

**NIGEL HIORNS**

Managing Partner

**FIRE ENGINEERING**[nigel.hiorns@fireingenuity.co.uk](mailto:nigel.hiorns@fireingenuity.co.uk)

PhD Mechanical Engineering,  
(not written up)  
BSc (hons) Mech Eng, 1983  
MIFireE, (by exam)  
AIMechE

Nigel is the Managing Partner of Fire Ingenuity, and also a Director and Council member of the Association of Fire Consultants (the association representing the professional interests of fire engineering consultancies). Nigel has been involved on award-winning projects and on the best buildings, with best clients, and best architects and engineers.

Nigel's strengths are:

- developing and delivering innovative solutions that best-enable Design Excellence; the architectural, engineering, and operational objectives,
- effective integrated multi-disciplinary team-working,
- maximising differentiation,
- skilled risk and value management, and
- ensuring an efficient design and approvals process.

Nigel is acknowledged for his ability to developing sophisticated solutions from a technically-excellent skill-base:

- Fundamental (mechanical) engineering skills, with specialist expertise in fluid dynamics, mathematics, & thermodynamics.
- Formal Safety, Risk & Reliability expertise, having operated in mature risk-based sectors including transport, defence, nuclear, and oil & gas.
- Sophisticated modelling expertise, having developed commercial and in-house CFD software and commercial evacuation/pedestrian modelling software

This compelling combination of capability, creativity, & credibility differentiates Nigel from the standard fire engineer.

Nigel has presented his work at conferences including the IFE International conference (Peterborough), the US NIST conference (Washington), IHEEM Conference (Harrogate), SFEN Conference (Strathclyde), & Numerical Methods in Thermal Modelling Conference (Atlanta). He was winner of the Institution of Fire Engineers lecturette competition, and has been a visiting lecturer in Fire Safety in Britain (Bath University 4<sup>th</sup> Year Architects/Civil engineering course, University of Greenwich MSc course) and in the US (Worcester Polytechnic Institute Fire Engineering PhD course).

Nigel has had involvement, and continues to be involved, in development of national standards, guidance, and national strategy via committee representation. This includes;

- developing Key Performance Indicators for Fire Engineering and also developing fire safety guidance - both for the Office of the Deputy Prime Minister (ODPM), to enable Building Control to assess engineered solutions more effectively.
- team leader in developing an international fire safety guide for air transportation applications for IATA,
- General role in Development of FIRECODE for DoH, and currently involved in the development of HTM05-03 Part M (Hospital Atria Fire Safety Guide)
- BS9999 Means of Escape for BSI.
- NES 149 – Naval means of escape standard

**Employment Summary****SAFE Consulting, Rambøll: 2003 – 2009**

**Director** SAFE is one of the leading fire engineering consultancies. SAFE was recently acquired by the Scandinavian engineering consultancy, Rambøll, and one of Nigel's specific roles was to lead the Rambøll healthcare network and capitalise on the world-class knowledge within the combined organisations.

**Buro Happold FEDRA: 1995 - 2003**

**Technical Manager**, responsible for delivering quality and innovation. Established Buro Happold's numerical modelling group & access consultancy.

**AEA Technology: 1992 - 1995**

**Senior Fire Safety Engineer** in Applied Risk Analysis department. Application of formal risk assessment techniques and consequence analyses in mature "risk-based" industries including nuclear, oil & gas, transport, and chemical sectors. Developed pedestrian/evacuation modelling software AEA EGRESS.

**Computational Dynamics Limited: 1991 - 1992**

**Senior Engineer**, responsible for development and application of STAR-CD, a general purpose commercial CFD package.

**Fluid Gravity Engineering: 1987 - 1991**

**Senior Engineer** in Defence and Commercial Consultancy responsible for unique defence and aerospace design solutions by developing and application of in-house CFD software, Mathematical modelling and Project Management.

## Project Experience

Format: Project, £value, [Client], (Architect), awards

### Museums / Galleries / Heritage / Assembly

Notable projects include:

#### **Sheffield Millennium Gallery & Winter Garden £12.5M [Sheffield City Council] (Pringle Richards Sharratt)**

*RIBA Award 2003 Civic Trust Award 2002 Academy of Urbanism The Great Place Award 2007 Royal Fine Art Commission Trust Building of the Year Award 2003*

- Permanent and Temporary Galleries, with storage and preparation areas specified to the highest international conservation and security standards, meeting all current government indemnity standards. The benefits of the fire strategy included an engineered design to enable extended travel distances and escape times, accounting for licensing and security requirements. Also design for the connected Winter Garden, and an engineered system to enable the glass wall between the gallery / winter-garden to achieve a fire compartmentation performance (which also had benefits in developing a means of escape strategy for disabled persons based on progressive horizontal evacuation between the two buildings).

#### **Millennium Dome £400M [New Millennium Experience Corporation] (Richard Rogers & HOK Sport / Populous)**

*MacRobert Award for Innovative Ideas in Engineering 1999*

- General Fire Strategy for the dome (including CFD smoke & environmental modelling) & specific fire strategies for central arena and exhibits. The key benefits of the fire strategy included enabling the extended travel distances associated with a single compartment 300m diameter space with the concentration of the population in the centre (central arena), as well as enabling flexibility in exhibit design by demonstrating the ability of the smoke control system to accommodate a high fireload.

#### **Harbourside Centre £50M [Bristol City Council] (Behnische & Behnische - Stuttgart)**

- The Harbourside Centre comprised fixed and temporary auditoria, and permanent and temporary exhibition space. Key feature of the design was the openness between the floors, achieved by staggered vertical penetrations, and enabling the unprotected circulation routes to be used for escape. The fire strategy was developed to the end of Stage E, when the project controversially lost its funding.

#### **Cabinet War Rooms £5M [Cabinet War Rooms] (HOK)**

*The Joint Award for Outstanding Achievement 2005*

- Creation of an additional 1000m<sup>2</sup> gallery in the existing Cabinet War Rooms, as well as opening more of the accommodation to the public. Key benefits of the fire strategy included minimising intervention to the listed structure, and development of a strategy that enabled the existing escape routes to serve 200% more persons than a standard strategy. Helping in development of the fire safety manuals and training the CWR staff in Fire Risk Assessment procedures.

#### **British Museum Great Court £100M [British Museum] (Foster & Partners)**

*RIBA Award 2000, National Heritage Museum of the Year Award 2000/2001*

- The project comprised development of permanent and temporary exhibition space, basement galleries and auditoria, retail, corporate entertainment, and licensed areas. The new development was wrapped around the existing Round Reading Room, in the central courtyard of the British Museum – which is a quadrangle building. The key benefits of the fire strategy were to enable the open architectural and operational ambitions with minimum intervention to the existing structure (which is all Grade 1 listed) and to achieve best value.

#### **North Wall Performing Arts Centre £20M [St Edward's school] (Haworth Tompkins)**

*RIBA National Award, RIBA South Conservation Award, Evening Standard Special Award for Innovative Theatre, Civic Trust Award - All 2008*

- Timber-framed building providing a public theatre, also for student training, with disabled student access to all levels including the fly gallery.

**Wildscreen World, Bristol £14M [At Bristol] (Michael Hopkins & Partners)**

- The project comprised development of exhibition (including a “virtual” zoo), tropical gardens, IMAX cinema, roof-level entertainment, licensed and retail accommodation attached to the refurbishment of an existing foundry. The fire strategy took advantage of the inherent compartmentation of the building to develop a means of escape strategy based on progressive horizontal evacuation and staged evacuation. The key benefits of the strategy included enabling the use of unprotected routes for escape, and removal of all stairs other than those needed for circulation.

**Glasgow Wing Tower £8.5M [Glasgow City Council] (Richard Horden / BDP)**

*RIBA Award 2002, Glasgow Institute of Architects Design Award 2001, Bentley Success Award 2003, Dynamic Place Award 2002*

- Scotland’s tallest free-standing structure, which rotates according to wind direction. Fire strategy to enable the efficient design of a single-staired tower with a public viewing space 100m above-ground, and basement entertainment / retail complex.

**Skyline Pavilions – Skegness, Bognor, & Minehead £50M [Butlins] (S&P Architects)**

- Development of a fire strategy enabling creation of a covered, single compartment, exhibition area in the central courtyard of an existing entertainment complex. Also undertook fire risk assessments to help the Client in the ongoing fire safety management of the facility during the operations phase.

**The Hepworth Gallery, Wakefield £25M [Wakefield Metropolitan City Council] (David Chipperfield Architects)**

- Addressing Client, Architectural, and BS 5454 requirements and negotiation with interested parties (Building Control, Licensing Authority, MLA) to clarify the brief. Development of the fire strategy to enable the design quality of the building, incorporating innovative solutions to minimise implications on management procedures, optimise capability of building to serve disabled persons, and achieve tight budget. Negotiation with site master-planners to ensure maximum benefit for the gallery.

**Pitt Rivers Research Centre, Oxford £5M [Oxford University] (Pringle Richards Sharratt)**

- Development of the fire strategy for a 3-storey new build artefact research centre created in the external courtyard adjacent to the existing Pitt Rivers museum, in the centre of a congested site in the Oxford University estate. Fire Engineering was applied to develop the best strategy to achieve the project goals, including an assessment of requirements under BS 5454.

**Magna Centre, Rotherham £60M [Magna Centre] (Wilkinson Eyre)**

*RIBA Stirling Prize 2001, Design Week Best Exhibition Award 2002*

- Conversion of an existing, single-compartment, steel foundry / mill to create an exhibition celebrating the four elements: Earth, Fire, Air, and Water. The specialist design of the smoke control system was critical to the success of the project, enabling the large open compartment housing the 4 exhibits and the open escape from the suspended “Air” pavilion.

**Architectural Foundation £5M [LandSecurities] (Zaha Hadid)**

- Development of a fire strategy to enable the innovative architectural design and achieve best value for money without undue reliance on management procedures. In particular the design required a fire-engineered approach to enable the desired 200 persons on a storey with a single stair / single direction of escape – strategy agreed with Building Control & LFEPA

Also

- Richmond Station Visitors centre (Potts Parry Ives & Young)
- Castleford museum – (Niall McLaughlin Architects)
- Egg Children’s Theatre Bath (Haworth Tompkins) *USITT Award with Honour 2007, RIBA Award 2006, B&NES Design Quality Award 2005*

## Healthcare

Notable Healthcare projects include:

### **ROYAL ALEXANDRA CHILDREN'S HOSPITAL, Brighton £50M [Kajima] (BDP)**

*Prime Minister's award for Best Public building 2008. Civic Trust Award 2009, The Prime Minister's Better Public Building Award 2008, Design and Health Academy Award (Healthcare Design Project Award) 2007, Building Better Healthcare Award (Highly Commended — Best Designed Hospital and Winner, Best Client Team) 2007, Health Business Award (Hospital Building Award) 2007*

Project Director, also responsible for the design of the fire strategy and leading negotiations with interested parties. A key component of the design is the central atrium, which binds all levels; delivering natural light and acting as a social hub. The objective of the fire strategy was to enable the architectural and operational ambitions for the hospital (which were significantly different from the standard FIRECODE solutions) and achieve best value for money. Furthermore, the construction of the hospital on a tight site required careful consideration to ensure the safety of the existing, operational, buildings. The RACH has been independently cited at international healthcare conferences as an exemplar hospital where fire-engineering has been best used in hospital design.

### **Stobhill ACAD, Stobhill £100M [BBCL] (Reiach & Hall)**

*BBH Awards 2009 - UK's 'Best Designed Hospital' 2009, Roses Design Awards - 'Best Public Building' and best of the best Architecture Grand Prix award.*

Project Director, also responsible for the design of the fire strategy and leading negotiations with interested parties. The key benefits of the fire strategy included:

- Designed the atrium space to minimise the amount of fire rated glazing required, reducing it to toughened glazing where possible;
- Increased compartment sizes based on risk and occupant characteristics;
- Reduced stair numbers compared with the SHTM requirements and guidance for fire-fighting facilities.

### **Peterborough Acute, CCC, & MHU £300M [Brookfield] (Nightingale Associates)**

Project Director for the three facilities, also responsible for the design of the fire strategy and leading negotiations with interested parties. The key benefits of the fire strategy included the natural-ventilation based design of the atria, structural fire engineering, engineering-based radiation calculations to justify omission of fire-rated glazing, bespoke evacuation strategy and firefighting strategy to justify omission of 5 stairs compared with the HTM81 guidance provision.

### **Broomfield Hospital, Chelmsford £200M [Bouygues] (Llewelyn Davies Yeang)**

Project Director, also responsible for the design of the fire strategy and leading negotiations with interested parties. The key benefits of the fire strategy included:

- The design of the central atrium space that links to the existing hospital is separated from adjacent clinical departments by non-fire rated, toughened glazing
- A bespoke fire safety provisions/fire-fighting measures developed for the inclusion of a roof-top heli-pad.

### **Northern Batched Hospitals: Manchester £300M [BBCL] (HKS & Keppie Design)**

Project Director for the four facilities, also responsible for the design of the fire strategy and leading negotiations with interested parties. The northern batched project comprises a new acute hospital and education block at Salford hospital, and a new DTC & EMI at Tameside hospital. Significant benefits were achieved by the fire engineered approach, including: atrium fire strategy enabling use of non-fire-insulated glazing to facade & natural smoke ventilation, assessments of performance of existing connected buildings. Reduction of number of stairs, rationalisation of dampers – e.g. enabling continuing operation of aseptic suites, fire-engineered assessments and specifications of systems to minimise the need for sprinklers. Phased decant and construction on a live site.

**Victoria Hospital, Kirkcaldy £200M [BBCL] (BDP)**

Project Director, also responsible for the design of the fire strategy and leading negotiations with interested parties. Victoria Hospital is a new 8 storey acute hospital. Key benefits of the fire-engineered approach included: fire-engineered design to enable the ward layout desired by the Trust, rationalisation of sprinklers (a partially-sprinklered option was preferred by the Trust) and fire dampers, Structural Fire Engineering that justified omission of fire protection from a significant number of beams, assessments of performance of existing site and interface with connected building.

**Forth Valley Acute Hospital, Larbert, Scotland £300M [Laing O'Rourke] (Keppie Design)**

Project Director for the three facilities, also responsible for the design of the fire strategy and leading negotiations with interested parties. The new acute hospital will have approximately 860 inpatient and day beds, and includes a MHU. Key benefits of the fire-engineering included: Non-sprinklered design, which led to revised guidance from NHS Scotland (CEL 25 2008) supporting principle that hospitals do not require sprinklers if appropriately designed, atrium fire strategy enabling use of toughened glazing to facade & natural smoke ventilation (which was independently validated by Strathclyde University), rationalisation of smoke vs fusible-link dampers, general benefits from fire engineering, enabling timber construction (MHU). Addressed the proposals for phased decant and construction.

Hospital Experience summary includes [BBCL, Kajima, Laing O'Rourke, Carillion, Mowlem, Costain, Dawn, Morgan Ashurst, Brookfield, Ryder, Sir Robert McAlpine, Nuffield, etc] (BDP, Keppie Design, Reiach & Hall, Sheppard Robson, Nightingale Associates, HKS, Maap, Hopkins, Avanti etc) (PFI/PPP unless otherwise stated):

- Southampton AMHU £25M
- 3T's Brighton £300M
- Peterborough Hospital £300M
- Broomfield Hospital £200M
- Victoria Hospital Kirkcaldy £200M
- Royal Alexandra Children's Hospital £50M
- TEWV AMHU £40M
- Salford Hospital PFI £300M
- Tameside Hospital PFI £100M
- Crosshouse Maternity PFI £25M
- SWL LIFT various
- LSL LIFT various
- Farah Healthcare Academy £40M (traditional)
- Blackburn Hospital PFI £100M
- St Margaret's Hospital £14M
- ProCure21 Pilot Regions & National Roll-Out (Various)
- Derby Hospital PFI £120M (FITN)
- Manchester Children's Hospital PFI £280M (FITN)
- Fairfield Hospital £3M (D&B)
- Royal London Hospital Original PFI £200M (PB)
- King's College Hospital PFI £45M
- Ruskin Wing PFI £11M
- St George Hospital £30M (Beirut – Traditional)
- Portsmouth Hospital PFI £160M
- Newcastle RVI PFI £160M (FITN)
- Peninsula Medical Schools £33M (traditional)
- Leeds Oncology PFI £160M (FITN)
- Forth Valley Acute PFI £300M
- Wakefield Hospitals PFI £200M (PB)
- Leeds Nuffield hospital £20M (D&B)
- Oxford Nuffield Hospital £20M (traditional)
- Lewisham Hospital PFI £40M (ITN)
- Swindon DTC PFI £22M
- Evelina Children's hospital £35M (traditional)
- Fairfield Hospital £3M (D&B)
- Moorfields Eye Hospital £11M (traditional)
- Belfast Maternity £8M (traditional)
- Lyngton £25M (FITN)
- St Helen's & Knowsley £160M (FITN)
- Birmingham Hospital £400M (PB)
- Health and Safety Laboratory Buxton (PB)
- Barnsley PCT LIFT £10M (ITN)

## Education

Education buildings can represent the most challenging fire safety projects, and the critical success factors to enable design excellence and best value for money would typically include:

- Addressing property protection and business continuity aspects, and general compliance strategy for BB100 for schools
- Open-ness of design (atria, large compartments).
- Smoke control systems, to enable smoke retardant construction and toughened glazing to achieve fire compartmentation performance, or to enable open balcony escape.
- Extended travel distance and use of accommodation stairs for escape.
- Choice of evacuation strategy. Progressive Horizontal Evacuation may enable best management of any evacuation, especially beneficial for special needs students and disabled persons.
- Strategy for means of escape for disabled persons and coordination with the management of evacuation for the facility.
- Cost-benefit analysis of sprinklered, partially-sprinklered, and non-sprinklered options.
- Integration of fire strategy with building service's environmental strategy, particularly relevant for natural ventilation and low-energy solutions.
- Integration of security and escape, and development of engineered fire alarm systems (BS 5839 L5 standard); particularly relevant in the design for partial-occupation situations e.g. where areas of the school are occupied (e.g. let for third-party/out of hours purposes) whilst remainder of school is unoccupied.
- Account for effect of construction on any existing facilities and for any phasing of occupation.
- Fire service access and firefighting
- Negotiation with Building Regulations body and Fire Authority, to ensure an efficient approvals process and enable confident progression of the design

Education projects comprise:

- Schools & Academies
- Higher Education



## Education: Schools & Academies

Notable projects include:

- **Pimlico School** PFI (PB) £15M [Costain] (Ellis Williams)
- **Hackney (Bridge) Academy** (Traditional) c£20M [DCSF] (BDP)  
*SCALA\* Civic Building of the Year Award, 2009 ACE Engineering Excellence Award 2009, Bentley Success Award (Best use of BIM) 2006*
- **Ealing Schools** PFI c£75M (FC): [DCSF] (Seymour Harris Keppie)
  - Brentside High School; Gifford School; Ravenor School, Downe Manor Primary School
- **North Tyneside Schools** PFI c£70M (FC) [DCSF] (Seymour Harris Keppie):
  - Marine Park First School, Coquet Park First School, Western Community Primary School, Burnside Community High School
- **Leigh Academy** (Traditional) c£20M [DCSF] (BDP)
- **Unity College Peterborough** (Traditional) £9m [Diocese of Peterborough] (Saunders Boston)
- **Manchester Schools** BSF £250M, including review of 10 years Manchester schools fire data to develop case for omission of sprinklers, development of Manchester's strategy for means of escape for disabled pupils. Specific input on schools including: Gorten Education Village (*Best Healthy Learning Environment category at the 2009 British Council for School Environments (BCSE)*), King David's, Our Ladys RC and associated SEN Levenshulme & Acacias Abraham Moss Digital Communication Academy Brookway - Health Academy, St Matthews, Newall Green [BBCL & Laing O'Rourke] (AEDAS, Ellis Williams, & Walker Simpson)
- **Liverpool Schools** BSF: £50M Gateacre & Hope [BBCL] (BDP)

## Education: Higher Education

Notable projects include:

- **Anglia Ruskin University** £40M development of new building within and attached to other existing buildings in a congested operational site [ARU] (BDP).
- **Partnership For Learning** [Jaguar] (Taylor Young)
- **Blackburn College of Higher Education** £20M multi-storey building with atrium on operational site. [Blackburn College] (Buttress Fuller Alsop Williams)
- **Sheffield University Learning Centre** £30M – A phased construction / occupation facility within a congested operational site [Sheffield University] (RMJM)
- **LAMDA** £25M. A new facility in a congested site providing studio and educational facilities and a new auditorium/training theatre, connecting to an existing building. [London Academy of Music & Dramatic Arts] (Niall McLaughlin Architects)
- **Hope Hospital Education Block** £30M – a new 5-storey education building on the existing congested operational hope hospital site. [Hope Hospital] (HKS)
- **Wildscreen World @Bristol** £40M – includes a large format theatre, education centre, and an interactive (PC-based) zoo [At Bristol] (Michael Hopkins & Partners)
- **St Andrew's Medical Centre** £50M [St Andrews] (Reiach & Hall)
- **Forth Valley College** £30M [Forth Valley] (Reiach & Hall)
- **North Wall Performing Arts Centre** £20M (*RIBA National Award, RIBA South Conservation Award, Evening Standard Special Award for Innovative Theatre, Civic Trust Award - All 2008*); a timber-framed building providing a public theatre, also for student training, with disabled student access to all levels including the fly gallery. [St Edward's school] (Haworth Tompkins)
- **Pitts River Museum Research Centre** £15M – The new research centre is attached to the existing Oxford University Pitts River Museum, and includes archive & public access accommodation [Oxford University] (Pringle Richards Sharratt)
- **Hull History Centre** £25M – A new facility incorporating archive and public access. [Hull City Council] (Pringle Richards Sharratt)

## Stadia

Notable projects include:

### **Wimbledon All England Lawn Tennis & Croquet Club £100M [AELTCC] (HOK Sport / Populous)**

Means of escape strategy for Centre Court (including the Royal Box) and site-wide strategy, accounting for efficient design of stands and need to separate escape for public, dignitaries, and players. Surveys of crowd filling and evacuation. Innovative “time of arrival” node assessment for escape enabled a greater number of seats to be served by a given escape route width.

### **Millennium Dome £400M [New Millennium Experience Corporation] (Richard Rogers & HOK Sport / Populous)**

*MacRobert Award for Innovative Ideas in Engineering 1999*

General Fire Strategy for the dome and specific fire strategies for central arena and exhibits. CFD smoke modelling, environmental modelling and wind modelling.

**Key strategic input for innovative elements on:** Arsenal / Oval / Leyton Orient / Royal Ascot

**Numerous assembly buildings and similar** that include auditoria, hospitality / licensing interface, means of escape for disabled persons / public and other relevant elements to stadia, e.g Chelsea Flower show, Harbourside Centre (Benisch & Benisch), Wildscreen World (Hopkins), Architectural Foundation (Zaha Hadid), Hepworth Gallery (David Chipperfield), Millennium Gallery, Sheffield (Pringle Richards Sharratt)

## Office

Notable projects include:

### **St Catherine’s house £30M [Exxon Mobil] (Rolfe Judd)**

- St Catherine’s house was a facade-retention project on Kingsway, to convert the registry office into a prestigious headquarters for Exxon Mobil. Critical success factors for the fire strategy included addressing;
  - Section 20 requirements
  - Means of escape for disabled persons
  - Integration of structure and services, using cell-form beams
  - An innovative smoke control system for the Section 20 smoke clearance.

### **No1 City square Leeds £25M [Shepherd Construction Ltd] (AEDAS)**

- No 1 city square is a landmark building in the centre of Leeds. Key components of the fire strategy included

### **Park House [LandSecurities] (Hamilton Associates)**

- Park House is a high quality urban regeneration development which covers an entire city block, on a prime Oxford Street location near Marble Arch. The dramatic, glass-roofed structure will combine exclusive retail space over 3 storeys (lower ground, ground and first floors) and 39 high specification residential apartments with 165,000 square feet of exceptional office space on the upper storeys. The innovative Fire Strategy for the office efficiently addressed the requirements for Section 20, the ability to split the floor-plate into multiple-tenancies, a sophisticated approach to means of escape for disabled persons, and – with the atrium option – a design that achieved the required compartmentation performance using just toughened glazing as well as enabling the Section 20 smoke clearance requirements to use the atrium ventilation system.



## Retail

Notable projects include:

### **Park House [Land Securities] (Hamilton Associates)**

- Park House is a high quality urban regeneration development which covers an entire city block, on a prime Oxford Street location near Marble Arch. The dramatic, glass-roofed structure will combine exclusive retail space over 3 storeys (lower ground, ground and first floors) and 39 high specification residential apartments with 165,000 square feet of exceptional office space on the upper storeys. The innovative Fire Strategy for the retail developed a bespoke smoke control system that enabled use of open stairs between the storeys, and also enabled the stairs to discharge into the centre of the store, thereby freeing-up the valuable shop-front zone for displays.

### **Princesshay - Exeter Town Centre £225M [Land Securities] (Chapman Taylor)**

*Most outstanding medium-sized shopping centre in Europe 2008 & Best in the West RTPA Award 2008*

- Mixed-use development comprising principally retail.
- Combination of stand-alone shops, retail malls, anchor stores, single units, and multi-storey units. In new and existing build.
- A variety of innovative and effective solutions were deployed on Princesshay to maximise the design quality and value for money, including:
  - Bespoke smoke control solutions for means of escape and for firefighting
  - Statistical quantitative fire risk analysis
  - Fire & smoke modelling

### **Lower Precinct Coventry £20M [Arrowcroft] [Michael Aukett Architects]**

*BCSC Refurbishment & Extension Award, Civic Trust Award Commendation*

Lower Precinct is one of the four principal thoroughfares through Coventry's core retail area. As a result of the natural gradient, Lower Precinct provides shopping on two levels and was designed as one of the key focal points in the city centre. The development included enclosing the existing (external) precinct under a glass roof, and providing natural ventilation system for the environmental & fire safety requirements.

- Wind-tunnel data gave vent pressure coefficients for variety of different wind directions
- Sophisticated smoke modelling was undertaken to determine the performance of the smoke control system for different wind directions, wind speeds, and vent configurations. This identified specific proposed vent locations that were unsuitable.
- A detailed risk assessment using local wind-rose data demonstrated that the safety associated with the natural ventilation system was acceptable for Building Regulations compliance.

### **Hill Street Centre Middlesbrough £5M [Royal & Sun Alliance] (Leslie Jones)**

- Reconfiguration of shop units and mall smoke extract systems within an existing, operating, shopping centre. Smoke control calculations to optimise the systems and an assessment of the effect of the proposed mall ceiling to demonstrate an acceptable performance was achieved compared with the existing condition.

## Hotels

Notable projects include:

### **Midland Hotel Morecambe (conversion of listed building) £30M [Urban Splash] (Union North),** *RIBA Crown Estate Conservation Award 2009)*

- The fire strategy was a key component for this refurbishment of the Grade II\* art deco hotel, enabling the atrium to be re-opened to its original glory and minimising intervention to the existing structure.

### **Northumberland House Hotel [Masterworks Developments] £26M**

- The Northumberland House Hotel comprised the refurbishment of a MoD building, latterly used as offices, to create a prestigious hotel and long-term accommodation for the LSE. The building is Grade II listed and the fire strategy successfully addressed some key challenges including:
  - Section 20 requirements
  - Minimising intervention to existing structure
  - HMO requirements for the LSE accommodation
  - Security, yet shared escape, between LSE and Hotel accommodation
  - Enhanced populations for public rooms in the ground and basement storeys
  - Partial sprinkler coverage
  - Rationalisation of fire resistance for elements of structure: 60min was agreed for the new storey rather than the guidance 120mins.
  - Means of escape for disabled persons

### **Argyle International Hotel Glasgow £125M [Progress Property Developments] (Ian Simpson Architects)**

- A 6\*\*\*\*\* hotel for Progress Property Developments. A key element of the fire strategy was the design for the atrium to enable the required open spatial design and intended flexibility of use for the atrium base.

### **Le Royal, Amman £150M [Le Royal Chain]**

- A 5\*\*\*\*\*+ hotel and a member of the Leading Hotels of the World. Le Royal Hotel has 31 above-ground floors as well as basement storeys, offers its guests unequalled services and facilities: deluxe guest rooms, banqueting and high-end convention facilities, an array of ethnic and gourmet restaurants, popular bars, a shopping mall, movie theatres, office space, and a world class spa and health club. The fire strategy was based on international hotel standards/NFPA and the key considerations were;
  - to enable the non-standard design ambitions of the architect,
  - minimise the number of escape and firefighting cores, and thus maximise the usable floor area,
  - to develop an effective design for the double-atrium (the hotel has two principal atria, stacked one above the other)
  - to account for the mix of different accommodations.
  - to address the high security associated with the royal storeys.
  - to agree the fire-engineered approach and ensure an effective approvals process with the local authorities.

## Residential

Notable projects include:

### **Lakeshore Bristol £30M [Urban Splash] (Ferguson Mann)**

- Conversion of the 1974 Cor-ten Grade II listed Imperial Tobacco office into high-quality residential accommodation. Key benefits of the fire strategy included;
  - the design of the atrium to achieve equivalent performance to a courtyard, thereby enabling the apartments to be designed on the basis of an open-deck approach and to be naturally-ventilated into the atrium.
  - use of the perimeter balcony for escape, which gave greater flexibility in the design of apartments.
  - rationalisation of sprinklers; sprinklers were only deployed where of benefit

### **Wilton Plaza £40M [LandSecurities] (Jestico & Whiles)**

- A prestigious development for LandSecurities comprising market & affordable housing apartment blocks and two blocks of student accommodation for UCL. The key benefits achieved by the fire strategy included:
  - The design ensured that the required standard of fire safety for legislative compliance (including Section 20 & HMO requirements) was achieved with a single stair to each block; this significantly enhanced the floor-plate efficiency compared with the guidance 2-stair solution.
  - A tailor-made mechanically-assisted design for the firefighting smoke shaft was deployed; the system has the least extract, leanest cross-sectional area, and simplest design compared with commercially-available mechanically-assisted shafts.

### **Leghorn Road**

- Innovative fire strategy for an apartment block, enabling the required standard of safety to be achieved with a single, open, stair.

## Industrial

Notable projects include:

### **Glendoe Hydro-electric Plant £150M [Scottish & Southern Energy]**

- The 100MW Glendoe project is the first large-scale hydro-electric project to be built in the UK since the 75MW Errochty station in Perthshire in 1957. Fire strategy advisor to SSE for this challenging industrial project. Also undertook HAZOP risk assessments of the mechanical & electrical systems to ensure appropriate operational design and reliability.

### **Atomic Weapons Establishments £1Bn+ [Hunting-BRAE]**

- Fire Safety discipline leader. In preparation for NII certification and as due-diligence for operator transfer, all 4 AWE sites (Aldermaston, Burghfield, Foulness, & Cardiff) were surveyed. Survey teams inspected all facilities against requirements for 5 disciplines; Radiation, Ventilation, Fire Safety, Building construction, general Health & Safety. Responsibilities included selection of staff, training of teams, planning of surveys, provision of fire safety advice, surveying/assessing, liaison with AWE, determination & costing of remedial actions.

**Various warehouses, storage centres, etc.**

## Transport

A summary of relevant experience includes:

- Risk Assessment/Safety management for London Underground Limited, CrossRail and MerseyRail, including QRA of tunnel ventilation system, cooling and ventilation of stationary trains,
- Station Fire Risk assessments for Merseyrail.
- Fire Risk Assessments for Railtrack principal surface & sub-surface stations.
- Jubilee Line Extension evacuation modelling.
- Leader for Fire Risk Assessments/Fire Safety Design for Atomic Weapons Establishments, which incorporate extensive "contained" areas and innovative solutions for means of escape.
- Extensive experience in developing smoke control strategies and escape from basement FM tunnels (these tunnels contain robotic systems, span hospital sites and also connect to the energy centres)
- Risk Assessment; Methane ingress for Heathrow Express tunnel.
- Stansted Airport and Heathrow Terminal 3 CFD Modelling, including interface with tunnel system
- Retained as Expert Witness for Scandinavian Star Ferry disaster.