

Senior Lecturer in Fire Dynamics
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Employment History

Senior Lecturer in Fire Dynamics, School of Engineering, University of Edinburgh.
From August 2019

Lecturer in Combustion and Fire Dynamics, School of Engineering, University of Edinburgh.
April 2013 to July 2019

Research Fellow, School of Engineering, University of Edinburgh. *January 2005 to March 2013*

Research Associate, Department of Civil & Offshore Engineering, Heriot-Watt University.
Four contracts: April 1998 to March 2000, April 2000 to March 2001, August 2001 to July 2002, January 2003 to December 2004

Research Associate, Department of Civil & Environmental Engineering, University of Edinburgh.
September to December 2002

Fire Modelling Consultant, International Fire Investigators & Consultants (IFIC), Glasgow.
April to July 2001

Research Assistant, Centre for Explosion Studies, University of Wales, Aberystwyth.
November 1994 to March 1998

University Education

PhD, Civil Engineering , Heriot-Watt University	2004
MPhil, Chemistry , University of St Andrews	1994
BSc (Hons), Chemistry and Physics , University of St Andrews	1992

Main Academic Contributions

Co-editor of **Handbook of Tunnel Fire Safety** (1st Edition, Thomas Telford 2005; 2nd Edition ICE Publishing 2011) and author of five chapters therein. Discussions for 3rd edition are ongoing.

Associate Editor of **Fire Safety Journal** (2010-2015). On editorial board of **Fire Technology**.

Author of 20+ papers in refereed journals, two of which have been cited more than forty times each, 40+ conference papers, several magazine articles; the principal author of the majority of these. Full list available on request.

International reputation in the field of fire safety, evidenced by invited keynote presentations at the 5th International Symposium on Tunnel Safety and Security, New York, USA, 2012; 1st Tunnels Fire Safety Conference, Amsterdam, 2013; and SFPE Europe Conference, Warsaw, Poland, 2016.

2014 conference paper "**Rediscovering the Throttling Effect**" won the **Best Paper** award at the 6th Int. Symp. on Tunnel Safety and Security, Marseille.

Awarded the "**ISTSS Achievement Award 2018**" at the 8th Int. Symp. on Tunnel Safety and Security, in Boras, Sweden, March 2018

Research Interests

Primary research interest is fire dynamics in forced ventilation conditions, particularly as this relates to fires in vehicles and tunnels.

Current interests also include fire dynamics in underventilated conditions and vitiated environments, such as long tunnels, sealed compartments and basements.

Interested in the wider aspects of tunnel fire safety, such as the interaction of people with safety systems and human behaviour in smoke or suppression-laden atmospheres.

Also interested in modelling fire growth, suppression & extinction, and the fire performance & burning behaviour of novel and unique materials used in the transport industry, such as railcar and aircraft interiors.

Academic Experience

Teaching:

'Fire Science and Fire Dynamics' course (since 2012; runner up in the '**Best Course**' category, Edinburgh Uni Student Association awards 2018) & 'Models for Fire Safety' course (since 2017; also taught earlier courses on related topics since 2011)

Supervising:

PhD students (completed):

Chia-Lung (Farian) Wu, graduated in July 2019.

Ben Ralph, due to graduate in November 2019.

Jiayu Hu, due to graduate in July 2020.

PhD students (current):

Vaishnavi Abhyankar, starting January 2020.

Masters' students: 18 to date.

Examiner duties:

Internal examiner for five PhD candidates in Edinburgh, 2013 - 2019

External examiner for two PhD candidates at UK universities, 2015 & 2018

External examiner for two PhD candidates in Norway and New Zealand, 2014 & 2017

External expert/reviewer for two PhD candidates in Sweden and Finland, 2014 and 2018

CPD courses:

Annual 'Fire Dynamics and Fire Safety Engineering Design' course (since 2008)

Annual 'Fire Science and Fire Investigation' course (since 2010)

'Introduction to Tunnel Fires' course (2016)

Bespoke courses for various clients in 2012, 2015, 2017, 2018 & 2019

Consultancy Experience

I managed most of the consultancy activities of the fire group at the University from 2005 to 2013. This involved organisation of over 15 different projects, management and supervision of students working on the projects, writing proposals and project reports, carrying out experimental testing, numerical modelling, fire risk assessments and engineering calculations for a number of different clients including the Byzak Ltd. (contractors on Clyde Tunnel), City of Edinburgh Council, Jacobs Engineering, the Health & Safety Executive, Le Crossing Company Ltd. (Dartford Tunnels), Lothian & Borders Police, and Powerwall. The largest of the projects I brought in was worth £250,000 and involved the management and co-ordination of a team of six students and academics doing modelling work, analysis and on-site testing in a road tunnel. I have been a consultant to the Rail Accident Investigation Branch in their analysis of the 2008 and 2015 Channel Tunnel fires. I have been involved in experimental testing and computer fire modelling in several consultancy jobs.

Research Expertise

- "Compartment fire dynamics and fire-fighting"* **(PI)** PhD studentship
Funded by Fire Services Research & Training Trust (FSRTT) 2019
- "The effects of long-term exposure to post-fire conditions – A scoping study"* **(PI)**
Funded by FSRTT 2018
- "Capability of the 'cutting-extinguishing' approach in under-ventilated fires"* **(PI)**
Funded by FSRTT 2017
- "Effectiveness of the gas-cooling technique in larger compartments"* **(PI)** Funded by FSRTT 2016
- "Strategies for Fire-Fighting in Basements"* **(PI)** Funded by FSRTT 2015
- Aircraft Fire Project* Funded by EU Framework 7, 2011-2013
- Fire Paradox Project* Funded by EU Framework 6, 2009-2010
- PREFIRE NANO Project* Funded by EU Framework 6, 2005-2009
- "Predicting fire size and spread for vehicle fires in tunnels with longitudinal ventilation"*
Funded by EPSRC, 2003-2004. Project rated "Outstanding" by EPSRC
- "The behaviour of sandwich panels in fire"* Funded by CORUS, 2002
- "Predicting the outcomes of using different longitudinal ventilation velocities for fires in tunnels"*
Funded by EPSRC, 2001-2002. Project rated "Outstanding" by EPSRC
- "The Effect of Tunnel Geometry on Fire Severity"*
Funded by EPSRC, 2000-2001. Project rated "Tending to outstanding" by EPSRC
- "The Effect of Longitudinal Ventilation on Fire Size in a Tunnel"* Funded by EPSRC, 1998-2000
- "Investigation of Combustion Processes for Metallic Particles"* Funded by DERA, 1994-1998
- "Studies in the Catalysis of Hydrocarbon Air Oxidation"* Funded by St Andrews Uni, 1992-1993

Books & Conference Proceedings Edited

1. A. Beard & R. Carvel (Eds) "Handbook of Tunnel Fire Safety" Second Edition, ICE Publishing (2011), ISBN 978-0-7277-4153-0. (First Edition published by Thomas Telford (2005), ISBN 0-7277-3168-8). Author of five chapters therein.
2. R. Carvel (ed) "The Science of Suppression" Published by the School of Engineering, University of Edinburgh (2011). ISBN 978-0-9557497-5-9
3. R. Carvel (Ed) "Fire Safety Engineering in the UK: The State of the Art" Published by the School of Engineering, University of Edinburgh (2010). ISBN 978-0-9557497-4-2
4. R. Carvel (Ed) "Fire & Building Safety in the Single European Market" Published by the School of Engineering & Electronics, University of Edinburgh (2008). ISBN: 978-0-9557497-3-5
5. D. Bradley, D. Drysdale, V. Molkov & R. Carvel (Eds) "Fire & Explosion Hazards: Proc. of the 5th Int. Seminar" Published by the School of Engineering & Electronics, University of Edinburgh (2008). ISBN: 978-0-9557497-2-8
6. G. Rein, C. Abecassis Empis and R. Carvel (Eds) "The Dalmarnock Fire Tests: Experiments and Modelling" Published by the School of Engineering and Electronics, University of Edinburgh (2007). ISBN: 978-0-9557497-0-4