# Clarity achieved

Video image fire detection has had its skeptics: initial challenges with the technology in conjunction with ambitious claims for use and less-than-optimal installations got the systems off to a rough start. But a well-thought-out plan and implementation strategy makes this technology a viable option for numerous applications, writes Rick Jeffress, Fike.

Top: the targeted detection means that the system alarms when smoke enters the blue alarm zones or when flame enters anywhere except in the red zones (where welding and burning occur). Below left: the system alarms when smoke enters the blue zone or when flame occurs in the red zone. Below right: the system alarms when smoke enters the blue zone or when flame occurs in the red zone.

In the early days of video image fire detection, manufacturers new to the technology and installers with limited application experience caused numerous cases of poor results. Video image detection manufacturers looking to gain revenue and pay for their investments and sales persons promoting the systems tended to oversell the technology (some still do) as a detection method for every hazard. The results were, in many cases, misapplied technology or inexperience in configuration, resulting in high false alarm rate or reduced detection capability.

These negative experiences caused equipment distributors, their sales people, end users and many in the fire protection industry to distrust the technology. We admit to a steep learning curve in determining effects of sunlight, shadows and movement in the camera's view. However we had confidence that the technology, applied correctly, could provide very early detection for many challenging and important applications.

Video image detection is true 3D volume detection because the detection potential extends from the camera lens to as far as the camera can see and anywhere in its field of view. Third-party testing has documented that VID outperforms spot and aspiration smoke detection technologies repeatedly in high ceiling applications, and available settings allow flexibility with flame detection as well. With years of experimentation with detection settings in numerous applications and environments, we have developed a strategy that has proven, in systems as large as 600 cameras, to allow repeatable, successful results.

In the most basic sense, video analytics' algorithms for smoke detection monitor the image for movement of light patterns relative to a stable background. If the movement is consistent with known smoke movement patterns, and preset alarm zone, sensitivity and time-delay thresholds are met, then an alarm is generated. For flame detection, the analytics are monitoring the same stable background and looking for groups of pixels indicating slow changing brightness accompanied by known dynamic flicker signatures.

Our original opinion was that video image detection was going to be useful only in specialised applications. However as we have gained experience with various applications and mastered the use of flexible detection settings, we have successfully applied the technology in varied hazards, from light hazard airport catering facilities to power plants, aircraft hangars and outdoor chemical processing.

An example of configuration flexibility is the ability to set specific areas within the camera view as alarm zones; the analytics monitor and track the camera view and, when smoke breaks the plane into the alarm zone, an alarm is generated. Alarms zones allow us to specifically target areas for alarm. This strategy can also be used in aircraft hangars or outdoor chemical processing with flame detection by targeting specific areas of possible flame, while monitoring – but not alarming – in areas with false alarm potential. Time delays, alarm verification and sensitivity setting are also available and, used together, allow limitless possible configurations to avoid false alarms and increase detection capabilities.

There are two primary standards for approval of video image detection devices. UL 268B - *Outline for Investigation for Video Image Smoke Detectors* uses the existing applicable US requirements in UL 268 *Standard for Smoke Detectors for Fire Alarm Systems*, and incorporates additional requirements for the evaluation of video image smoke detectors. FM 3232 – *Approval Standard for Video Image Fire Detectors for Automatic Fire Alarm Signaling* covers both flame and smoke detection requirements of a video image fire detector as a combination video image smoke and flame detector.

## Map for success

Video image fire detection is a highly specialised detection technology, and experienced application engineers should be involved from the very beginning using a standardised, proven evaluation process, design/layout recommendation as well as installation and configuration support to assure optimal results. We have found that the key to a successful project is a planned sales process, which includes multiple steps; including the possibility of walking away from the application if it does not meet required criteria. A complete and successful assessment can usually be accomplished in 30 minutes to a couple of hours and typically turned around the same day of request. A project has five key elements.

**1. Application review**

Distributors or integrators provide the Fike application support engineers with dimensioned drawings or sketches and pictures (if available), as well as answer a prepared set of questions regarding the application and customer detection goals so that a hazard analysis can be performed and detection strategy created. Potential fire sources, storage height, expected color of smoke and background, obstructions and lighting conditions, as well as other factors are considered and reviewed.

**2. Camera layout and submittal information**

If, as determined by the Fike application engineer's hazard analysis and discussion with the customer, video image detection technology suits the application, the application engineer provides camera layout recommendations for required coverage, a priced bill of material, relevant references and listing/approval information with equipment specification sheets for proposal submittal.

**3. Design review**

System design review may be performed by Fike application engineers to determine if there are potentially missed areas of detection, camera height relative to storage, sunlight or possible shadows, relay monitoring or power supply issues.

**4. Installation and configuration**

Even though Fike factory training provides guidance to its distributors on camera setup and configuration, and is required for technicians installing and configuring the system, every application can have its unique challenges. When the system is installed and video is available in the video management software, a live video conference or other online session is scheduled between the distributor and the Fike application engineer, who is already familiar with the application as they performed the original review. Live video from the camera's view is evaluated and alarm or masking areas configured, sensitivity and time delays set based on experience and lessons learned from past installations.

Live configuration assistance by the application engineer also creates an opportunity to provide real application training with the technician that will most likely continue to oversee the project to completion. We have found that this is a valuable, worthwhile investment of our time as they will be able apply the knowledge to the current and future installations and speak confidently about the application and technology.

If live interface is not possible, the technician can send an audit report that has a picture of the camera's view; application engineers can provide configuration recommendations and training regarding the specific hazard in the same manner.

**5. System verification**

As with any fire detection system, there is an evaluation period to monitor for false alarms and make adjustments based on the installed environment that can last days or, in extreme cases, weeks to assure there are no false alarms. The above process of proactively configuring each camera's settings, with the assistance of an experienced application engineer, as well as follow-up sessions if necessary, has greatly decreased the set-up time for Fike systems to a few days in most cases. When the system is stable and configuration complete, functional testing is performed as required by NFPA 72 and manufacturer recommendations to confirm detection capability with final camera settings.

In summary, an organised, thorough plan for video image detection projects, with the assistance of experienced application engineers has proven to be the formula for successful video image detection projects.

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