but in particular closely related to our PhDs; such as modeling progressive collapses in structural fires (Ruirui) and experimentation of structural systems in fire (John). Some of the ideas presented had controversy and were thought provoking but all had some use for our projects; one example is the 'simple' or 'not simple' modeling perspectives, which were elaborated on by Prof. Jean Mark Franssen with respect to further research and endeavors we plan. What we found particularly helpful was that lectures provided a window into professional thought; such as when new research results are presented, what it takes for them to accept or reject. The practitioners and academics provided expertise on what our duties as young researchers are. These presentations widened, inspired and comprehensively pushed our knowledge establishing a more thorough and solid research background for integrated fire engineering.

The brainstorming session followed with nearly 30 student presentations of research projects being conducted throughout Europe (mostly PhD projects but also MSc. were included) covering diverse topics from passive fire resistance, fire development, risk assessment etc. The presentations all allowed for some flexible but yet intense and interesting discussion, where ideas, knowledge and opinion were exchanged by the young researchers, practitioners and academics. The experience for us students was not only to directly give us ideas on where to go

next or how to sort out the problem we are confronted with, but also, more valuably, make us think about our problems rationally and to develop a professional thought process on research and problem solving. The abstracts and slides for these presentations can be viewed in the website referred to above.

Rarely do conferences give an opportunity to speak of projects in the level of rigorous detail that we were allowed here, and to the level of depth of helpful discussion generated afterwards. This is one of the merits that this training school (rather than a normal conference experience) stood out. At times though, it was a challenge to understand others work and suggest solutions or different ideas, but that is mostly due to different presentation styles and branches of study we may not fully be familiar with (typical of multidisciplinary events). Standing as presenters, it was a wonderful and valuable experience to exchange work to our peers and experts, gathering advice and feedback.

We both come from known fire-research groups which regularly challenge and communicate with one another in much the same spirit of this training school however, presenting within your own group sometimes it is easy to miss key things that you can or could consider. This training school was all the much more valuable to participate in, as fresh eyes could look at our problems. Students from so many backgrounds (with incredibly diverse expertise) were present ready to share ideas and push each other further. Moreover, it is very exciting to find common-ground with other researchers on their work and seek research collaboration with them. Two imminent examples of this continuing collaboration are the visiting of two students, one from Thessaly and the other from Naples, each to Sheffield and Edinburgh respectively for several weeks to research on structural and fire.

The conference was not only about work though; the attendants participated in a number of visits in Malta after the conference (see photos below). The sites to see, food to taste and overall Maltase atmosphere make us wish more fire research events could be held like this training school. The people (Maltese, organizers, students) were amazing and incredibly helpful.

We were incredibly thankful to be selected as student representatives of the United Kingdom to attend the training school, we thank those who organized the conference, in particular Ruben Paul Borg (host of the training school), the attendees, and all for the feedback they had provided us. We hope that this training school, or something along the lines of it, will continuously be held to engage and motivate more young researchers in integrated fire engineering

Signed: John Gales, University of Edinburgh and RuiRui Sun, University of Sheffield

Scandinavian Fire Safety day, Lund

On April 18, 2012, the 2nd Fire Safety Day, which is a collaboration between the Technical University of Denmark (DTU) and Lund University, was organized out at Lund. The day was a success with 100 participants from Scandinavia, Germany and Scotland. During the day there was focus on fire research in Scandinavia. But also contributions from other countries were presented.

The next Fire Safety Day will be held on April 17, 2013 at DTU. Information can be found at www.brand.dtu.dk.

Signed: Anne Dederichs, DTU, and Patrick van Hees and Robert Jönsson, Lund University.

SFPE Asia-Oceania, Hong Kong

The Exchange Meeting of Society of Fire Protection Engineers (SFPE) Asia-Oceania Chapters was successfully held on 23 June 2012 at The Hong Kong Polytechnic University, Hong Kong, China. This meeting was facilitated by Professor Ai Sekizawa, Chairman of Coordination Committee of SFPE Asia-Oceania Chapters, taking the advantage that a great number of experts and professionals in the fire protection engineering community were gathered in Hong Kong at that time to attend the biennial conference: SFPE 9th International Conference on Performance-Based Codes and Fire Safety Design Methods from 20 to 22 June 2012.

About 50 participants attended the exchange meeting, including the SFPE Chapter Presidents from Hong Kong, Taiwan, Korea, Japan and Singapore, and members from Indonesia, Malaysia, USA, Australia, Sweden, Poland and Iceland.

In the morning session, presidents from each SFPE Asia-Oceania Chapter reported their activities held and future plans, followed by free discussions. Some directions for the next exchange meeting were proposed.

An open forum facilitated by Professor W.K. Chow, President of SFPE-Hong Kong Chapter, was scheduled in the afternoon. The topic was "For Improvement of Recognition and Qualification of Fire Protection Engineers", starting with a message from the Headquarters of SFPE by Mr. Morgan Hurley, Technical Director of SFPE. A keynote lecture titled "Professional Licensing and Certification for Fire Protection Engineers" was delivered by Mr. Chris Jelenewicz, Engineering Program Manager of SFPE.

There were two more presentations on special topics. The first one was "Fire Safety Design of Tokyo Sky Tree" by Mr. Kiyoshi Fukui, President of the SFPE-Japan Chapter. The other one "Implementation of Registered Fire Protection Engineers in Hong Kong" was presented by Mr. Leung Kwun-Hong, Acting Deputy Chief Fire Officer (Fire Safety), Hong Kong Fire Services Department.

Signed: W.K. Chow, Hong Kong Polytechnic University

Structures in Fire 2012, Zürich

This message is to inform those of you were not in Zürich in June 2012 about the outcome of the seventh international conference, SiF'12.

The number of proposals that we received has again increased from the previous conference because 228 extended abstracts were send for review. Each abstract was reviewed by three reviewers from the list of 43 who served for this conference.

Fifty papers communications have been given 20 min for presentation in the single track session, which is only 22% of the proposed abstracts and makes our conference extremely selective. Another series of 34 papers were presented as posters while their authors were given 5 min to present the essential features of their paper to the delegates in two parallel sessions. The fact to have a short presentations of the posters is a feature introduced for

the first time in the SiF conferences and it was very much appreciated by the authors and by the delegates. Nevertheless, because the acceptance letters sent to the authors mentioned only the word of "poster", several authors could not get the funding for coming presenting a poster.

All 84 papers have been printed in full extend in the proceedings without any distinction between them. The proceedings of the conference can be downloaded as a pdf file on: http://e-collection.library.ethz.ch

The attendance was high with 178 delegates in total, coming from all over the world, with the highest delegation coming from Edinburgh as usual.

The local organization by the team of Mario Fontana from ETH Zürich was characterized by warm friendly attitude as well as typical Swiss efficiency and everything went perfectly, from welcome meeting party, to technical sessions, official banquet and even the weather.

Don't forget to visit our website maintained by Paulo Vila Real: http://www.structuresinfire.com. You can find interesting information such as the proceedings of previous SiF workshops and conferences. Don't hesitate to contact Paulo if you want to contribute to the web site with relevant information.

The steering committee has decided that the next SiF conference in 2014 will be organized by Tongji University in Shanghai, China. Professor G.Q. Li and the steering committee have since decided that the conference will take place from June 11 to 13. Please note these dates for yourself and help us advertising the conference. A web page dedicated to this conference will certainly be set up by G.Q. and his team.

Proposals for hosting SiF'2016 should be sent not later than one month before the start of SiF'2014. The objective is to announce the location of SiF'2016 at SiF'2014. As decided in Singapore, SiF 2016 will be held on the American continent, anywhere from the north of Alaska to Ushuaïa.

Believe it or not but we already received a proposal to host SiF'2020 in Asia.

We look forward to meet you in Shanghai.

Signed: Jean-Marc Franssen, Université de Liège and SiF movement

High Challenge Storage Protection, Paris

High challenge warehouse fire protection strategies are of global concern to the fire protection community. As new high hazard commodities appear in challenging storage arrangements, new approaches to fire protection are required.

On July 27th in Paris, France, the National Fire Protection Association and the Fire Protection Research Foundation presented a one day seminar on recent global research to address this challenge, in cooperation with the European Fire Sprinkler Network. Three global property owners, Inditex, Valspar and IKEA reviewed the challenges they face with new commodities and new storage arrangements.

Global research organizations including the Health and Safety Laboratory, UK, Ineris, France, and SP, Sweden served as honorary sponsors of the event; each also presented their organizations recent research initiatives on the topic including fire protection solutions for automated storage arrangements and hazard assessment of lithium ion batteries and combustible liquids in composite intermediate bulk containers. U.S. based organizations FM Global and Aon Fire Protection Engineering and Underwriters Laboratories presented recent research on automated storage protection, HVLS fans and sprinkler protection, and new pallet material hazards.

Finally, global insurers XL Insurance, FM Global and Zurich Insurance reviewed emerging storage challenges around the globe and spoke to the need for continued research to address them.

A truly global audience of 120 safety professionals participated in the program; based on its success a similar program is planned in the future. Seminar presentations will be available on the Foundation's website on August 15th.

Signed: Kathleen H. Almand, Fire Protection Research Foundation

CALL FOR PAPERS

Fire Science Reviews

Fire Science Reviews has begun publication as an online, open access review journal. The first paper published is: *A review of fire blocking technologies for soft furnishings*, by Nazaré S and Davis RD

Forthcoming review papers include: *Low Temperature Oxidation of Linseed Oil: A Review*, by Juita, Bogdan Z Dlugogorski, Eric M Kennedy and John C Mackie, and *Assessment of Factors Affecting Fire Performance of Mattresses: A Review, by* Shonali Nazare, Rick Davis and Kathryn Butler

The journal website is http://www.firesciencereviews.com. You can sign up for email publication alerts at the website. Potential authors are encouraged to contact Editor-in-Chief Craig Beyler at editorial@firesciencereviews.com. Review paper concept proposals are welcome in any aspect of fire safety science. See the website for details.

7th Fire and Explosions Hazard

The 7th International Seminar on Fire and Explosion Hazards is a scientific meeting on the latest developments and findings from experiments, theory, modeling, and case studies on fires and explosions. Scientists, engineers, professionals, and students who are interested in gaining knowledge and exploring its impact and application to the practical challenges of fire and explosion safety are invited to attend and submit presentations to the Seminar.

Previous meetings have been held in Moscow (1995, 1997), Lake Windermere (2000), Londonderry (2003), Edinburgh (2007), and Leeds (2010). The next Seminar will be held in Providence, USA, the capital city of Rhode Island. Providence mixes the vibrancy of a big city with the atmosphere of a small town. In addition to its own attractions, it provides easy access to several interesting locations on the Massachusetts (Cape Cod) and Rhode Island (Newport) coasts.

For more information, please contact Jenny Chao at jenny.chao@fmglobal.com.

Fire Safety Design and Sustainable Buildings: Challenges and Opportunities

NFPA and the Fire Protection Research Foundation (FPRF) present a one and a half day symposium, Fire Safety Design and Sustainable Buildings: Challenges and Opportunities, taking place November 7-8, 2012 at the Courtyard Marriott Chicago Downtown/Magnificent Mile. The symposium will feature perspectives from architects, engineers, the sustainability community, and research institutions on the challenges and opportunities of integrating fire safety and sustainable design. http://www.nfpa.org

The symposium will comprise three different sessions that address: 1) Sustainable building design features and impact on fire safety, 2) Fire safety features and impact on sustainable building design, and 3) Life cycle sustainability of structures including fire safety features/practices.

The goal of this event is to bring the fire protection and architectural communities together to discuss these topics and share ideas and best practices for sustainable fire safe design.

Submit an abstract for consideration by November 1. In conjunction with the symposium, the Fire Protection Research Foundation will feature a best practice showcase, Integrating Fire Safety and Sustainability Design Goals, illustrating the symposium's theme of meeting fire and sustainability goals with good design practice. Please e-mail abstracts to Eric Peterson.

UPCOMING EVENTS

5th International Symposium on Human Behaviour in Fire, Cambridge, UK, Sep 19-21, 2012. http://www.interscienceccomms.co.uk

2nd International Conference on Fires in Vehicles (FIVE), Chicago, USA, Sep 27-28, 2012. http://www.firesinvehicles.com

SFPE Annual Meeting: Professional Development Conference and Exposition. Oct 14-19, 2012, Savannah, USA. http://www.sfpe.org

International Symposium on Fire Investigation Science and Technology (IFSI), Maryland, USA, Oct 15-17, 2012. http://www.isficonference.com

Asia-Oceania Symposium on Fire Science and Technology by AOAFST, Hefei, China, Oct 17-20, 2012. http://aosfst.csp.escience.cn

International Congress on Fire Computer Modeling, Santander, Oct, 18 - 19, 2012. http://www.fcm2012.unican.es

2nd Fire Engineering Conference (FIRE 2012), València, Spain, Oct 25 – 26, 2012. http://fire.blogs.upv.es

NFPA Fire Safety Design and Sustainable Buildings: Challenges and Opportunities, Nov 7-8, 2012, Chicago, http://www.nfpa.org

Performance-based Fire Safety Engineering of Structures, 1st International Conference on Performance Based and Life Cycle Structural Engineering, Hong Kong, 5-7 Dec 2012. http://www.eng.ed.ac.uk/fire/performance

Fire and Materials conference, Jan 28 -30, 2013, San Francisco, USA. http://www.interscienceccomms.co.uk

4th Fire Behavior and Fuels Conference, IAWF and IAFSS, Feb 18 -22, 2013, Raleigh, North Carolina, and Jul 1 -4, 2013, St. Petersburg, Russia. http://www.iawfonline.org/2013FuelsConference

14th International Conference on Numerical Combustion - SIAM, 8-10 Apr 2013, San Antonio, Texas, http://www.siam.org/meetings/nc13

3rd Fire Safety Day (Scandinavian), April 17, 2013 at the Technical University of Denmark, www.brand.dtu.dk

Application of Structural Fire Engineering Conference, 19-20 Apr 2013, Prague. http://fire.fsv.cvut.cz/ifer

5th International Conference on Design, Fabrication and Economy of Metal Structures, 24-26 April 2013, University of Miskolc, Hungary. http://www.dfe2013.uni-miskolc.hu

13th Interflam - International Conference and Exhibition on Fire Science and Engineering Jun 24 -26, 2013, London, UK. Submission deadline Nov 1 2012. http://www.interscienceccomms.co.uk

7th Internationals Seminar on Fire and Explosion Hazards, May 5-10, 2023, Providence (USA)

13th International Congress on Combustion By-Products and their Health Effects May 15-18, 2013, New Orleans. http://www.lsu.edu/piccongress

8th US National Combustion Meeting, May 19-22, 2013, Park City, Utah. http://combustion2013.utah.edu

Fire Retardants in Plastics 2013, June 13-14, 2013, Denver, CO, USA. http://www.amiplastics-na.com/events/Event.aspx?code=C516&sec=3039

6th European Combustion Meeting (ECM2013), Lund, Sweden, Jun 25-28, 2013. http://www.ecm2013.lth.se

24th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Jul 28 to Aug 2, 2013, Taipei, Taiwan. www.ncu.edu.tw/~icders2013

8th Mediterranean Combustion Symposium, Sep 8-13, 2013, Izmir, Turkey. http://www.ichmt.org/mcs-13

Eurofire conference, Basel, Switzerland, Oct, 2013. http://www.eurofireconference.com

11th International Symposium on Fire Safety Science, 2014, New Zealand.

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

35th International Symposium on Combustion, Aug 3-8, 2014, San Francisco, California. https://www.combustioninstitute.org

JOB OFFERS

Post-doctoral position in pyrolysis modeling in France

Topic: Pyrolysis mechanisms and models used in CFD codes for fire simulations

Location : Laboratory: UMR 6614 CORIA, INSA de Rouen, Campus du Madrillet, Saint Etienne du Rouvray. Duration : one year. Start date : before the end of 2012

Candidate profile : This computational research project requires a background in physics, engineering or chemistry with an interest in transport phenomena and scientific computing. The candidate must have a PhD degree in a relevant area of Engineering, Physics, or Applied Mathematics, and a strong background in computational fluid mechanics.

This post-doc is part of European project 'Aircraft Fire' (2011-2013 FP7). The project aims for the increase of passenger survivability in the case of fire aboard aircraft focused on the next generation of aircraft. The composite materials and other combustible materials are increasingly used in order to reduce the weight of the aircraft or to higher the passenger comfort, but they raise the fire load significantly.

Although these materials have passed the certification tests, it is necessary to study and assess fire risks for relevant areas, specific zones of the aircraft and the entire aircraft. Existing simulation tools will be developed and adapted in the project in order to provide improved simulations of in-flight and post-crash fire scenarios.

The basic physical and chemical mechanism of material pyrolysis under fire will be studied and the performance of existing physical and mathematical models will be analysed. The adequate implementation of the results of fire testing for running CFD codes requires tests of pyrolysis models, in particular in view of the material properties as thermal diffusivity, absorptivity, time to ablation, time to start the charring, heat of pyrolysis, etc. Existing pyrolysis models at small scales (material scale), based on ablation or thermal-mass transfer approaches, will be analyzed and the calculated values compared to experimental results obtained in others tasks of the Aircraft project (tests at small and medium scales). These models will be used to understand the most important phenomena in the material degradation processes. The sensitivity analysis of the pyrolysis rate will be performed for varying conditions of radiant heat flux, ventilation and material properties. The results of these tests will also be used to optimize the sub-models of pyrolysis and develop fast procedures useful for fire dynamic and smoke propagation models (FDS, FireFOAM, etc).

Contact: Alexis Coppalle, coppalle@coria.fr, +02 32 95 97 73 80

PhD Studentships (x5) in fire modeling in Denmark

We need Five Early-Stage Researchers (ESRs) to carry out research with focus on creating computing simulation methodologies, tools and models to increase the usability of fire tests conducted on building products and construction elements which act as fire barriers (i.e. real fire tests in laboratory or pilot facilities) by fire properties simulations. More specifically, they will address the determination of the fire properties of building products, content and barriers, in order to assist companies, based on advanced computational models and predictions, to simulate and predict the fire performance of materials, products and structures earlier in their product development processes.

The ESRs will be enrolled in a Doctoral Programme at LUND UNIVERSITY with courses concentrated in the initial 12 months of the Programme. The remaining 36 months will be spent at the Danish Institute for Fire and Security Technology and will be focusing on the individual PhD projects (training in research) and participation/ organization of shorter training events in on site or at one of our associated partners. All ESRs will obtain a doctoral degree from ULUND after completing their training (In order to complete the Doctoral Programme each ESR will need to accumulate 100 ECT.)

Each ESR will be dedicated to an individual research project but all individual projects have many common elements, and it is expected that the five ESRs work closely together in solving multidisciplinary problems and establish synergies for developing innovative experimental methodologies and computer models.

One ESR will work on a methodology for fire behavior of solids materials used in building products, content and barriers by means of material data at micro scale. One ESR will work on a methodology for fire behavior of solids materials used in building products, content and barriers by means of solid material data. Three ESRs will work

on a methodology for fire behavior of building products, content and barriers by means of composite material data, solid material data and material data at micro scale

Furthermore, the training programme has an emphasis on industrial problems and needs, with each ESR spending at least 50% of his/her time at DBI and additional short secondments to other private sector partners.

Full announcement at http://ec.europa.eu/euraxess/index.cfm/jobs/jobDetails/33808933

Contact: Danish Institute of Fire and Security Technology, email fgu@dbi-net.dk, http://www.dbi-net.dk

PhD Studentships (x3) in flame retardant chemistry in UK

These exciting projects address one of the major challenges in European fire safety – the replacement of eco-toxic halogenated flame retardants with safe alternatives. There are three studentships associated with this project and applicants will be considered for all three studentships unless indicated otherwise.

Applications are invited for these 3 PhD studentships, funded by the European Union Framework 7. Each studentship is tenable for 3 years, subject to satisfactory progress. Each studentship will cover the cost of tuition fees for UK/EU residents, plus an annual, tax-free bursary of £16 000 (approx €20 000). The projects will start around January 2013. International applicants may apply but will be expected to pay the difference between the UK/EU and International Fee Rate (approx £ 8 000 per year).

Studentship 1: Investigation of release of carbon nanotubes and other additives from materials. This project will investigate the particle size distribution, structure and composition of atmospheric carbon nanotube release from burning, as ultrafine particles and the toxic gases in fire effluent can increase toxicity. Using a cascade impactor to quantify particle size distribution on the impact of nanoparticles and carbon nanotubes (CNT) on the formation of smoke and toxic products under different fire scenarios will be investigated. Agglomeration, transport and deposition of particulate matter from different bench scale test methods (steady state tube furnace, NBS smoke chamber) will be carried out. Characterisation of the microstructure and composition of the soot in terms of elemental composition using different analytical techniques (ICPMS, XRF, SEM-EDX, NMR, Raman) will be undertakenin order to assess the toxicity.

Studentship 2: Investigation of Toxic and Eco-Toxic effects of Fire Effluents from novel CNT polymer Nanocomposites. This project will investigate the influence of carbon nanotubes (CNTs) on the overall fire toxicity, as very little is known at present about the chemistry that governs the formation and emission of toxic effluents and their dependence on nanostructure. A number of experimental procedures will be used for the investigation of flammability and generation of combustion products.

Studentship 3 : Optimisation of a new CNT flame retardant formulation through microscale analysis and pyrolysis modeling. This project involves the measurement of thermophysical properties of novel CNT based polymer nanocomposites as a function of temperature (e.g. heat conductivity, rheological properties, heat capacity, heat of degradation etc.) and the effects of these parameters have on a burning polymer. A sophisticated numerical model such as ThermaKin will be used to bring these parameters together to show how they affect the burning behaviour.

Versatile and enthusiastic chemistry/physics/analytical science or engineering graduates are required. Applicants should have or expect to receive a good degree in chemistry or related subject preferably 1st class honours or equivalent. Requests for an application pack (quoting the reference number RS1208) should be directed to the Graduate Research School Office. Tel: 01772 895082 or email: researchdegrees@uclan.ac.uk

The project is led by world experts in the field, Dr. Anna A Stec, and Prof. T Richard Hull (editors of Fire Toxicity, (Woodhead Publishing, Cambridge, UK), and both based at UCLan.

Announcement http://www.uclan.ac.uk/research/prospective_students/research_studentships.php#fzRS1206

Closing Date: 3 September 2012 (as this timescale is rather short, please let us know as soon as possible, if you cannot meet this deadline).

Informal enquiries should be made to Dr. Anna A Stec, aastec@uclan.ac.uk or Prof. Richard Hull trhull@uclan.ac.uk.

Fire Safety Engineer in Australia

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is seeking a Fire Safety Engineer for the Melbourne office. This team works in the area of fire hazard evaluation and fire safety design in the built environment. The team is also involved in carrying out fire tests and hot smoke tests of buildings and tunnels to a range of Australian and international standards. The position will be based within the Industrial Research Services group of the Materials Science and Engineering Division in Highett, Victoria. More information about this role can be found by visiting our website:

http://csiro.nga.net.au

The role closes to applicants on the 19 September 2012.

OBITUARIES

Professor Adel F. Sarofim Passed Away Dec. 4, 2011

Reproduced with permission of Lilian Tsang

It is with great sorrow that we share the news of the passing of Professor Adel Fares Sarofim on December 4, 2011. Professor Sarofim has been the Chair of the International Advisory Committee of the Combustion Energy Frontier Research Center since its founding in August, 2009.

Professor Sarofim was born on October 21, 1934 in Cairo, Egypt. He received a B.A. in chemistry from Oxford University in 1955, an S.M. in chemical engineering practice in 1957 from MIT, and a ScD. in chemical engineering in 1965, also from MIT. He joined the faculty of MIT after graduation, becoming the Lammot DuPont Professor of Chemical Engineering at 1989. In 1996 he moved to the University of Utah as the Presidential Professor and Co-Director of the Utah Clean Coal Program.

Professor Sarofim was an extraordinary scientist, gentleman, human being, mentor and friend. He authored and co-authored over 200 papers covering the diverse subjects of radioactive heat transfer, furnace design, circulation patterns in glass melts, the freeze process for desalination, nitric oxide formation in combustion systems, combustion generated aerosols, soot and polycyclic aromatic hydrocarbon formation, and the characterization of carbon structure and reactivity. For his research contributions, he received more than a dozen international prizes related to engineering and environmental science, including the Sir Alfred Egerton Gold Medal from the Combustion Institute in 1984; the Kuwait Prize for Petrochemical Engineering in 1983; the Walter Ahlström Environmental Prize of the Finnish Academies of Technology in 1993; the Senior Thermal Engineering and the Towend-BCURA Awards of the Institute of Energy in 1994; the University of Pittsburgh's 1995 Award for Innovation in Coal Conversion; the U.S. Department of Energy's 1996 Homer H. Lowry Award in Fossil Energy; the American Society of Mechanical Engineers' 1996 Percy Nicholls Award; the 1998 Lawrence K. Cecil Award of the Environmental Division of the American Institute of Chemical Engineers; and an honorary doctorate in chemical engineering from the University of Naples “Federico II” in 1998. He was the Hoyt C. Hottel Lecturer at the 21st International Combustion Symposium in 1986 and the Lacey Lecturer at the California Institute of Technology in 1987. Dr. Sarofim was elected to the U.S. National Academy of Engineering in 2003 “for advancing our understanding of the mechanisms and modeling of processes that control radiation in and pollution emission from combustors.” In addition to his teaching responsibilities, he supervised and mentored over 80 PhD students, many of whom currently hold prestigious academic, industrial and governmental positions.

Professor Sarofim played an important role in the development of many combustion researchers, particularly junior faculty, not just at his own institution but across the world. “Although he had already left MIT for Utah, Professor Sarofim helped recruit me to join the MIT chemical engineering faculty,” said William Green, a Principal Investigator of the CEFRC and the Hottel Professor of Chemical Engineering at MIT, “and then at several crucial points he provided advice and important letters of support. It was difficult starting as an assistant professor in the field of combustion during the 1990’s, when there was not much interest in energy, but his support and encouragement helped me succeed. And I know I am not the only one he supported in this way. By doing this, he helped the field of combustion continue to develop talented young faculty through a difficult period.”

"Professor Sarofim was a giant in the combustion community," added C. K. Law, Director of the CEFRC, "his technical contributions to combustion science and technology was singularly important, and he was immensely admired and respected by his colleagues for his warm and encouraging personality. He has provided critical guidance during the formative stage of the CEFRC in the past couple of years. We will miss his leadership."

In addition to his wife, the former Mary Ellen Crowe, Dr. Sarofim is survived by his son Dr. Marcus C. Sarofim of Washington, DC, sister Lola Beck of Virginia Beach, brother Nabil Sarofim of Dale City, and sister Nabila Harris of London, UK.

Article published by Lilian Tsang in the CEFRC newsletter on Dec 14, 2011 at http://www.princeton.edu/cefrc

William Kingston died in June 2012

From: Belfast, Northern Ireland. Qualifications: MEng, Structural Engineering with Architecture, University of Edinburgh, 2009. Supervisors: Dr. Pankaj, Prof. Asif Usmani, Prof. Jose Torero. William was writing up his PhD thesis at The University of Edinburgh. The following text was read by his supervisor Dr. Pankaj at a memorial service on 25th June.

Remembering Will

Dear Friends,

Will was my PhD student. Will had been at Edinburgh University for about 8 years now - 5 years as an MEng student and almost 3 years as a PhD student. My close association with him began when he did his MEng thesis with me - his thesis was on the engineering of knee implants. During the course of this thesis we had a number of meetings with one of the senior most knee surgeons in Edinburgh and it was great to see a young engineer, Will, argue why certain implants do better than others. After MEng Will was keen to continue with a PhD and when an opportunity of funding from BRE came up he was very happy to accept. Will's PhD work was on simulating the behaviour of a reinforced concrete nuclear containment in a loss of coolant accident which results in extreme internal pressure and temperature within the containment. This has assumed considerable importance after the Fukushima Daiichi nuclear disaster, but Will started this work before Fukushima happened.

Will was in the process of writing his thesis. He felt good about his work and the area of research. We had discussions about how the UK nuclear industry was set to expand and this made Will feel confident about his future. He had established a number of contacts with the industry. Last year Will and I went to attend the conference on Structural Mechanics and Reactor Technology in Delhi. This is the biggest conference in this area and was being held in India for the first time. Will's presentation at the conference evoked a lot of interest and he managed meet people from this area from around the world.

In the last few days I have been thinking a lot about the relationship between a PhD student and a supervisor. It is, I think, a strange but strong association. A PhD student is a student to whom the supervisor provides his knowledge and experience and also acts as a guardian, a fatherly figure. But a PhD student is also a research colleague and the work done by him/her benefits the supervisor as well. And since the supervisor and the student work closely and attend meetings and conferences together they also end up being mates. Will was my student, my research colleague and my mate. This multiple relationship unfortunately also multiplies the heartache and grief.

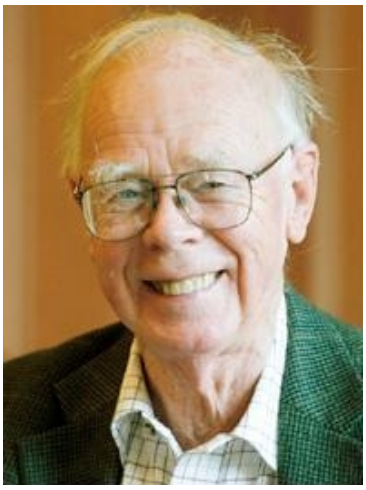
My first thoughts when I realised Will was no longer with us were not about the technical discussions we had had. They were not about the journal paper we had just submitted. They were also not about confident presentations he had delivered at meetings and conferences.

Instead my thoughts were about small things that perhaps make us who we are: I thought of the gestures Will would make to open and then close his log book when he came over to discuss things with me. I thought of the breakfast bap we both ordered every time we went to BRE and had breakfast at Luton airport. I thought about his shoes that he wore as an undergraduate project student - they had holes for laces but no laces. And I remembered the two of us trying to get some liquid out of frozen beer bottles in my hotel room in New Delhi last year.

These little things somehow seemed really important. And these memories will remain with me.

Piece written by Dr. Pankaj, http://www.eng.ed.ac.uk/fire/2009-phd-william.html

Professor Peter Gray, MA, PhD, ScD, FRSC, FRS (1926–2012)



Reproduced with permission of John Griffiths and Allan Hayhurst

Peter Gray, who has died at the age of 85, was one of the pillars of strength in the British and international combustion community throughout the latter half of the 20th century. Born in Newport, Wales, where he attended the High School, Peter in 1943 (i.e. during the second world war) was awarded a Major Scholarship to study Natural Sciences at Gonville and Caius College, Cambridge.

Having taken a BA (Hons) 1st class, in 1946 Peter began research in the Cavendish Laboratory to investigate vapour phase initiation of explosives. Thus began a life-long interest in spontaneous ignition phenomena, but which evolved into both experimental and theoretical investigations of a much more diverse range of topics.

Perhaps it was the interdisciplinary background of his early years that spawned the 'intellectual wanderlust.' Still working in conjunction with Bowden and Yoffe on explosives, Peter became a Ramsay Memorial Fellow at Gonville and Caius College (1949–1951) and a University Demonstrator in the Department of Chemical Engineering (1951–1955). Then, departing from Cambridge in 1955 to appointments at Leeds University, Peter held posts in the Department of Physical Chemistry as Lecturer and Reader. A Personal Chair was conferred in 1962.He became Professor of Physical Chemistry in 1965, and remained as Head of Department for 23 years. This was a rich and rewarding period, not just for Peter, but for Leeds University and UK combustion as a whole.

At Leeds, gas-phase studies were initiated; they included chemical kinetic measurements, Alan Williams being the first associate in that work, with particular interest in reactions of alkoxyl radicals. Spherically propagating flame studies also entered the portfolio, at David Smith's hands, using schlieren imaging to a rotating drum camera. The techniques have become very popular again, albeit with different technology and with the important difference that flame stretch effects, of which there had been no appreciation, are now routinely included. There was also a simultaneous attack on thermochemical and vapour pressure measurements and the application of thermal analysis. Measurements of gas-phase thermal conductivity and of diffusion coefficients were also begun in the Department of Physical Chemistry, in a well-rounded attack on the comprehensive understanding of flame propagation. These important investigations carried through into Graham Dixon-Lewis's computations of laminar flame structure, (and subsequent work of others elsewhere), and by this route into Derek Bradley's flamelet modelling in turbulent combustion, both of whom were in other Departments at Leeds.

During his career at Leeds University, Peter always promoted links to other researchers and was an architect, in 1967, of the Centre for Combustion - a consortium drawn from the combustion interests within the Departments of Fuel and Energy, Mechanical Engineering, and Physical Chemistry, for the purpose of post-graduate teaching through the MSc course in Combustion, and for joint research. Throughout most of its existence, 20–30 tenured academics were engaged in the Centre's activities. Over the years, Peter also attracted many very distinguished visitors to Leeds on short-term Fellowships.

The '60s also heralded an astonishingly prolific four decades of research in Leeds. It began with the measurements of temperature change, using very fine thermocouples, for the direct validation of Frank-Kamenetskii's thermal explosion theory in low-pressure gases (<20 Torr). These important studies were linked with contemporary investigations in Manchester, by Sandy Ashmore and his group. Definitive theoretical developments on thermal ignition followed, with a formidable research team including Terry Boddington, Brian Gray and Steve Scott, advancing understanding of thermokinetic phenomena (cool flames and autoignitions) and the spontaneous low temperature combustion of hydrocarbons. Peter was a student and admirer of Russian work, especially that of Semenov, Frank-Kamenetskii, Merzhanov, Sal'nikov, and Zel'dovich. How fitting then that, at Peter's funeral service in his Cambridge College, the choir sang a Russian Kontakion.

Notable in this seminal work, on the experimental side with John Griffiths, was the development and exploitation of small-scale, wellstirred flow reactors. Important and novel interpretations of the combustion of mixtures of CO + H2 + O2 emerged from these investigations. The recognition of how the theory and experiment impinged on the stability issues that were simultaneously exercising chemical engineers' minds in chemical reactor theory, opened up the much wider subject of 'nonlinear dynamics.' Peter's work on the oscillatory nature of cool flames and his knowledge of the chemistry and chemical engineering literature – and in particular of Russian combustion literature – positioned the group at Leeds as a leading centre in the 1980s and 1990s in the emerging field of chemical instabilities and chaos through studies of thermokinetic feedback and chemical

autocatalysis. Peter was instrumental in the creation of the Centre for Nonlinear Dynamics, at Leeds in 1984, fostering more interdisciplinary research across a wide range of Departments.

However, of all Peter's contributions to combustion, and combustion kinetics in particular, the one that has made the widest impact must surely be that of his foresight in establishing a project to assess elementary kinetic rate data. The outcome was published initially as the blue-bound 'Butterworth' tomes (1972, 1973 and 1976). This project has its lineage from 1967 in the Department of Physical Chemistry, where it was directed by Don Baulch, and continues to be updated periodically by a highly respected team of kineticists from around the world. No combustion kinetics modeler would be able to function without this documentation. During his distinguished career, Peter was awarded many major prizes, including the Meldola Medal of the Royal Institute of Chemistry (1956), the Marlow Medal of the Faraday Society (1959), the Bernard Lewis Gold Medal of The Combustion Institute (1978), and the Italgas Prize (1988). Peter was elected as a Fellow of the Royal Society in 1977.

A founding member of the British Section of the Combustion Institute, in 1954, Peter joined its Committee in 1974, serving until 1982, and was 'Host Chairman' for the 17th International Combustion Symposium, when it was held at Leeds University during that period. He was re-elected to the Committee as its Chairman, in 1986, and held this post until 1992. Peter was then appointed a Life Member of the Committee and contributed to its meetings, almost without exception until 2010 and often with a key mission to find money to enable graduate students to go to conferences. He served on the Editorial Board of Combustion and Flame in the late 1970s. Peter's first contribution to the International Combustion Symposia was at the 5th Symposium, in 1954. He gave an invited lecture at the First Specialists' Meeting of the Combustion Institute, at Bordeaux (1981), and he presented the Hottel Lecture at the 23rd International Symposium, in Orleans (1990). He enjoyed Visiting Fellowships to a number of prestigious institutions in Europe and elsewhere throughout the world. He was awarded honorary degrees from many overseas universities and received an honorary DSc from Leeds in 1997.

In 1988 Peter was invited to become Master of his old College, Gonville and Caius, in Cambridge. He retired from the Mastership in 1996, but remained as a Life Fellow of the College. These later years at Cambridge were far from easy. Quite early on, Peter's first wife, Barbara, died, so he lived alone in the large Master's Lodge for some time. Happily, as a result of his subsequent marriage to Rachel, this particular cloud lifted just before he retired. In the meantime, given the options, ''I can choose either to make an impression or not'', there could be only one course for Peter to adopt. He threw himself into being a Committee man in Cambridge. He served on the Council of The Senate and The Financial Board – both very substantial jobs – as well as chairing The Faculty Board of Engineering and The Cambridge Philosophical Society. In all of these roles he promoted the participation of women and young members of staff. He was a great listener and showed huge patience with the young, especially the reformers. He tried hard to make Cambridge less stuffy and daunting, so that those who originated from unusual backgrounds would be able to flourish there. The last years were made considerably more difficult by failing eyesight as a result of macular degeneration. Peter remained passionate about science and, with no diminution in his determination, continued to attend as many of the British Section one-day meetings as possible – as is exemplified by his having travelled alone to Leeds by train, in 2008, for the meeting on 'Transportation Biofuels.' Peter did find time for other activities. He was an avid reader – an aficionado of Milton – and, despite his impaired vision, with the same determination he continued to read widely. He loved walking and, throughout the Leeds years, was richly rewarded by easy access to the magnificent Yorkshire Dales, which he so enjoyed.

Clear and acute in thought, Peter possessed the rare skill of being able to anticipate the potential consequences of his actions, perhaps three or more steps further down the line. It contributed to his talent as a supreme leader. But amongst his greatest qualities by far, in this regard, were his ability to inspire individual skills and to foster group fellowship. He engendered the utmost loyalty and respect: anyone within Peter's orbit automatically aspired to his or her very best. His magnanimous apportioning of credit and his generous dispensing of praise were almost to a fault. Peter's friendship was unconditional. There are several generations of colleagues and friends, now dispersed throughout the world, who owe an inestimable debt to this wonderful person. He was much loved by all who knew him.

Widower of Barbara, in 1992, Peter is survived by his second wife, Rachel, and his children Christine, Andrew, David, and Sally from his first marriage. We offer them our condolences.

Original and longer article published by John Griffiths and Allan Hayhurst in Combustion and Flame on Aug 4, 2012
http://dx.doi.org/10.1016/j.combustflame.2012.07.002

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 (Dr Guillermo Rein, g.rein@imperial.ac.uk).

For the next issue (No. 34), the deadline for submissions is Jan 10, 2013.

http://www.iafss.org

2011-2014
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