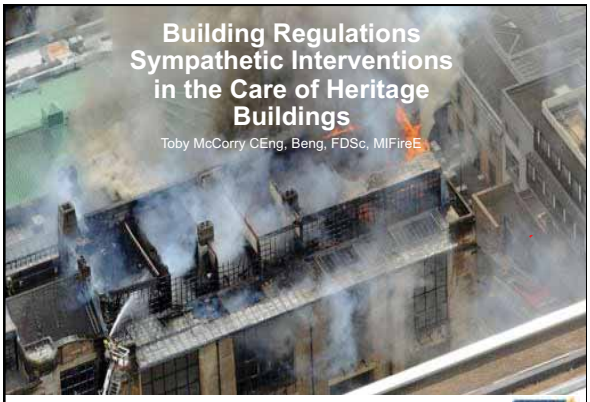

Building Regulations Sympathetic Interventions in the Care of Heritage Buildings

Toby McCorry CEng, Beng, FDSc, MIFireE

The Question

Can a resolution be sought that marries a sympathetic and sensitive intervention philosophy with the rigours of modern fire life safety requirements of the current Building Regulations (Part B)?

The Path to the Answer

- De-mystifying Fire Legislation
- Role of performance based design and the Fire Engineer
- Case studies
  - Willis Building, Friar Street, Ipswich
  - Rougemont House, Exeter
  - Manchester Central Library (Arup)

De-mystifying Fire Legislation

- The Building Regulations
- The Regulatory Reform (Fire Safety) Order

De-mystifying Fire Legislation – The Building Regulations

STATUTORY INSTRUMENTS

2010 No. 2214

BUILDING AND BUILDINGS, ENGLAND AND WALES

The Building Regulations 2010

Building Work

- Material Change of Use
- Material Alteration

De-mystifying Fire Legislation – The Building Regulations

Material Alteration – Chasing the tail

- Building work results in – arrangement not complying with a relevant requirement where previously it did; or being more unsatisfactory
- After completed – arrangement complies or is **no more unsatisfactory** than before the work was carried out

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

De-mystifying Fire Legislation – The Building Regulations

Material Alteration – Examples in heritage buildings

- Increasing population or accessible accommodation
- Adding accommodation within existing fabric or new fabric
- Alteration of existing fabric forming fire safety provisions
- General refurbishment
- Specific – unlikely to be all parts…

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De-mystifying Fire Legislation – The RR(FS)O

The RR(FS)O and Fire Risk Assessment:

- Another reason for upgrading fire safety performance
- May be more onerous than Building Regulations
- Anticipating the future

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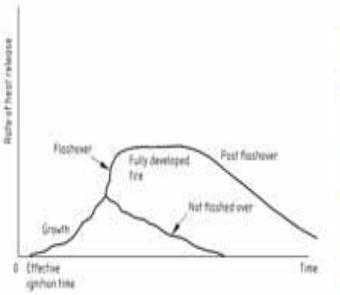
Role of performance based design and the Fire Engineer



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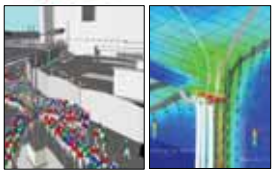
Role of performance based design and the Fire Engineer

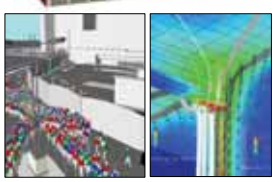


Tools at our disposal:

- Employing performance based design
  - Qualitative justification
  - Quantitative assessment and Quantitative risk assessment – BS 7974 etc.
  - Detailed modelling techniques – mindful of rubbish in, rubbish out
- Relationships with Approving Authorities
- Knowledge of fire safety guidance and background – Magic numbers

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Role of performance based design and the Fire Engineer



Examples for heritage buildings:

- Fire and smoke spread analysis
- Means of escape analysis
- Structural fire protection analysis
- Fire safety systems – fire detection, sprinklers etc.
- Risk based assessments

Or sometimes applying a little common sense.

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Case Studies

Rougemont House, Exeter

Willis Building, Ipswich

Manchester Central Library (Arup)

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter




- Grade 2* listed, 4 storey, Georgian
- Council owned, used as a Museum and Café… before a dwelling
- Grand accommodation stair and narrow servants stair
- Lots of previous intervention… some less sensitive than others
- To become specialist Maths school for 16-18 year olds

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter


Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter




Key challenges

- Achieving appropriate access and escape when neither existing stair suitable
- Existing structure to be maintained but parts do not meet modern fire safety standards
- Existing fabric to be retained and form means of escape routes
- Removal of some undesirable interventions

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter

Performance requirements and approach

- Already an “Assembly Use”
- No change of use as such but material alteration
- Benchmarks - AD B and BB100 for Schools
- Performance based design for some aspects

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter

Access and means of escape

- Introduction of modern stair and lift
- Addressed as a single stair building for means of escape, with access through the grand stair space
- Supported by new category L2 fire detection and alarm
- Refuge and carry down for MIPs
- Better than existing.

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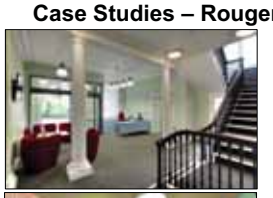
Case Studies – Rougemont House, Exeter



Maintaining existing structure and fabric

- Assessed to have a minimum fire resistance of **30 minutes** where structure and fabric in good condition.
- An existing condition not made more unsatisfactory…. But supported by performance based approach utilising new category L2 fire detection and alarm and assessment of the Required Safe Evacuation Time (RSET)
- Upgrading where necessary and new cavity barriers

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Rougemont House, Exeter

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Case Studies – Rougemont House, Exeter

Removal of undesirable screen

- Considered a good idea by all parties
- Supported by overall improvement in building and arrangements for escape
- However, Fire Service believed it made existing condition more unsatisfactory
- Several weeks of argument and counter argument!
- Solution – Ventilation to head of stair

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

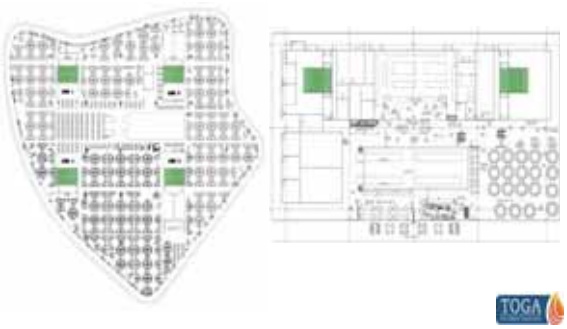
- Grade 1 listed, 4 storey 1970s office
- One of the first examples of modern open plan office design including:
  - Central open atrium
  - Café/restaurant/roof garden at top floor.
  - Swimming pool at ground floor (sadly covered over!)
- General refurbishment and increase in office population
- However, FRA had picked up several deficiencies in the fire safety design… see if you can spot one of them

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich



Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

Deficiencies…

- None of the escape stairs discharged to outside…
  - 3 stairs (and both stairs serving 3rd floor) discharged into loading bay
  - Insufficient means of escape provision for current population… never mind increased population
- Doors to the escape stairs were not fire doors (not picked up by FRA)….

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

Performance Requirements and Approach

- No change of use as such but material alteration
- Addressing FRA requirements
- Benchmarks - AD B
- Performance based design for some aspects

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

Addressing stairs and door:

- Sensitive introduction of escape corridors to only the most critical escape stairs
- Supported by performance based approach to demonstrate sufficient means of escape capacity achieved – incl. new category L2 fire detection and alarm
- Replacing existing doors – bespoke solution

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Willis Building, Ipswich

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Manchester Central Library (Arup)

- Grade 2* listed, 1930s, Neo-classical
- Vincent Harris
- Buildings refurbished to extend lifetime for at least another 50 years
- Aspiration to increase from 30% accessible to 70% accessible
- New modern BS 5454 archive
- However, several challenges to achieve this.

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Manchester Central Library (Arup)

Key Challenges

- Existing book stack structure
  - Supported floors from basement to 1st floor reading room all under central dome!
  - Innovative at the time, but…
  - Limited fire resistance… several implications to building and project
  - Significant area at ground floor not accessible
  - Incompatible, outdated storage method for archives
- Greater access introduces larger populations – specifically ground floor
- Greater access for MIPs…

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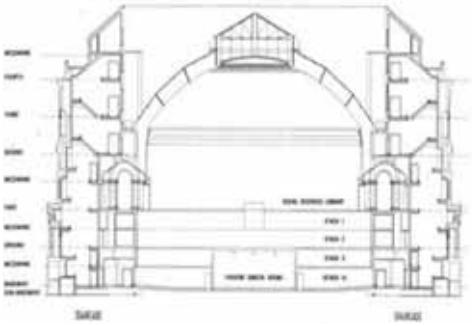
Case Studies – Manchester Central Library (Arup)



Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Manchester Central Library (Arup)

Performance Requirements and Approach:

- No change of use as such but material alterations
- Benchmarks - AD B
- Performance based design for some aspects

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

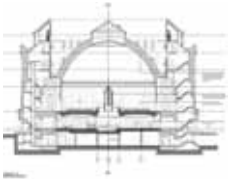
Case Studies – Manchester Central Library (Arup)

Existing book stack structure:

- Practically impossible to improve fire resisting performance
- Team presented case to EH for removal
- A more expensive solution but critical to realise project ambitions
- Small area was maintained

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

Case Studies – Manchester Central Library (Arup)



Greater access and population:

- Sensitive introduction of means of escape routes
  - using existing paths where possible
  - using new access routes such as vertical circulation core
- Limiting intervention by utilising performance based approach:
  - Benefit of new fire detection and alarm
  - Assessment of the Available vs Required Safe Evacuation Time (ASET vs RSET)
  - Detailed fire and smoke spread analysis

Building Regulations - Sympathetic Interventions in the Care of Heritage Buildings

The Answer to the Question…

Can a resolution be sought that marries a sympathetic and sensitive intervention philosophy with the rigours of modern fire life safety requirements of the current Building Regulations (Part B)?

Thoughtful and pragmatic fire safety design advice supported by performance based engineering. If applied throughout a project, this approach will play a key role in achieving and demonstrating an appropriate and robust level of life safety whilst preserving the fabric, character and integrity of the building.

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