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COMPLACENCY KILLS.

There is never room for complacency when it comes to fire safety, says Paul Bryant, CEO of Kingfell Plc

Complacency rules, or so it sometimes seems. It is amazing how, in light of the recent fire safety and building regulation legislative changes, the heightened risk of terrorist threat, and the widely publicised deaths that have resulted from people's inability to escape from burning buildings, that greater attention is not paid to building evacuation.

And the problems seem to be across the board. Building owners, architects, fire engineers, facilities managers, "responsible persons" under the Regulatory Reform (Fire Safety) Order, staff and visitors all need to be more aware and take greater care. Building designers need to work more closely with fire engineers, not merely on the passive and active fire precautions of a building, but also – at the earliest concept stage – on how occupants will evacuate in a number of different fire, explosion or emergency scenarios. Fire engineers need to utilise the best available fire modelling and evacuation modelling technology. Facilities managers, and particularly "responsible persons" need to ensure that effective evacuation procedures are in place, that they are properly communicated, that staff are trained, and that the procedures are tested. Staff and visitors need to become more "evacuation aware" if lives are to be saved.

So, it is a much more complex set of challenges than it may, at first, appear.

PUBLIC'S REACTION TO FIRE.

The public's reaction to fire and evacuation continues to puzzle and frustrate many fire safety professionals. However, it is behaviour that has to be accommodated by engineers devising evacuation strategies, even though it may, at times, be bizarre and irrational.

When an automatic fire detection system triggers an alarm, occupant's response is often anything but automatic. Upon hearing the alarm, time is often squandered in

non-evacuation activities. This phase is known as the pre-movement time, during which occupants are trying to figure out what is happening and what, if anything, they should do.

Some make telephone calls; a few even take it upon themselves to investigate the reason for the alarm. Many will question whether the alarm is "for real", merely a test, or a false alarm; it will not necessarily be accepted as a fire cue. Even when they do decide to evacuate, they may well not make an immediate start. They return to their apartment, hotel room or office to retrieve personal belongings, and attempt to warn and gather family and friends before starting evacuation.

Whichever, critical time is lost. But why? The propensity of false alarms, a desire not to appear to be panicking, waiting to be told what to do, or simply having no idea of what to do are all commonly quoted reasons. In reality, the time taken to respond to an alarm depends on many factors. Those with disabilities, the very young, the elderly and those under the influence of alcohol or drugs may well require more time to respond, and use different routes to the adult able-bodied.

Research shows that people attempting to escape a building are prepared to move into smoke – the main killer in a fire – when endeavouring to evacuate. Frequently they will try to exit the building either by the route they entered or via one of the two or three routes that they habitually use. Obviously, in some cases, this is taking them towards danger rather than away from it.

Education is the key to empowering building occupants to make better informed decisions about a fire situation and to appreciate the importance of rapidly taking appropriate action. This may be to remain where they are and await instructions. However, we are talking about training before the event, not during. And it has to be on-going and combined with regular fire drills. These will help to overcome the myopic use of known exit routes.

THE OCCUPANCY PROFILE.

By and large, this training is going to have its greatest impact on people that regularly or frequently occupy the building. It does though have an important secondary benefit, as trained staff are in a much better position to guide and assist – or shepherd – occasional visitors to the building.

While, in commercial offices the number of visitors is, in relation to the number of employees, usually relatively small, and visitors are likely to be accompanied by a staff member, this is not always the case. Even in a commercial building, contractors unfamiliar with the site may be working, occasional suppliers may be making deliveries, and utility services may be servicing equipment. The position in

public assembly buildings is even more challenging, where the ratio of visitors to staff is far greater.

Clear signage has an important part to play, but so does ensuring that visitors are made aware of the fire safety arrangements and evacuation procedures. Voice alarm systems can play a major role in overcoming some of these obstacles, giving clear directions, zone by zone, on the appropriate course of action that should be taken. However, we now live in a multi-cultural society, where English is not everyone's native tongue. So voice alarms are not a universal panacea, although voice announcements in languages other than English may make a major contribution in areas of the country where a particular ethnic community predominates.

Voice alarms can also play an important role by informing occupants when not to evacuate. An example of this is following an explosion that is suspected to have been caused by terrorist action. In certain cases, the safest course of action is possibly to remain in the building, rather than to mass-evacuate the building, possibly exposing everyone to the danger of a second explosive device targeted at the building's fleeing occupants.

Staff and visitors with disabilities is another major evacuation consideration. Two factors have to be considered: the ability of the disabled person to comprehend the alarm, and their ability to follow the same evacuation route and procedure as an able-bodied person. Disability comes in many forms; we have something of a misconception that all disabled people are wheelchair-bound. So voice alarms are unlikely to be of much use to a deaf person or an individual with severely impaired hearing. Similarly, an evacuation strategy that requires using stairs is completely inaccessible to a person in a wheelchair.

The effect of these considerations is that there is no single solution, and the architect needs to work very closely with the fire engineer and have a very clear understanding of the use and occupancy of the building. The same detailed consideration needs to be given to existing buildings, particularly when they undergo a "material change of use".

STRATEGY DEVELOPMENT.

Prior to the terrorist attack on the World Trade Centre, evacuation from a high-rise building was always considered to be a phased operation, but this tragic event highlighted the need for a more sophisticated evacuation strategy where fire conditions are extreme or where there is an imminent danger of building collapse. Greater sophistication is called for to deliver evacuation strategies that can contend with a range of threats. In fact, the University of Greenwich has recently

undertaken a comprehensive study of the World Trade Centre evacuation – the largest full-scale evacuation of people in modern times – to ascertain what lessons can be learnt by interviewing the survivors.

A co-ordinated approach throughout the building, particularly a high-rise building, is absolutely vital, more so if the building is multi-use or multi-occupancy. A major component in achieving this is the utilisation of the latest fire modelling and evacuation modelling software.

EVACUATION MODELLING.

Put in its simplest form, fire safety for a building's occupants relies on the RSET or Required Safe Egress Time being less than the ASET or Available Safe Egress Time. In other words, to arrive at a solution where there is more time available to evacuate the building than is necessary to complete the evacuation. To determine these times it is essential to construct models of both a building's fire and its evacuation, and to utilise both models in the CFE or Computational Fire Engineering process.

There are a number of evacuation modelling software packages available today, including: Exit 89, an evacuation model designed to handle the evacuation of a large population of individuals from a high-rise building; Simulex, which uses SEAS or Synthetic Environments for Analysis and Simulation; Steps, which predicts pedestrian movement; and Exodus, the preferred system chosen by Kingfell.

Exodus is a modular package that is validated for a wide range of scenarios, with a 15-year track record and a pedigree that was endorsed by its winning The Queen's Anniversary Prize in 2002. It can be applied to a number of different, complex scenarios including tower blocks, large passenger-carrying aircraft, dome structures, ships, stadia and campus structures. Most important, it is regularly updated and supported by the University of Greenwich – where the World Trade Centre evacuation project was undertaken – and can be linked to the CFast and Smartfire fire modelling programmes.

The software package enables the fire engineer to answer several important questions: is there an evacuation problem in the building: where is the problem; how can I understand it; and how can I solve it? The answers to these questions may indicate that changes are needed to the building's design, the fire safety strategy or both, to create a safe design.

There is an even greater number of fire models, with two main types: zone models, or field models that are also known as computational fluid dynamics [CFD] models. While CFD models take longer to set up and run, they are more suitable than zone

models for buildings with complex geometry, and the results are more accurate. For these reasons, Kingfell chose Smartfire from the options currently available on the market.

A key benefit is that Smartfire can be linked directly to the Exodus evacuation modelling software. It is also supported by the University of Greenwich, and has been used and developed over the past ten years. As with the Exodus evacuation package, the Smartfire fire modelling software can be used for a wide variety of building types and applications.

TEAM EFFORT.

Before the catastrophic events in New York on September 11, 2001, perceived wisdom was that evacuation from high-rise and large scale buildings should be phased. Sadly, we now live in a world where the risks are such that this is not always possible. In fact, even if phased evacuation is the most suitable strategy, can we rely on occupants of large structures to "await their turn" while they recall the horrific images of the collapsing World Trade Centre?

There is no doubt that we need to be constantly developing new evacuation strategies. But we also – all of us involved in fire safety – need to be working more closely together and shoulder our responsibilities. Complacency simply must not be tolerated.

Those of us involved in the building design process must think more broadly about the fire safety threats today – and tomorrow – and use the available technology to devise the safest solutions. Those appointed to oversee safety in our buildings must be ever vigilant and conscious of the fact that disaster chooses its own time and place and is no respecter of forgetfulness, lack of attention or lethargy. Management must invest more in training, and not as a grudge expenditure, but as an investment in employees, customers or guests' safety and wellbeing. Finally, each of us must accept personal responsibility to look, listen and learn, because we may well only get one opportunity to get it right.

Author:

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