VIKING®
Integrated Safety

Intelligent Video Flame Detection for Aircraft Hangars

The Importance of Fire Detection in Aircraft Hangars

Aircraft hangars are themselves valuable — a high-spec hangar alone could cost $3M (USD)to construct. That cost pales in comparison to the value of the items inside. A civilian aircraft like the Boeing 777-9 is priced at $442M, while the cost of a single US military aircraft can reach $1B.

Clearly then, the importance of securing a hangar against fire related accidents that could damage its contents is paramount. That's easier said than done. Aircraft hangars are also hotbeds for fire hazards. The presence of jet fuel and other hydrocarbons, refueling, and moving aircraft all pose dangerous risks.

Severe damage to an aircraft from a large fire can occur within under a minute, but expansion foam can take longer than two minutes to sufficiently fill the hangar and suffocate fire at the top of a small aircraft. That's why it is critical to accurately identify a fire as soon as they start.

Optical Flame Detectors in Hangars

Optical flame detectors are well suited to aircraft hangars' unique conditions and are therefore widely used. Detectors of this kind have wide fields of vision, allowing them to detect flames from a distance of over 40m.

That's ideal when you consider hangars' high ceilings, where identifying a fire on the ground from a long distance could otherwise be difficult. High ceilings also pose a risk of thermal stratification, which can often thwart heat detectors' ability to identify fires.

An additional benefit of optical flame detectors is their capacity to recognize fires faster than smoke or heat detectors: usually within 10 seconds of a small fire breaking out.

While they have many benefits, traditional optical flame detectors like multi-spectrum infrared detectors have certain key flaws, mainly related to false alarms.

The Issue of False Alarms

The risks associated with traditional optical flame detectors demonstrate the need for a more effective detection system with a lower risk of activation caused by false alarms:

- **CO_2**

Traditional optical flame detectors like MSIRs and IR3s identify flames by responding to the presence of hot CO_2 in the air.

But in an aircraft hangar environment, where jet engines and motors are in frequent use, this is hardly an ideal detection method.

- **Sunlight Desensitization**

While sunlight won't generally trigger false alarms in optical flame detectors, it might impair them, as they can become desensitized when exposed to too much sunlight.

That's a big problem in hangars, whose wide doors are often kept open during the day to facilitate the moving and maintenance of aircraft.

- **Blackbody Radiation from Planes/Engines**

Optical flame detectors may trigger false alarms due to blackbody radiation from aircraft or service vehicles.

Intelligent Video Flame Detectors (IVFD)

IVFDs are an excellent alternative to traditional optical detectors. While false alarms are still possible when IVFDs are in place, the risk is significantly lower.

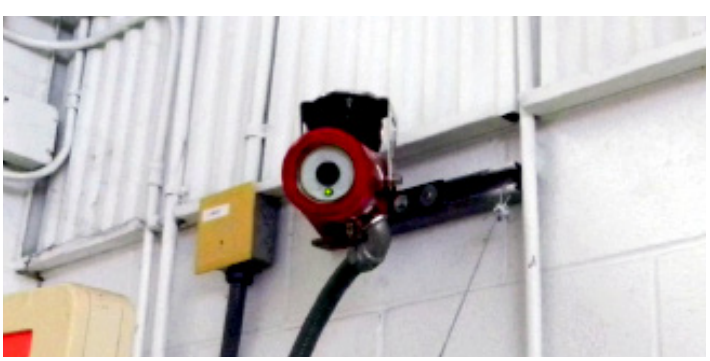
IVFDs use a camera and onboard mechanism to spatially analyze video for fire. Remote viewing options allow operative personnel to visually confirm a fire in the event of an alarm warning or activation of an automatic suppression system, meaning they can quickly react and, if necessary, override the response.

IVFDs cannot identify CO_2 emissions, so an alarm won't be triggered because of exhaust fumes from jet engines or diesel generators during routine activities including aircraft maintenance. This fact alone makes a good case for the adoption of IVFDs in aircraft hangars, as they are better suited to the context.

Recording Incidents with IVFDs

Viking VSF301 IVFD has the ability to record alarm-triggering events. This is a valuable asset when identifying the causes of genuine fires or false alarms.

In the event of a real fire, investigation into its origins can take place, avoiding the issue of so-called "black-hole" fires, where hangars are damaged to the extent that no evidence explaining the cause of a fire survives. In the event of a false alarm, the video footage can be reviewed to determine the reason. From the information gathered, lessons can be learned and new processes put in place to prevent similar false alarms from reoccurring.



Viking VSF301 **Intelligent Video Flame Detector**

The Viking VSF301 is an explosion-proof video flame detector. It processes live video images to detect the characteristic properties of flames visually, by means of its FM- and SIL 2-certified flame detection algorithms and onboard digital signal processing (DSP). The detector provides live video images for situational awareness and has a Micro-SD memory card slot to record images for forensic analysis.

The benefits of installing a Viking VSF301 Detector:

- Live color video image of the aircraft hangar
- Not affected by black body radiation (radiated from the aircraft body)
- Not affected by welding/grinding
- Not affected by differing light levels
- Less affected by dirt/grime/oily deposits on the lens
- High temperature rating +185° F (85° C)
- Pre- and post-alarm video recording of the event onto an on-board micro-SD card

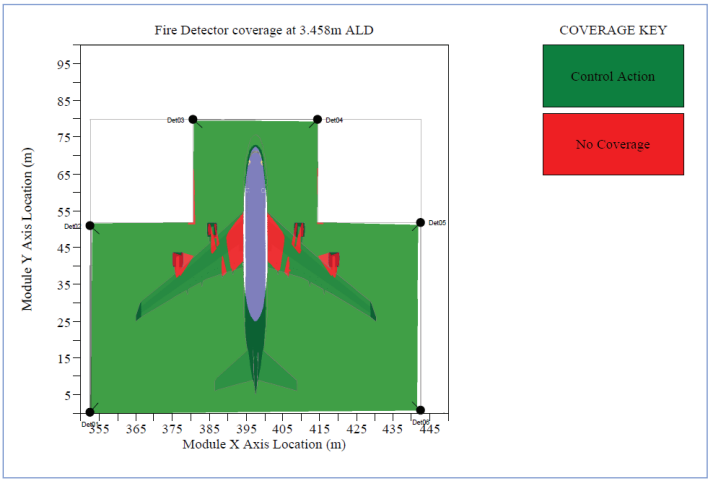
Intelligent Video Flame Detectors with 3D Mapping

The benefits of IVFDs can be taken even further when combined with 3D mapping. Using widely available hazard mapping technology like MICROPAK HazMap3D software, users can assign a risk grade to every area of the aircraft hangar. A graded area is typically one to five metres in size. Grading an area's hazard risk helps users to explain the likelihood of a fire or the potential impacts of a nearby fire in each area. The risk level can be graded by area use, checking for factors like aircraft presence, liquid hydrocarbon presence, refuelling, maintenance, and moving aircraft.

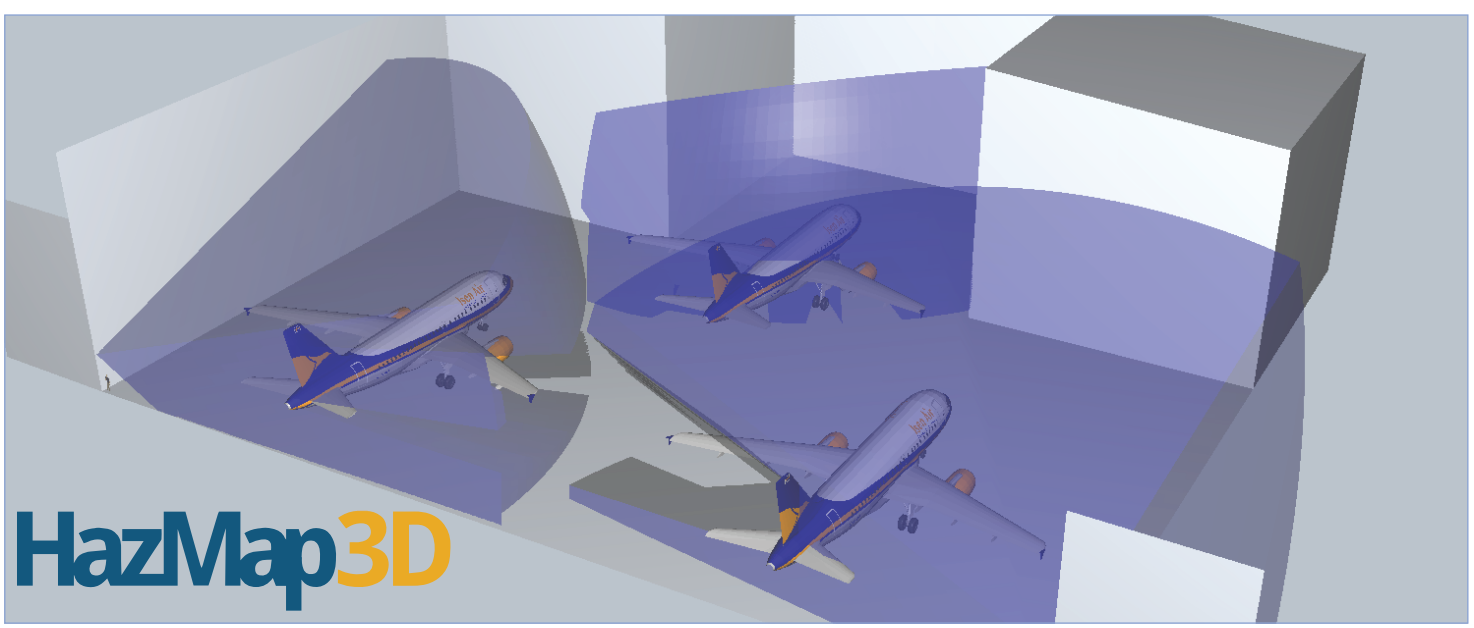
When grading is complete, IVFDs can be positioned for optimal coverage. This allows users to understand when it is necessary to change detector positions, run new assessments, and immediately gauge the impact in coverage.

Given their breadth of coverage, fewer detectors are needed, resulting in lower up-front maintenance costs compared with other forms of optical flame and heat detectors.

IVFDs with 3D mapping allow for enhanced flame detection at longer ranges and with fewer false alarms than optical flame detectors like multi-spectrum infrared (MSIR) detectors.



To ensure compliance with standards such as NFPA 409, a performance-based design approach must be followed with the correct detection system used for the hazards present. The detection system must be coupled with a robust fire protection system capable of rapid response to ensure the aircraft are protected. The performance-based design of the detection system should be centred around a robust flame detection mapping study. This should be performed using an approved Fire & Gas mapping system (i.e. HazMap3D) by either a Fire & Gas



practitioner or professional fire protection engineer. Viking provides expert design and support services to facilitate this process.

Viking Global Engineering Support Services Center (GESSC)

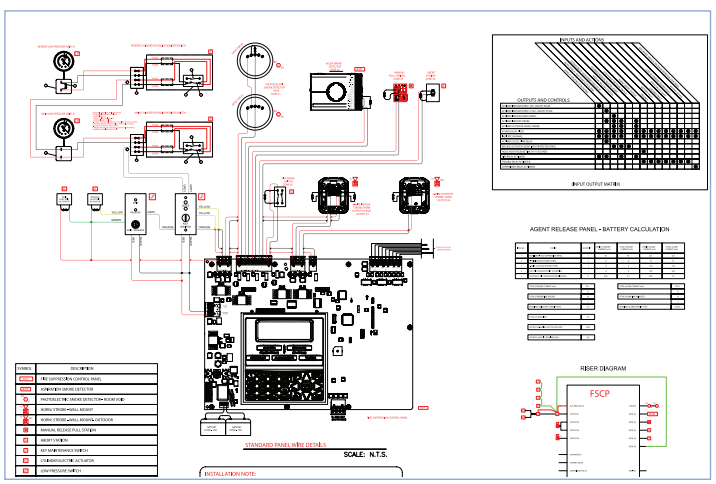
The Viking GESSC provides expert support and resources to help with the design, installation, and maintenance of fire protection systems from start to finish. We work with various engineering design tools including CAD, 3D modeling software, and our own calculation software to create design packages that meet code-compliance, budget, application, and bandwidth requirements. Our team provides timely, accurate, and complete solutions for your project needs.

GESSC assists consultants, architects, engineers, contractors, and building owners with system design. Working with our local partners, we provide training processes, and support installation, commission, service, and maintenance operations.

We have extensive, hands-on experience with a focus on life cycle optimization, simplified facility operation, maintenance, and efficiency. Our focus on multi-trade coordination, improved accuracy, clear documentation, reduced waste, and early decision-making sets our services apart. Additionally, we are able to support projects in multiple languages and regions. Choose from supported product lines or custom-order desired products to fit your needs.

Buying VIS Solutions

All VIS solutions are sold through Viking SupplyNet. Established in 1988, Viking SupplyNet distributes the largest selection of integrated detection, alarm, and suppression systems to customers in over 70 countries. Viking SupplyNet's state-of-the-art inventory system links all locations worldwide to ensure that every solution is available for timely delivery — to any job site, anywhere in the world. See **VikingGroupInc.com/locations.**



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