BRE Global discusses the importance of appropriate fire strategies in airports

The protection and life safety of travelling passengers and airport staff is vitally important should a fire occur. The application of fire engineering principles is essential in order to create an appropriate fire strategy, which will consider a range of factors designed to protect people and prevent disruption to business operations. Adoption of fire safety guidance which is not appropriate for complex buildings such as airports, could lead to an overly onerous fire strategy.

Airports have to comply with local fire regulations. The Building Regulations for England and, in particular, Approved Document B – Fire Safety (ADB) provides guidance on factors such as the incorporation of warning systems and evacuation of people from fires. However, in larger and more complex premises such as airports, fire hazards are likely to be more varied and complicated, requiring specialist professional knowledge and expertise to produce an appropriate fire strategy.

Special assistance and advice should be sought from a professionally qualified fire engineer when preparing a fire strategy. Such a service provided by an independent organisation such as BRE Global, who can provide expert knowledge and guidance and help develop strategies which are easy to manage and cost effective.

A few factors that must be considered:

**Occupancy**

ADB provides guidance on the estimated occupancy density based on floor space factors for a range of different occupancy types. However, this guidance is not suitable for use in airports as it does not necessarily reflect the occupancy which may be expected due to the use of the buildings. For example, in a check-in or arrivals concourse there will be occupants with bags and trolleys which will need to be considered but is not typical for the buildings covered in ADB. The airport will have a safe floor space density which will allow the effective operation of the area, however it is also important to consider the effect of disruptive events, such as, in the event of severe weather or an airfield emergency, which can cause the floor space factor to vary. Therefore, a bespoke floor space density will need to be considered.
Airports’ operations require a number of management features which can be utilised as part of an effective fire strategy. Airports incorporate flow team managers whose role is to manage the occupants if numbers reach uncomfortable levels, such as in a disruptive event. Flow teams generally work with a central monitoring centre which can identify areas of crowding via CCTV anywhere in the airport.

Managing and directing people in the event of an evacuation is also important. Fire response teams are provided, for example, to investigate and manage fluctuations in occupancy numbers when large numbers of people are intent on reaching their next destination on staying put to await their flight and ignoring the alarms and/or directions. A fire engineer can utilise these emergency management teams, and other, existing management systems to optimise the fire strategy for the building.

**Business**

Maintaining the business operations in an airport is an important objective in an airport fire strategy. Airports operate as part of a series of functional areas each of which forms an important link in the operation of the airport.

In departing from an airport, passengers will use a number of different areas including check-in, security, departure lounge etc. A fire in any one of these areas can disrupt the operation of the airport and lead to delays for departing passengers.

Behind the scenes, the baggage handling facilities fulfil one of the most critical roles in the operation of airport. The facility is relied upon to screen and process arriving and departing passengers’ luggage and therefore any down-time will have a serious impact on the business operations.

Fire engineers can utilise a number of approaches to help maintain the business continuity of the airport. For example, high risk areas, such as tenant accommodation, storage or kitchen areas are typically separated from the main functional areas of the airport using compartmentation with specified fire resistance. This is designed to separate and contain the fire hazard within a specific area, protecting the remainder of the building for a period of time.

Unwanted false fire alarms can cause significant disruption to the operation of the airport. Double knock alarm systems can help reduce the disruption caused by false alarms as they allow an investigation time for a fire alarm response team to check and confirm the occurrence of fire.
Commercial enterprises in airports provide an important source of revenue. Pressures to provide retail units can lead to the addition of new retail units in existing areas. Where this occurs it is important to understand how this affects the fire strategy.

Building flexibility into the fire strategy at the design stage is useful for airports, for example, accounting for a range of design fires, including kiosks and shop units to account for possible future changes of use.

Human response and evacuation

The role of human behaviour, including the focus of a passenger to complete their journey, should be considered in any fire strategy.

Airports operate a series of interlinked areas, occupants will often be focussed on reaching their next location in the airport process, for example an arriving passenger will progress to clear immigration and then proceed to collect their baggage. If the baggage reclaim compartment is on fire, then clearly movement into this compartment is a hazard and the evacuation route will require managing.

A fire engineer may recommend a zonal evacuation strategy incorporating secret signage which illuminates to instruct “do not enter” and this is coupled with a staff response.

Evacuating passengers outside of the building can also cause significant disruption and also potentially additional risks. BRE Global have developed airport evacuation strategies which are based on zonal evacuation, enabling passengers in the fire affected zone to move beyond lines of compartmentation to places of relative safety. This allows passengers to remain in the building in safety and comfort and avoid the risks associated with evacuation outside, for example across the aircraft apron.

BRE Global has supported this evacuation approach in the refurbishment of a pier at a major UK airport. Piers are often areas large areas of minimal fire loading but which may potentially accommodate large numbers of people in gaterooms, and along arrival corridors. Through fire engineering analysis, BRE Global developed a strategy which was based on dividing the pier horizontally into separate zones to enable occupants in a fire affected zone to move to the safety of an adjacent zone. This avoided the need for simultaneous evacuation of the entire pier to the outside, during the initial stage of an evacuation. Based on a review of a likely worst case design fire, BRE Global demonstrated that the zones could be created by smoke barriers, avoiding a reliance on standard fire rated division of the
building. This was a much less intrusive design solution and avoided unnecessary capital cost during the building refurbishment.

Looking to the future, airports will continue to be crucial to the economic prosperity of cities, regions and countries. As airports continue to become larger, more complex and ever more intensively operated, fire engineering will play an increasingly important role in ensuring that they continue to transport millions of people safely and efficiently and address the important considerations associated with business continuity during and after a fire.