Application of Aspirating Smoke Detection Technologies in IT/Communication Infrastructure

Rory Manley
Regional Sales Manager, Xtralis
Xtralis

- Core competency
- Industry leader
- Proven track record
- Technology innovator

The World’s Number 1 Brand of Aspirating Smoke Detector

VESDA® by Xtralis™
Fire Detection
Gas Detection & Environmental Monitoring
Traffic Detection
Intrusion Detection
Video Transmission, Recording & Analysis
Access Control
Fire Risks

Common instigators...

- Electrical
- Mechanical
- Administrative
Fire Protection Strategy

What’s driving requirements…

- Codes and standards
- Economic loss
- Regulatory impact (e.g. maintain network reliability)
- Brand Image
- Life and welfare of public relying on function of network
- Building occupants or exposed property
- Military and government installations relying on function of network
Fire Detection Goals

Ensure uptime...

- Detect
- Control
- Mitigate
Challenging Environment

*With many variables...*

- Obstructions
- Configuration
- Temperature
- Airflow patterns
- Air velocity
- Air circulation
- Dilution
Leaving to question detection…

- Suitability
- Placement
- Spacing
Conditions

For smoke detection systems to detect products of combustion, the products must travel from the source to a sensor or port and arrive there in sufficient density to be detectable.
Detection within exhaust/return air distribution path, at a point prior to dilution provides best opportunity to detect incipient stage of fire development.
Air Sampling Smoke Detectors

Suitable performer...

- Sensitive
- Capable
- Flexible
- Intelligent
- Simple
- Secure
Air Sampling Smoke Detectors

Detector performance...

- Measurement certainty
- Operational stability
- System integrity
Air Sampling Smoke Detectors

Sensitive by design...
Air Sampling Smoke Detectors

Staged response...
Air Sampling Smoke Detectors

Flexible by design...
Air Sampling Smoke Detectors

Accessible by design...
Air Sampling Smoke Detectors

Affordable by design…

- Less hardware to install
- Reduces equipment cost
- Reduces labor cost
  - Improves TCO
  - Green solution
Air Sampling Smoke Detectors

**Affordable by design…**

- Less hardware to maintain
- Accessible
- Significantly reduces cost
- Mitigates risk
Implementation

*Design Conditions & Factors...*

- Requirements
- Environment
- Coverage area
- Performance category
- Coverage techniques
- Zoning requirements
- Product selection
- Integration
Requirements...

- Local codes & standards
- End user practices
- Facility requirements
Design Conditions & Factors

Environment...

- Environmental Conditions
- Structural Characteristics
- External Influences
- Accessibility
Design Conditions & Factors

Coverage area...
Smoke detection performance categories...

1. Standard Fire Detection (SFD)
2. Early Warning Fire Detection (EWFD)
3. Very Early Warning Fire Detection (VEWFD)
<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SFD</th>
<th>EWFD</th>
<th>VEWFD</th>
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</thead>
<tbody>
<tr>
<td>Sensitivity(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Alarm(^2)</td>
<td>Optional</td>
<td>Optional</td>
<td>0.2% obs/ft.</td>
</tr>
<tr>
<td>Alarm</td>
<td>2.5% obs/ft.</td>
<td>1.5% obs/ft.</td>
<td>1.0% obs/ft.</td>
</tr>
<tr>
<td>Coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Area</td>
<td>900 sq. ft.</td>
<td>400 sq. ft.</td>
<td>200 sq. ft.</td>
</tr>
<tr>
<td>Air Distribution Paths</td>
<td>Duct Detection</td>
<td>Duct Detection</td>
<td>Every 4 sq. ft. grille area</td>
</tr>
<tr>
<td>Transport Time (ASSD)</td>
<td>120 sec.</td>
<td>90 sec.</td>
<td>60 sec.</td>
</tr>
</tbody>
</table>

\(^1\) Sensitivity at each port/sensor  \(^2\) ASSD provides pre-alarm capabilities across all sensitivity categories
Design Conditions & Factors

Coverage techniques...

Air sampling pipe distribution networks are designed and installed to monitor the total room for smoke concentration, not simply an area within a larger space.

<table>
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<th>Area coverage</th>
<th>Air distribution paths</th>
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<td>Ceiling</td>
<td>Return Air grilles</td>
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<td>High/Low</td>
<td>Transfer grilles</td>
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<td>Beam pockets</td>
<td>Ducts</td>
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<td>Drop ceiling</td>
<td>Economizers</td>
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<td>Ceiling / Floor voids</td>
<td>Ceiling &amp; floor voids (plenum spaces)</td>
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<tr>
<td></td>
<td>Containment structures</td>
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</tbody>
</table>
Coverage Technique Details

Area Coverage (Ceiling)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement**: Sample points 1-4” below ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport**: In accordance with performance classification
- **Benchmark Test point**: 5ft AFF

Fig. 1: Grid Layout Example
Coverage Technique Details

Area Coverage (High / Low)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe. Use of stanchions.
- **Placement**: Alternate sample points above/below cable trays or other horizontal obstructions orientating points downward towards floor
- **Spacing**: In accordance with performance classification alternating between high/low sampling holes
- **Sensitivity / Transport**: In accordance with performance classification
- **Benchmark Test point**: 5ft AFF
**Coverage Technique Details**

**Area Coverage (Beam Pocket)**

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe. Use of stanchions.
- **Placement**: Sample points in accordance with NFPA 72 oriented downward
- **Spacing / Sensitivity / Transport**: In accordance with performance classification
- **Benchmark Test point**: 5ft AFF

![Fig. 1: Inter-Beam Sampling](image1)
![Fig. 2: Underside-Beam Sampling](image2)
Coverage Technique Details

Area Coverage (Drop Ceiling)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings installed above drop ceiling with remote sample points mounted to the underside of the drop ceiling. Use of flexible “capillary” tubing to interconnect port to pipe
- **Placement**: Sample points 1-4” below drop ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport**: In accordance with performance classification
- **Benchmark Test point**: 5ft AFF
Coverage Technique Details

**Area Coverage (Drop Ceiling)**

**Design Efficiencies**
- Reduces rigid pipe installation
- Improves transport times
- Maximizes detector capacity
- Reduces hardware
- Reduces cost
Coverage Technique Details

Area Coverage (Ceiling/Floor Void)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement**: Sample points 1-4” below ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport**: In accordance with performance classification
- **Benchmark Test point**: 5ft AFF
AHU (Return/Supply/Exhaust Grille)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement**: Sample points positioned at face of grilles oriented 30-45° towards incoming flow, no ports outside of grille area
- **Spacing / Sensitivity / Transport**: Every 4 sq. ft. of grille area, 1% obs/ft, 60 seconds
AHU (Outside Air Intake)

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement**: Sample points positioned at face of grilles oriented 30-45° towards incoming flow, no ports outside of grille area
- **Spacing / Sensitivity / Transport**: Every 4 sq. ft. of grille area, 1% obs/ft, 60 seconds
Coverage Technique Details

AHU (Outside Air Intake) application example
**AHU (In-Duct)**

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect duct. Must be dedicated to duct being monitored.

- **Construction:** Rigid pipe, sample points drilled directly into pipe. Exhaust returned directly to duct being sampled.

- **Placement:** Sample points positioned across width of duct oriented 30-45° towards incoming flow, no ports outside of duct.

- **Spacing / Sensitivity / Transport:** Spacing based on duct size (w x h) following MFG’s guidelines, 1% obs/ft, 60 seconds transport.

- **Benchmark Test point:** 5ft AFF
Coverage Technique Details

**Containment structures**

- **Equipment**: ASSD appropriately sized to adequately and efficiently protect area
- **Construction**: Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement**: Sample points positioned within air exhaust path oriented 30-45° towards incoming flow
- **Spacing**: Depends on configuration
  - Open collar: min. 6’ on center
  - Chimney: one port per chimney
- **Sensitivity / Transport**: 1% obs/ft, 60 seconds transport
- **Addressability**: Individual aisle
- **Benchmark Test point**: 5ft AFF
Coverage Technique Details

Containment structures

Contained Hot Aisle (Open Collar)…

- CRAH
- Equipment Rack
- Ceiling Return Plenum
- Equipment Rack
Coverage Technique Details

Containment structures

**Contained Hot Aisle (Server Rack Chimneys)**...

- **Ceiling Return Plenum**
- **CRAH**
- **Equipment Rack**
- **Equipment Rack**
Coverage Technique Details

Containment structures

Contained Hot Aisle (Overhead Coolers)…

- HVAC
- Equipment Rack
- Equipment Rack
Containment structures

**Contained Hot Aisle (In-Row Coolers)**...
Spacing is too far apart may miss smoke!
For very early warning within containment structures, consider port spacing at a minimum every 1.2m (6 ft) on center.
Zoning Requirements

Consider…

- Suppression zones
- Locating source
- Product selection
- Cross zoning
Suppression Cross Zoning

Strategic use of sectors...

Sector 1

Sector 2

Sector 3

Sector 4

VESDA VLS (ZN-01) + VESDA VLS (ZN-02)
Single-Zone ASD

VESDA VLP (one per every four hot aisles)
Single-Zone ASD

Zone 1

Zone 2

Zone 3

Zone 4

4 x VESDA VLF or VLC (one per hot aisle)
Multi-Zone ASD

Zone 1
Zone 2
Zone 3
Zone 4

VESDA LaserSCANNER (one per every four hot aisles)
Product Selection

Detector Selection/Value Engineering Strategies

- Coverage capacity
- Addressability
- Integration
Designing & Specifying ASD Systems

Elements of success…

- Commissioning
- Requirements
- Qualifications
- Coverage
- Products
- Review
- Programming
In Closing

- First line of defense
- Dynamic detection challenges
- Aspirating Smoke Detection advantage
- Holistic design approach
- Integration for effectiveness & efficiency
- Specifications improve field experience
- Experience matters
Tools & Resources

- Visit www.Xtralis.com (login as partner)
  - Application Guides
  - Design Guides
  - Datasheets
  - Presentations
  - Whitepapers
  - and much more....

- Xtralis ASD Specification Template
  - Streamline your next project
  - Avoid common errors
  - Achieve efficient and effective results
Xtralis Unsurpassed Dedicated Support

- 30+ Years of innovation and application know how
- Dedicated Client Account Manager
- Specification consultation
- Dedicated 24/7 tech support
- Field Application Engineers at your fingertip
- Customized training in conjunction with distributor
- Design, application & commissioning assistance
Thank You

Q & A