SOLUTIONS FOR EFFECTIVE FIRE DETECTION IN LARGE OPEN SPACES- PART 2

The key for effective control of fires in Large Open Spaces (LOS) is to detect and manage them at the earliest possible stage.

Systems that deliver very early warning fire detection and/or systems that detect smoke close to potential fire sources are best suited to detect diluted and/or stratified smoke in a LOS environment:LOS3
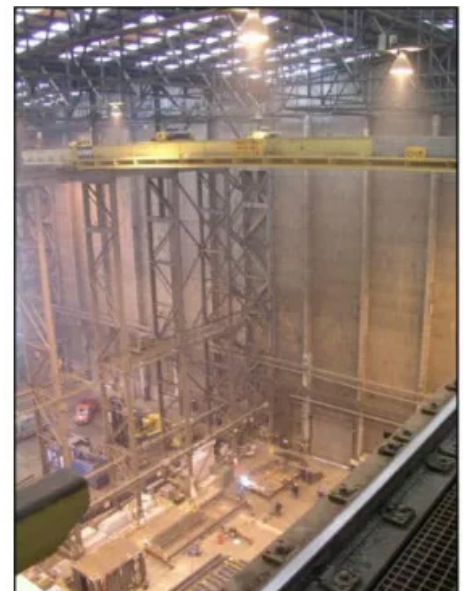
Aspirated smoke detectors with very sensitive alarm settings and cumulative sampling capabilities (i.e. smoke integration from all sampling holes), can detect smoke reaching high ceiling levels from relatively small fires in the space below.

A research project conducted by the British Research Establishment (BRE) published in two parts (Part 1 and Part 2) successfully demonstrated this capability and the findings have influenced changes in the FIA (Fire Industry Association) Code of Practice for Aspirating Smoke Detectors, and the UK installation code (BS 5839-1). A useful Fact File summarizing the BRE research can be downloaded here (Fact File 45).
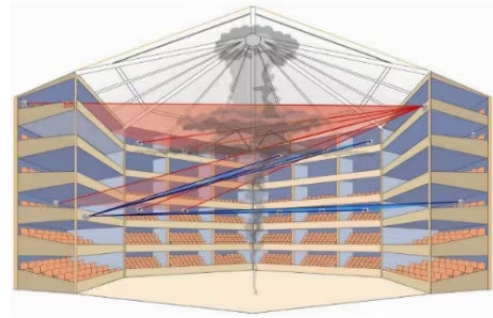

The Xtralis VESDA Aspirating Smoke Detectors (ASD) provide cost-effective protection of high ceiling spaces due to their sensitive response and inherent cumulative effeLOS4ct making them particularly responsive to dispersed smoke

The same BRE research project demonstrated that optical beam smoke detectors configured with enhanced sensitivity are also effective at the ceiling and that horizontal deployment of beam detectors at intermediate heights with dense spacing, will respond to rising and stratified smoke (albeit cost prohibitive)

More recently, CFD modelling findings from a FIA-sponsored research into stratified smoke identified that 3-D detection by strategically deployed angled

optical beam smoke detectors can provide effective and cost efficient multi-level detection of stratified smoke where ceiling mounted systems would fail to detect. Read the "Predicting the effectiveness of various detection strategies protecting spaces where smoke may not reach the ceiling," SUPDET conference paper.

The Xtralis Open-area Smoke Imaging Detector (OSID) in multi-emitter deployment can provide reliable and cost-effective volumetric (3-D) coverage in high ceiling spaces.

In cases where the complexity of LOS is unsuitable for prescriptive solutions (high / complex ceilings), or there is a requirement to reduce cost, or provide greater asset protection, a performance-based design (PBD) solution must be incorporated in the fire safety design. A PBD solution based on the identified hazards and risks will apply rigorous engineering analysis of the effects of the enclosed space and the prevalent environmental / operational factors to the development of a fire and behavior of the smoke plume.

The Xtralis Application Engineering Group (AEG), can assist with the design and assessment of smoke detection solutions in LOS with CFD modelling of smoke plume development, smoke layer temperature/depth time dependency, smoke stratification, etc.

PROJECT EXAMPLES

Fashion Retailer Mango – Barcelona, Spain

Mango, a major international fashion brand of women's and men's clothing built a new logistics centre incorporating the latest technological logistics tools and robotics. The state-of-the-art logistics centre occupies an area of 395,000m2 with 46m high ceilings that provided a challenge for reliable smoke detection.
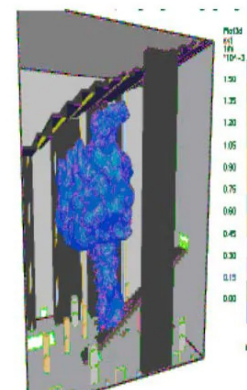

Mango selected VESDA-E aspirated smoke detectors for greater sensitivity and reliability for providing the best protection of valuable assets against fire threats and ensuring business continuity. The VESDA-E detectors with long pipe networks protect wide areas with high ceilings while allowing the mounting of detectors at a convenient location for easy commissioning and maintenance."

"The ultra-sensitivity of VESDA-E combined with very long pipe runs to provide wide areas of protection is the right choice for the Mango logistics centre", commented Oscar Arias, Construction Managing Director, Mango. Click Here to read the Mango Customer Success Story in details.

Langham Place Complex, Hong Kong

A performance-based design analysis was used for a 60m high atrium space at the Langham Place commercial complex in Hong Kong to identify the appropriate solution for effective management of smoke and timely evacuation of occupants during a fire event.

CFD modelling performed by Xtralis, investigated the detection performance of VESDA detection points deployed at various locations at ceiling level for different scenarios relating to fire sizes, airflow conditions and thermal stratification gradients.The modelling results proved the VESDA system was able to provide early warning detection

with sufficient notification that enabled effective control of the smoke layer to maintain the egress paths "smoke free" during evacuation.

The modelled VESDA performance was successfully validated through in-situ hot smoke tests witnessed by local fire consultants and fire brigade. Read "Use FDS to Assess Effectiveness of Air Sampling-Type Detector for Large Open Spaces Protection,"

Chicken by-products Biomass Plant – Attleborough, Norfolk, U.K.

Providing reliable smoke detection for the 80m long x 25m wide, Banham poultry biomass plant was a challenge for traditional infrared optical beam detectors due to false alarms from building movement and excessive build-up of contamination.

Following local fire safety distributor recommendations, a OSID beam detector system was installed to provide three-dimensional area coverage using seven emitters placed at different heights within the field of view of a single imager. The OSID detector with dual wavelength (infrared / ultraviolet) detection created a reliable solution and less susceptible to false alarms caused by airborne dust, contamination, fogging, steam, reflections, sunlight, birds, insects and forklifts.

"OSID has been installed in our customer's biomass plant for over a year now and we're delighted that we never have to worry about when the next false alarm or fault will occur" explains Kevin Sparkes, fire distributor manager. Click here to read the Banham Customer Success Story in details.

Luxury Movie Theatres – Mexico City, Mexic

The maintenance personnel for the Mexico-based Cineplex chain movie theatres with presence in Latin America and the US were continually confronted with the difficult task of maintaining spot detectors in theatres as well as dealing with false alarms from high humidity levels. Due to these challenges, the customer opted for an alternative detection system that could provide reliable detection and easy accessibility for maintenance.

 The OSID beam detector was selected because of ease of installation, maintenance and superior detection and allowing technicians easy access to the OSID imager and emitters to inspect, clean and review performance without disruption in the theatre.

"OSID was selected to protect our movie theatre locations based on their proven track record and long history of protection in large, open spaces. We anticipate expanding the use of OSID in our future branches" explains the Cineplex security manager. Click here to read about this Customer Success Story in details.

To find out more about the Challenge for Effective Fire Detection in Large Open Spaces, please proceed to the blog part 1- Challenges for Effective Fire Detection in Large Open Spaces.

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