

VSD-8

Visual Smoke Detection System



Applications

- Electrical Power Generating stations (Nuclear, Fossil and Wood)
- Offshore Oil and Gas Installations
- Chemical and Petrochemical works
- Aircraft Hangers and Airport Concourses
- Automotive Plants
- Military and Merchant Ships Engine rooms
- Cement Works
- Paper Mills
- Tunnels, Road and Rail
- Paper and Document storage facilities
- Toxic waste plants
- Water treatment facilities
- Historic Buildings and Museums
- Storage facilities, Military and Commercial

The fire safety industry is unrelenting in the demand for fire detection products that respond quickly to potential fire conditions without generating unwanted, or nuisance alarms. These are the reasons for the growing interest in CCTV based fire detection systems, which feature comprehensive coverage, reliable performance and fast detection capability, on screen visual verification and false alarm immunity.

Fire safety professionals constantly seek the benefits of the early warning of potential fires. If it were possible to place hundreds of smoke, heat or flame detectors in close locations above or around the items or areas at risk, this would enable a fast response to a potential fire, saving valuable time even in voluminous areas or where a high airflow may be present. But such a solution is not possible from a practical or financial point of view. Or is it?

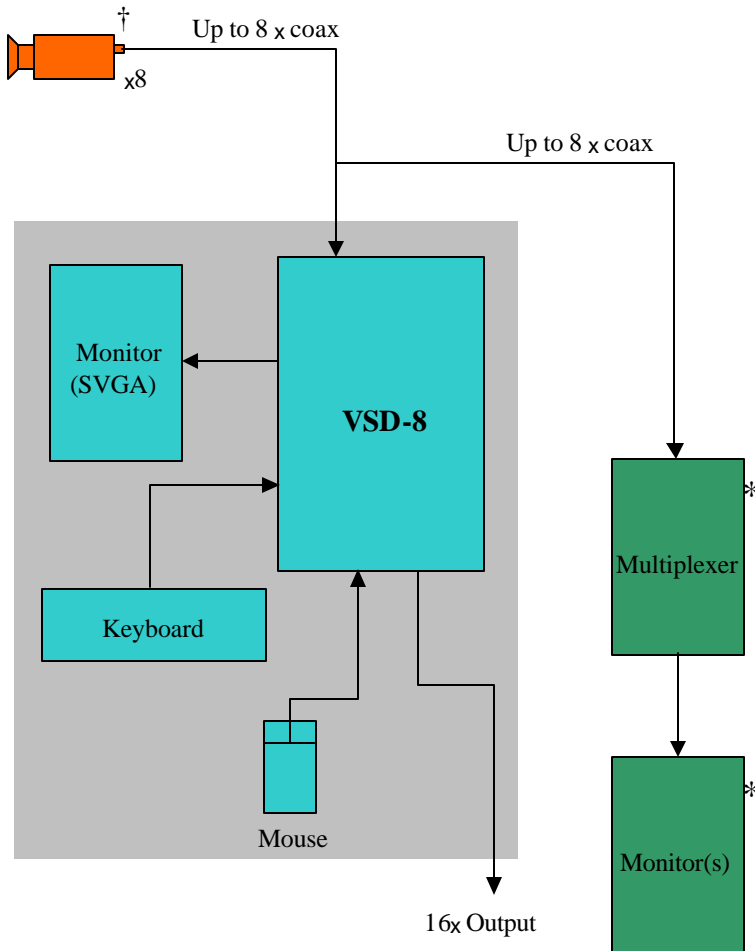
Such a system is now available from Fire Sentry Corporation.

The principle of operation of Visual Smoke Detection is based on sophisticated computer analysis of the video image, i.e. the area covered by the CCTV camera's (sensor) field of view. With the Fire Sentry Visual Smoke Detection, (VSD), System, detection zones can be placed anywhere within the camera view, on or around the items or areas to be protected. The ability to visually verify the alarm condition from the front-end processor screen or CCTV surveillance monitor represents a powerful new tool in the very early detection of fire.

Fire Sentry's VSD-8 Visual Smoke Detection System is a world first in delivering early warning of fire at the incipient stage, using cost effective tried and tested equipment combined with leading edge image processing technology. This technology has been subject to rigorous scrutiny by the Nuclear Power industry, one of the world's most demanding applications for fire detection systems.

A major fire in a nuclear power station has a potential for devastating environmental and human disaster. Additionally, the financial cost of cleaning up and rebuilding after such an event is almost incalculable. Faced with this chilling dilemma, the Nuclear Industry needed the most reliable and rapid possible means of detecting fire, a system that would quickly detect small amounts of smoke in a cavernous environment such as a turbine hall. The massive volume of air involved renders any system that relies on smoke entering a "point" or "beam" type detector far too slow. Similarly, by the time that heat sensors can respond, any fire will be well developed.

Working closely with Magnox engineers, part of British Nuclear Fuels Ltd., the solution developed was a system that continuously monitors standard CCTV video images frame-by-frame and immediately alerts the system operator to the presence of even the smallest amounts of smoke anywhere in the picture, sometimes before it is even visible to the naked eye.



† The cameras are required but not supplied

* These items are supportable but not supplied

The VSD-8 system can use existing standard CCTV cameras, which may have initially been installed for surveillance purposes, so that a user could still retain security surveillance, but with the added benefit of fire detection.

To reduce installation costs, the idea of developing special cameras with built-in intelligence was rejected. As standard CCTV cameras can be fitted into protective or intrinsically safe housings, or can look through glass windows, the VSD system can safely and reliably detect fires in hazardous areas such as radioactive, explosive, corrosive and extreme weather/temperature environments. Because the system uses standard CCTV cameras and lenses, it is possible to position the cameras some distance from the area to be protected, without compromising the effectiveness of the system. There are two advantages to this approach. Firstly, cabling and installation costs are minimized. Secondly, this avoids introducing electrical/electronic equipment into hazardous areas.

Principle of Operation

The VSD-8 system uses standard CCTV equipment linked to a self-contained processing system which is capable of recognizing small amounts of smoke within the video image and alerting the system operator both at the processor and by a variety of remote outputs.

The VSD-8 system employs highly complex algorithms to process video information for up to eight cameras simultaneously. Under normal conditions with all eight cameras connected, the system achieves a 5Hz-frame rate for each channel.

The video hardware allows simultaneous real-time digitizing of all eight images. This means that the system does not multiplex images and therefore no information is lost or delayed. Alarm conditions are stored within the systems log that has the capacity to store in excess of 5000 time and date stamped images.

The VSD-8 system detects smoke rapidly by looking for small areas of change within the image at the digitization stage and only passing these pixel changes to the main processor for further software filtering. - The video information is passed through a series of filters, which seek particular characteristics that are associated with smoke. Further analysis is then carried out on the relationships between the filtered characteristics to determine whether all the conditions have been met for the system to confidently predict the presence of smoke.

The system configuration has the ability to vary the quantity of smoke and the length of time that the smoke exists before an alarm condition is raised to cater for situations where there may be background smoke present. The system can also divide the video image into zones and program the system to alarm only if smoke is present in two or more zones. For even greater system performance, two camera images can be associated together such that smoke in one image can be treated as a pre-alarm condition, and smoke in two associated camera images can be recognized as a full alarm condition.

To provide compensation for areas of the image, such as windows, mirrors or smoke producing processes, which might give spurious alarms, the system has the ability to eliminate or mask-off parts of the image from detection on an individual pixel-by-pixel basis.

Reducing Unwanted Alarms



The VSD-8 system has sixteen opto-isolated alarm outputs that may be individually assigned to any combination of zones and sectors. These outputs are not linked to any particular camera to allow for the zonal and image association described above. Through the output logic matrix, it is possible to customize the system output or response to alarm conditions. Ultimately, there is no better false alarm rejection capability than an alerted operator, able to immediately view the highlighted source of the alarm on a monitor.

System Architecture

The VSD-8 system comprises a high-grade, industrial computer, mouse, keyboard and VGA monitor. Proprietary high-performance video grabbers are housed within the computer. The VGA monitor will display the digitized video image from any one of the eight cameras in detection mode. All control and set-up graphics, zonal layout information, pre-alarm and full-alarm information, zone and camera identification in alarm. The system's alarm log can be downloaded to a floppy disc or optional zip drive.

Camera Selection

The system will operate with any standard CCD camera (PAL or NTSC) that is capable of producing a clear image in the lighting conditions that are envisaged for the application. The resolution of the camera is required to be no less than 380 TV lines. However, the greater the resolution of the camera, the more precise the detection capability.

System Features

- Up to 8 cameras per system.
- 10 independent alarm zones per camera (giving 80 detection zones per system).
- No size restriction on detection zones. Therefore full screen may be analyzed.

- Individual pixel elimination for highly reflective surface areas of the image.
- Camera shake compensation.
- Adaptive sensor noise compensation for maximum sensitivity.
- Three levels of password protection. (Engineer, Manager, and User).
- PAL or NTSC video format.
- Automatic compensation for video signal loss, obscuration, low light level and low contrast level.
- Flexible association between zones in alarm, or cameras in alarm to produce pre-alarm and full alarm outputs.
- Automatic switching to cameras in alarm with queuing.
- Controllable sensitivity threshold.
- Controllable “smoke present in image” time before alarm.
- Alarm log with automatic storage of 5000 time and date-stamped images.
- 16 opto-isolated relay outputs.

Electro-Optical Fire Detection

Fire Sentry is the world leader in Electro-Optical fire detection technology, with over seventeen years experience in the manufacture and design of this type of equipment. Contact your local representative, distributor or the factory for information on our extensive range of fire detection products.



WORLD LEADER IN ELECTRO-OPTICAL FIRE DETECTION TECHNOLOGY

