Fire Engineering and Historic Buildings

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1. Fire engineering and the Building Regulations
2. Fire engineering analyses
3. Regulatory Reform (Fire Safety) Order (and risk based analysis)
4. Planned preventive maintenance and testing
5. Historic buildings – A Fire Engineering Case Study
6. Fire Engineering and historic buildings examples
Fire Engineering
The Building Regulations and Guidance for Risk Assessments are ‘functional’ – i.e. they represent a minimum standard to comply with.

Guidance documents, such as Approved Document B, represent one means demonstrating compliance with the Building Regulations.

Guidance can be restrictive and is often overly conservative, and sometimes not the most appropriate design approach.

Documents tend to reflect ‘simple’ building layouts.

Guidance for existing buildings assume compliance with modern buildings – large quantity of the UK’s building stock does not comply with the specifics of the standards due to age, changes in guidance, changes in building methods etc.

Risk based approach and bespoke design approach is more relevant.
Fire Engineering Benefits

• Fire Engineering offers bespoke solutions to meet the minimum standards
• Flexible approach allows for risk specific solutions to be developed
• Offers opportunity for value engineering and cost savings whilst still demonstrating compliance with the Building Regulations
• Offers solutions to existing buildings in terms of oversights or non-conformity in older buildings, especially relevant to historic and heritage buildings
• Fire engineering design approach – design codes such as BS 7974
Fire Engineering
Structural Fire Engineering

- Analysis of building structure to rationalise fire protection; either to individual elements or possibly the full frame
- Reduction in applied fire protection to the loadbearing structure
- A useful tool for justification of existing buildings / structures and in situ passive fire protection
• Can allow for flexible design taking into account fire development, effects of suppression, building geometry
Fire Risk Assessment
Regulatory Reform (Fire Safety) Order – Historic Buildings

• Regulatory Reform (Fire Safety) Order 2005 and equivalent legislation in Scotland and NI

• Replaced fire previous regime of fire certification operated by the fire authorities – it sometimes referred to as DIY legislation as it places the onus on the “responsible person” or “employer” to undertake a “suitable and sufficient” risk assessment

• Responsibility to implement “general fire precautions” as identified by the risk assessment

• Useful for assessment of “historic buildings” – how does this sit with older building stock?

• Risk based approach – what does it allow?
Planned Preventive Maintenance (PPM) Programmes
Historic Buildings

Important for “systems” based fire strategies which may be appropriate in historic / older building stock

- Development of compliant PPM programmes
- PPM rationalisation based upon risk assessment; e.g. based upon failure rates and redundancy
  - In-house risk matrices
- Review of competency of personnel
- Training requirements
- Accreditation of contractors maintaining and testing fire systems
- Overall, fire strategies reliant upon active systems as opposed to passive systems, require high levels of PPM
So what can FE offer in respect of historic building stock?

- Bespoke design meeting the “functional requirements” of the Building Regulations
- Provides adequate baseline for demonstrating safety
- Maintain the architectural integrity of the building and its features
- Avoids obtrusive fire systems
Fire Engineering
Historic Buildings – A Case Study - Change of Use
Fire Engineering
Historic Buildings – A Case Study
Fire Engineering
Historic Buildings – A Case Study
Fire Engineering
Historic Buildings

INNOVATION. TEAMWORK. PERFORMANCE. INTEGRITY.
• Challenges?
• Aesthetics of the design
• Obtrusive fire systems and applications
• Non-compliant design approach based upon modern guidance
Fire Engineering
Historic Buildings – A Case Study
Fire Engineering
Historic Buildings – A Case Study
• Issues
  – At some levels, the stair is not protected
  – Some of the bedrooms are inner rooms
  – Questions regarding structural reliability
  – Fire resistance of floors
  – Door closers
The Solution

- The strategy combined a series of measures and provided background information on the design which included
  - Automatic stand-alone fire alarm system to an LD1 standard
  - Low pressure water mist suppression
  - Floor sprung free swing self closing devices on enclosing doors
The Challenge

• As with any heritage building the balance between refurbishment and restoration was a key issue.

• The nature of the previous use allowed for a substantial amount of work to be done (which I believe had it not been so poorly treated) may not have been allowed.

• This enabled much of the systems to be “hidden” and incorporated into the building fabric.
Timber panelling on escape routes

- Do we spray with flame retardants and cause damage to listed material?
- Do we use other methods such as sprinklers (maybe not with timber!) or mist – cause a very damp atmosphere.
- If we avoid retardants for surface spread of flame which look awful what else can be done?
- What are the other options?
- Fire engineering? Develop a bespoke Fire Strategy justifying a baseline level of safety and compliance with the Building Regulations and preserving the architectural integrity of the building.
Problem - reduction in cross section due to insect attack – need to know extent of deterioration in order to accurately predict char rates and cross section loss

• The key issue here is you need to know the extent of decay/insect damage and how it affects sound cross section and strength grade in order to do the analysis.

• As well as the analysis, what else can be done?

• Use of active such as detection and suppression systems – water mist suppression?
• Justifying higher strength classes for timber which obviates the need for steel reinforcement which in turn obviates the need for additional fire protection

• Fire engineering with good materials knowledge can work in developing a risk proportionate strategy to save time and money
• Justifying higher strength classes for timber which obviates the need for steel reinforcement
• This in turn obviates the need for additional fire protection – so again – the combination of a timber specialist and a fire consultant with good materials knowledge can work to save time and money
Thank you for your attention.

Please feel free to ask questions?