

Fire Industry Advisory Committee

Industry leaders recently met at the Department of Civil and Natural Resources Engineering to discuss the continued development of the UC fire engineering programme. The Committee represents major local and international employers, the New Zealand Fire Service and research providers. The panel used this year's meeting to evaluate the roles of the Advisory committee itself and the New Zealand Fire Service Commission. It also discussed proposed course reviews in the Fire Engineering programme, the extension of the programme to include forest fires, future research directions and how best to improve links between fire engineering professional bodies and the department. Committee members in 2009: Chairman – David Barber (Arup Fire Australia), Paula Beever (NZFS), Michael Dixon (SFPE NZ Chapter), Darin Millar (Holmes Fire & Safety), Nick Saunders (Department of Building and Housing), Bob Taylor (FPANZ) and Greg Baker (BRANZ).

Staff Appointments

Dr. Mike Spearpoint has taken on a permanent continuing position in the Department.

After a world-wide search, the New Zealand Fire Service Commission Lecturer position has now been filled by Dr. Anthony Abu. Tony obtained a Bachelor's degree in Civil Engineering from Eastern Mediterranean University, North Cyprus and then completed his PhD in Structural Fire Engineering at the University of Sheffield, UK where he worked on the mechanics of tensile membrane action of composite slabs at elevated temperatures. He also worked with Buro Happold Engineers, UK on a number of structural fire engineering projects including the London 2012 Olympic stadium, The Everton Football Club Stadium and the Edinburgh Airport Lounge Extension.

With the arrival of Tony on the staff we can claim to be truly international since we have Andy



Dr Tony Abu

(Australasia), Charley (North American), Mike (Europe), Tony (Africa) and Kai (Asia)

Ph.D. projects

Dennis Pau's research is to assess the accuracy of FDS 5 in predicting the mass loss rate and heat release rate of small and medium scale test methods involving polyurethane (PU) foam by extracting and optimising suitable inputs from PU foam experimental data. Dennis has carried out a series of thermogravimetry (TG) experiments which involve heating a small PU foam sample within an oven under a constant heating rate. The TG results indicate the number of reactions during PU foam degradation and oxidation. Quantitatively, it provides the kinetic parameters of each reaction. The kinetic parameters consist of constants called pre-exponential factor and activation energy and they are inputs of FDS 5. By knowing these values, parameter optimisation will be more accurate as the boundaries of the search domain become more refined. (Supervisors – Dr Fleishmann and Dr Spearpoint).

Jeong-Ki Min is investigating the fire resistance of precast prestressed concrete floor systems. He has used the SAFIR software to predict the fire performance of hollow-core concrete floors, and is now investigating the fire performance of Double Tee floors. This work follows on from the PhD of Dr Jerry Chang, and will be extended to include a wide variety of floor systems and support details and analytical models. This

Scholarships and Awards

New Zealand Fire Service Commission scholarships were awarded to Peter Reddin, Jenny Han and Kevin Tsai. The Arup Fire Scholarship was awarded to Marco Yip.

work is in collaboration with the Future Building Systems project funded by FRST. (Supervisors – Dr Buchanan, Dr Moss and Dr Dhakal)

Dan Madrzykowski is an extramural student working at NIST, USA, examining the repeatability of burn patterns on gypsum wall board exposed to a range of source fires and to develop the input data needed to examine the ability of Fire Dynamics Simulator (FDS) to re-create burn patterns. The study includes real-scale, replicate fire experiments which includes measurement of heat release rate, heat flux, mass loss and temperature. The experiments have been completed and the results when combined with results from a series of bench scale tests will provide input to the FDS model. NIST is providing financial support, and a majority of the work will be carried out at NIST. (Primary supervisors – Dr Fleishmann / Dr McGrattan, NIST).

Greg Baker's PhD research forms part of a wider project to integrate significant enhancements into BRANZFIRE that will result in a new probabilistic fire development model that generates outputs in the form of probability distributions. Greg's work is to develop and experimentally validate a physics-based multiple-item fire spread model applicable to room fires and implement it in the BRANZFIRE software. From there he is going to develop a methodology for quantifying total uncertainty associated with residential fire scenarios and the spatial arrangement of items or objects in a room and use the fire spread sub model to generate probabilistic design fires. This will include a Quantitative Risk Analysis (QRA) simulation procedure that uses statistical sampling techniques. (Supervisors – Dr Spearpoint and Dr Fleishmann).

News

Professor Shanmugam and Professor Badaruzzaman from the National University of Malaysia visited the Department of Civil and Natural Resources Engineering in March. In particular they interacted with the Structures and Fire Engineering research groups and Malaysian postgraduate students. They were given a tour of the research facilities at the department and a broad overview of the department's research in steel structures and in fire engineering.

Professor Andy Buchanan was elected a Fellow of the Society of Fire Protection Engineers in July 2009.

Charley Fleishmann and Mike Spearpoint, as part of the development of a web-based teaching resource for high school teachers on the science of fire, were interviewed and filmed burning pieces of furniture (<http://www.sciencelearn.org.nz/contexts/fire>).

Charley Fleishmann was nominated for the University of Canterbury Student Association (UCSA) Lecturer of the year award, but lost (unfortunately) to Dr. Chris Astall from the School of Sciences and Physical Education.



Dr. Kai Yuan Li attended the International Symposium on Fire Science and Fire Protection Engineering in Beijing China this year. Greg Baker also attended the conference as part of his role at BRANZ. The aim of the conference was to enhance academic exchange among the researchers, engineers and administrators on fire science and fire protection engineering all over the world and to improve the fundamental research on fire science and fire protection engineering.



As part of Ed Claridge's research to develop the Fire Brigade Intervention Model (FBIM) for New Zealand conditions he organised the recording of fire fighter stair climbing times. A

broad cross-section of 52 career and volunteer personnel climbed a 26 storey Auckland office building. Most of the climbers wore Breathing Apparatus (although not donned) and several carried typical high-rise equipment such as hoses, a branch or an axe.

Research Thesis and Reports

2009	
R Harrison PhD Thesis	Entrainment of air into thermal spill plumes
M K Cheong PhD Thesis	Assessment of vehicle fire development in road tunnels for smoke control ventilation design
A Parkes PhD Thesis	The impact of size and location of pool fires on compartment fire behaviour
B Ghosh Report 09/1	Assessment of the benefits of fire extinguishers as fire safety precautions in New Zealand buildings
E Heyes Report 09/2	Human behaviour considerations in the use of lifts for evacuation from high rise commercial buildings
F Tan Report 09/3	Physical scale modelling of smoke contamination in upper balconies by a balcony spill plume in an atrium
A Merry Report 09/4	The Building Act 2004 and the inclusion of the New Zealand Fire Service in the building consent process

Publications

- Cheong M K, Spearpoint M J, Fleischmann C M. Calibrating an FDS simulation of goods-vehicle fire growth in a tunnel using the Runehamar experiment. *Journal of Fire Protection Engineering* 19, 3, p.177-196, 2009
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- Heyes E, Spearpoint M J. Lifts for evacuation - Human behaviour considerations. 4th International Conference on Human Behaviour in Fire, Cambridge, UK, 13-15 July 2009, p.73-84, 2009
- Li K Y, Hu H L, Huo R, Li Y Z, Chen Z B, Sun X Q, Li S C. A mathematical model on interaction of smoke layer with sprinkler spray, *Fire Safety Journal* 44, p.96-105, 2009
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- Richards P, Fleischmann C M, Spearpoint M J. Design fires for deliberately lit fire scenarios in which petrol is used as the accelerant. *Proc. 9th International Symposium on Fire Safety Science*, Karlsruhe, Germany, 21-26 Sep 2008, p.1017-1028, 2009
- Shelley J, Spearpoint M J, Bittern A. Tenability analysis of television set fires in a sprinkler protected compartment. *Journal of Applied Fire Science* 16, 1, p.35-70, 2009
- Spearpoint M J. Comparative verification exercises on a probabilistic network model for building evacuation. *Journal of Fire Sciences* 27, 5, p.409-430, 2009
- Spearpoint M J. Extracting fire engineering simulation data from the IFC Building Information Model. Chapter In J Underwood; U Isikdag (Ed.), *Handbook of Research on Building Information Modelling and Construction Informatics: Concepts and Technologies*, p.212-236, IGI Global, Hershey, PA, 2009
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