

Collaboration and cost-efficiency: why BIM is a boon for fire protection engineering

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The level of protection afforded to any building where large numbers of people move about has to be proportionate to the structure.

If this falls short, the time the protection provides for rescue services in the event of a real fire could be reduced and the steel's load-bearing capacity breached much more quickly than anticipated, threatening the safe evacuation of people.

Increased knowledge of how real buildings react in fire and how real fires behave has led many authorities to acknowledge that improvements in fire safety may now be possible in many instances by using Buildings Information Modelling (BIM) process and technology.

The essence of BIM is to support the supply chain with a platform which helps collaboration and data sharing.

On major projects, logistics and the handover of one phase to another – from concept and design to installation of products and application of fire protection – are major challenges.

The principles of the BIM process bring together all data associated with that project into one place.

UK government requirement for Level 2 BIM

The UK government requirement for Level 2 BIM on all central government projects means the construction industry wants to know which suppliers are BIM compliant.

Indeed, the British Constructional Steelwork Association (BCSA) for steelwork contractors has provided detailed training to more than 100 of its members and launched the Steel Construction BIM Charter. This means that BCSA member companies can now be certified as meeting requirements of both PAS 91:2013 and PAS 1192-2:2013.

The certification process requires companies to carry out an online assessment, which is then followed up by an onsite audit.

Certified companies are provided with a comprehensive document summarising the company's BIM capability, which they can then provide to the supply chain.

The BCSA's online directory means clients and main contractors can see which companies have been assessed against the BIM Charter, with the charter providing a simple way to pre-qualify steelwork contractors.

Under BIM, an essential component addresses budgeting and cost estimating, known as 5D. This can be a valuable source of information to reach better estimates, reduce assumptions and improve dialogue early in a project.

Ideally, BIM 5D is used either to link model elements to unit cost or assembly processes to produce an estimate. The BIM trend of collaboration and real-time input continues to bring efficiencies to cost controls and creates a shift in input as data, and the ability to report from the field, begins to replace input from the office.

Efficiency and versatility

Anyone in the supply chain who follows the principles of BIM will create transparency and help in making previously challenging projects financially sound, fit for purpose and – more importantly – safe.

Benefits to the process are apparent for main contractors, architects, structural engineers, steel fabricators and site inspectors. Accessing a BIM model collaboratively aids efficiency and versatility, particularly on projects with global players, where project team members may reside in different geographies around the world.

All can access the model over the internet and collaborate using cloud-sharing technology.

At Sherwin-Williams, our own fire design estimation tool – Firetex Design Estimator 2.0 – is offering a new calculated solution to the issues of fire engineering safety, and embraces BIM with an integrated tool allowing 3D modelling data to be directly linked into the software.

This offers the capability of providing calculations for coatings thicknesses of all shapes and sizes of steel sections, fire engineering, and in the case of cellular beams, allows for any configuration of web apertures to be seamlessly designed and passed back into the model.

We believe this software helps to eliminate any personal interpretations or assumptions. Many of the buildings currently being designed present difficulties further down the line in terms of fire protection design and this software supports the industry in keeping pace with advances in design and materials.

For the steelwork fabricator, the approach under BIM means they can manage the whole process from concept to design through to delivery of materials on site including the off-site applied fire protection. The same principle could also be adopted for use with on-site applied fire protection, offering advantages to the main contractor and eventually to the owner/operator.

Once the fire protection properties have been passed back into the BIM model, future interested stakeholders can access any of that information to manage many areas such as inspection and onward building fire maintenance as well as building insurers. Even fire and rescue services could create strategies using this data.

Regulatory Reform (Fire Safety) Order 2005

Under the Regulatory Reform (Fire Safety) Order 2005, those responsible for commercial buildings including the employer, owner or any other person with control of any part of the premises, must carry out a detailed fire risk assessment identifying the risks and hazards in the premises.

The responsible person usually has to call in a fire engineer or qualified person to assess the risk and make calculations about fire engineering design depending on the type of building and the risk.

Based on the findings of the assessment, employers need to ensure that adequate and appropriate fire safety measures are in place to minimise the risk of injury or loss of life in the event of a fire.

Although fire deaths are falling, insurers are concerned at increasing fire losses, which are at the highest level ever experienced since records began, totalling around £3.4 million per day across the UK.

Designing structures in the ambient state with no consideration for the fire condition presents unacceptable risk.

Our current industry procedures mean that this can easily happen and the burden of ensuring fire safe design, which may well include additional costly measures, is placed with either the wrong party or, in the worst case, missed altogether.

The danger in cutting corners is that fire safety measures will be compromised. We believe the responsibility in modern building design should lie with the designer up to handover of the building and then, with full knowledge of all fire -safety requirements, it becomes the responsibility of the owner-manager.

Using modern fire protection design as part of BIM can play a major part in delivering a safe, cost-effective project which meets the expectations and agreements made by all parties at the outset.