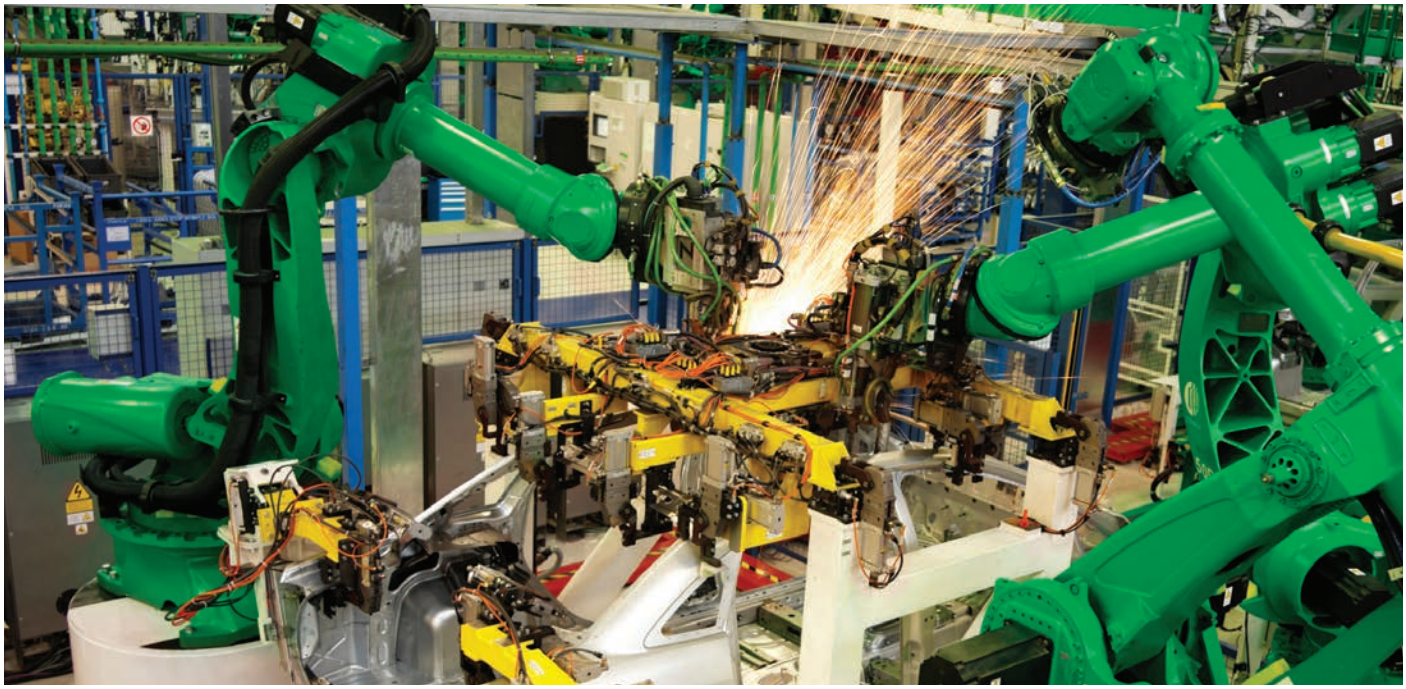
INDUSTRIAL “HOW TO INSTALL” SERIES

HIGH EMI / RFI ENVIRONMENTS



Introduction

Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) has typically always been a major concern for planners of fire detection systems as it can lead to costly unwanted alarms.

Unwanted alarms caused by EMI will depend on how and where these detectors are being installed. Designers as well as installers need to be conscious of the sources of EMI and the strength of magnetic fields that might influence the detectors. In production plants any unwanted alarm will generally cause a shutdown of equipment and processes, a factor that impacts production and costs. The biggest problem may be the ‘Noise’ you can’t hear?

A properly designed Aspirating Smoke Detection (ASD) system can be totally immune even to the highest levels of EMI and RFI.

So what is EMI and RFI?

Very simply EMI it is the energy that causes any undesirable response to any equipment that can be generated by sparking on motor brushes, power circuit switches, activation of inductive and resistive loads, relay activation, switches, circuit breakers, fluorescent lamps, heaters, automotive ignitions, atmosphere discharges and even electrostatic discharges between persons and equipment, microwave sets, mobile communication equipment, etc.

On the other hand RFI is a subset of EMI and causes undesirable responses in electrical equipment. Common sources include electric motors and generators Industrial machinery, elevators, welders, relays, switching power supplies, switch gear, motor controls, variable frequency drives, x-ray and gamma radiation, PLCs and computers, and even light dimmer switches are potential sources.

EMI/RFI Environments

Industrial processes and equipment such as high voltage line, welding, x-ray and gamma sources, switch gear, motor control, variable frequency controls, etc. often produce excessive EMI. When this becomes excessive or problematic, special methods must be used to protect electronic equipment. These methods may include special shielding and filtering or relocating power and communications lines to name a few.

The most obvious solution to a problem where electromagnetic interference exists is to move the detectors away from the magnetic sources. However, this is more easily said than done. It is not always possible to do this and system installer do not always know about issues or be aware of the potential source of the interference.

As stated previously a properly designed ASD system has the ability to operate in high EMI areas, since non-metallic sampling pipe will not transmit EMI. Locating the equipment in EMI free areas is the ideal situation.

The installation of point or spot type smoke detectors in high EMI environments can be problematic.

Figure 1 – Manufacturing facility with servo motors and variable frequency drives (image by Interference Technology Dec. 4, 2016)

Although modern day fire detectors undergo stringent EMI and RFI testing to ensure that they can operate in the vast majority of commercial and industrial environments, not all prove to be false alarm free. The ability to detect fire or smoke quickly and reliably in an industrial facility is paramount and will dependent upon the selection of the system's detectors.

ASD arguably provides the simplest and most effective means of protection in high EMI/RFI environments by enabling the detector and its associated electrical components to be placed in an area free from interference. The installation of non-metallic materials (sampling pipe) that is inherently immune to EMI such as CPVC, PVC, ABS, etc. provides an ideal solution free of nuisance alarms.

On the other hand, it may be necessary to locate the detector in an area where EMI/RFI is present. When this is the case it is important to ensure that the environment is fully assessed and that the ASD is installed per manufactures recommendations.

ASD benefits also include the ability to effectively detect smoke in high ceiling areas with the detector located at ground level and away from individual equipment and process areas where EMI may potentially exist providing better system immunity.

Figure 2 - VESDA detector located in factory where potential EMI exists

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