

## LARGE OPEN SPACES



VERY EARLY WARNING  
SMOKE DETECTION  
PROTECTS THE OCCUPANTS,  
SERVICE AND REVENUE  
ASSOCIATED WITH:

- AIRCRAFT HANGARS
- AIRPORT TERMINALS
- CATHEDRALS
- CHURCHES
- EXHIBITION & CONVENTION CENTERS
- HOTEL ATRIUMS
- LARGE WAREHOUSES
- OFFICE TOWER ATRIUMS
- RAILWAY STATIONS
- SHOPPING CENTERS
- STADIUMS
- SUPERSTORES

# LARGE OPEN SPACES AND THE CHALLENGE OF PROTECTING THEM FROM THE THREAT OF FIRE

## CONSIDER...

A fire starts because of an electrical fault on the second level of a three storey shopping center. The smoke spreads to the atrium section of the shopping center, but the smoke doesn't have sufficient energy to rise up to point-type detectors located on the ceiling of the atrium. The fire is not detected.

Smoke continues spreading on the second level of the shopping center, until it is noticed by shoppers who panic and run to the escalators. Meanwhile, a maintenance person stumbles across the source of the fire and in an attempt to prevent the fire spreading, he shuts off the power mains. The lighting in the shopping center goes out, and the occupants are left to fend for themselves in the darkness; smoke is building up and the sense of panic heightens.

## CONVENTIONAL DETECTORS ARE NOT SUITABLE FOR LARGE OPEN SPACES

Conventional point-type and beam-type detectors are not sensitive enough to provide early warning of smoke in a large open space. By the time smoke is detected a fire would have to be very large, creating sufficient heat and smoke to rise up to conventional point-type detectors located on the ceiling.

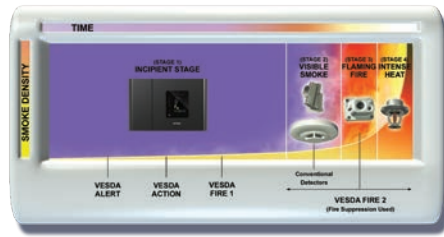


Figure 1 - Fire Growth Curve  
The incipient stage (Stage 1) of fire provides the widest window of opportunity to detect and control the spread of fire. VESDA smoke detectors can be configured to multiple alarm levels during the incipient stage of fire.

*With VESDA - smoke is detected early, information is available to assess the situation, and a plan is in place to respond accordingly. Lives are saved, assets are protected, and business continues as normal.*

## THE VESDA ADVANTAGE

VESDA - the world's leading air sampling smoke detection system - provides the earliest warning of a potential fire event (refer to Figure 1).

A VESDA system is highly sensitive, and excels at detecting diluted smoke. A safe and orderly evacuation is assured with the extra time that a VESDA smoke detection system provides.

## WHAT ARE THE CHALLENGES ASSOCIATED WITH DESIGNING A SMOKE DETECTION SYSTEM FOR LARGE OPEN SPACES?

### Dealing With Smoke Stratification

Smoke stratification occurs when solar radiation creates a hot layer of air under the ceiling of an enclosed area. When the hot layer of air is warmer than the smoke plume, it will prevent the smoke reaching ceiling-mounted point-type detectors.

A VESDA system is comprised of a detector and a series of sampling pipes. This enables the designer to place the pipe network where the smoke will travel, in addition to the ceiling, as may be required by codes and standards.

### Overcoming The Effects of Smoke Dilution

Smoke in a large open area will be highly diluted as it moves through a large volume of space, an effect which is compounded by air conditioning systems. Selecting a smoke detector with high sensitivity and multiple sampling points is essential in this environment. Beam detectors are often used for this application, but they are relatively insensitive - a fire would be quite large before being detected. A point-type detector measures smoke at a single point in space. If there is not enough smoke pooled at that point, the detector will not alarm.

VESDA detectors sample smoke through holes (sampling points) in the pipe network. Each sampling point contributes to the smoke being measured at the detector, enabling much earlier fire detection.





### Maintaining a Smoke Detection System High Above Ground Level

All detection systems require periodical maintenance and testing, as per local standards. Accessing conventional point-type detectors for maintenance within large facilities with tall ceilings is difficult. Service crews often require costly machinery and platforms to enable safe access to the detectors.

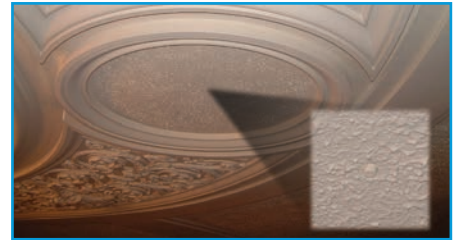
VESDA detectors can be mounted in accessible locations, enabling easy access to the detector and pipe network.

### Preventing Nuisance Alarms

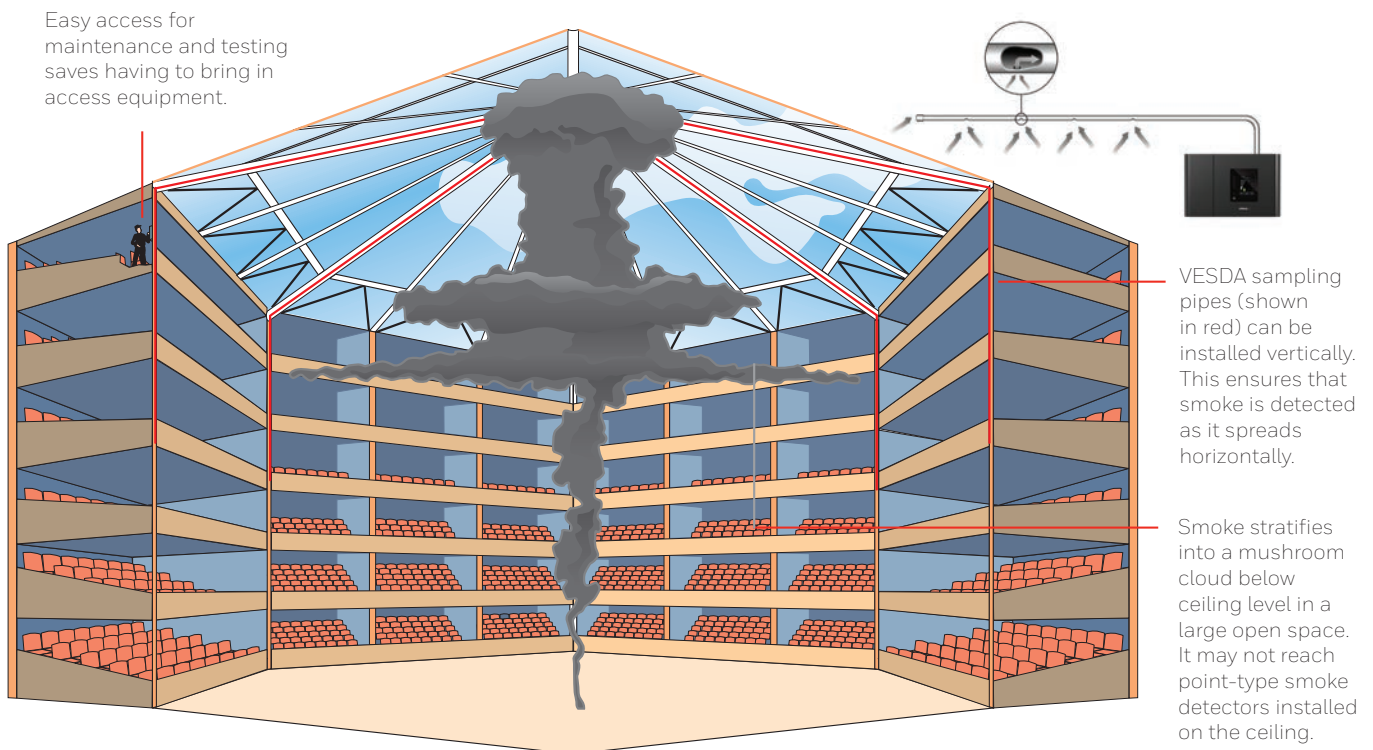
Beam-type smoke detectors are often prescribed for atriums and large open spaces. Unfortunately, seasonal banners and decorations can impede the beam, causing false alarms or faults. A VESDA smoke detection system is not susceptible to such false alarms. VESDA smoke detectors have multiple alarm levels and thresholds, enabling them to be used in conjunction with various planned response options. For example, the first alarm could be used as a low level alarm, instructing a security guard to investigate the event. The second alarm could alert management that the risk has escalated. In the unlikely event that the situation could not be controlled, the third alarm could initiate an evacuation and alert the fire department.

### Preserving Architectural Features

Traditional spot type smoke detectors can detract from the architectural beauty of a building. Using a concealed pipe network to supply air samples to a hidden VESDA smoke detector means that the smoke detection system can be virtually invisible within the building.



Close-up of a VESDA sampling hole in an intricate theater ceiling



# XTRALIS' GLOBAL NETWORK OF OFFICES AND REPRESENTATIVES MEANS THAT HELP IS SOON AT HAND



## EXAMPLES OF LARGE, OPEN SPACES THAT ARE PROTECTED BY VESDA SMOKE DETECTORS:

### Sports Venues

- Sydney Aquatic Center, Australia
- Olympic Velodrome, Sydney, Australia
- Melbourne Sports & Aquatic Center, Australia
- Xscape Indoor Skiing Center, UK

### Hotel & Entertainment Venues

- Jupiters Casino, Gold Coast, Australia
- Sydney Opera House, Australia
- Museum of Scotland, UK

### Transport Hubs

- ShangHai South Railway Station
- Hong Kong Airport Terminal Building
- Hong Kong Airport Freight Terminal

### Heritage

- St. Pauls Cathedral, UK
- Newcastle Cathedral, UK
- Stormant Castle, Ireland

### Convention Centers

- D. H. Lawrence Convention Center, Pittsburgh, USA
- Hong Kong Exhibition Center, Hong Kong
- Kunming International Convention Center, China
- Gaylord Opryland Resort & Convention Center, TX, USA
- Hyderabad International Convention Center, India

### Shopping Centers

- Bluewater Shopping Center, UK
- The Trafford Shopping Center, UK
- Braehead Shopping Center, UK

### Office Buildings

- Langham Place, Hong Kong
- Motorola, Austin, Texas, USA
- AstraZenica, Manchester, UK

## GLOBAL APPROVALS



## NEED MORE INFORMATION?

Visit [www.xtralis.com](http://www.xtralis.com) to access information about the VESDA smoke detector product range and our Design Guides.

## ABOUT XTRALIS



Xtralis is a leading global provider of powerful solutions for the very early & reliable detection of smoke, fire, and gas threats. Our technologies prevent disasters by giving users time to respond before life, critical infrastructure or business continuity is compromised.

We protect highly-valued and irreplaceable assets and infrastructure belonging to the world's top governments and businesses.

**To learn more, please visit us at [www.xtralis.com](http://www.xtralis.com)**