HOW TO INTEGRATE FIRE AND GAS SAFETY WITH PROCESS CONTROL

Integrated safety and control systems provide critical functions such as warning and mitigating a possible hazard that could threaten workers or operations.

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Editor's Note: This article is adapted from a comprehensive white paper, "Integrating Fire and Gas Safety with Process Control Systems: Why, What and How." Visit https://goo.gl/Ljz8zE to download the free, full white paper with additional information about guidelines from standards organizations, regulatory bodies and industry groups; why fire and gas (F&G) safety systems are needed; and subsystems in an F&G safety system, including flame, gas and smoke detection, the safety system controller, and notification and suppression-activation devices.

If a fire or gas leak is detected in an industrial facility, prescriptive actions must be taken by the fire and gas safety system and the process control system to mitigate and control the hazard. Using a certified, documented fire and gas safety system that can communicate appropriate messages to the process control system during an event is vital to worker and facility safety. However, specifying and integrating these two systems is no simple matter.

Mitigating a Hazardous Event that Has Already Occurred

Under certain conditions, processes in industrial, high-hazard manufacturing or processing plants can threaten the safety of employees, operations and the environment. In these settings, a fire and gas (F&G) safety system is the layer of protection responsible for mitigating consequences of a hazardous event once it has occurred.

Consider a chemical plant where flammable materials continue to be pumped into an area where fire has been detected. In hazardous situations like this, it's imperative that an F&G safety system communicate with the process control system (PCS). The relationship between a plant's F&G safety system and the operation's PCS is prescribed by multiple standards (download the full white paper for more information).

Here's a simple overview of what makes up process control and safety systems.

Process Control

1. Process Control System (PCS)
2. Process Instrumentation

Safety

1. Process Shutdown System (PSD)
2. Emergency Shutdown System (ESD)
3. Fire & Gas Safety System (F&G)
   - Flame, Gas and Smoke Detection
   - Safety System Controller
   - Notification and Suppression/Activation

In the United States, National Fire Protection Association standard NFPA 72® National Fire Alarm and Signaling Code® dictates that the F&G safety system can't be interrupted by the PCS.

Independence between these systems also is recommended by two highly regarded international regulatory bodies: NORSOK, whose standards are supported by the Norwegian Oil and Gas Association and the Federation of Norwegian Industries; and the Health and Safety Executive (HSE), an independent regulatory body in Great Britain.

While standards clearly dictate that the two systems — F&G safety, process control — remain independent, they don't prescribe how the systems should be integrated or define F&G safety system communication protocols about process control/process shutdown systems. The result is several possible approaches for F&G safety system integration and process control system communications.

Information Sharing Between the Systems

Integrating complex alarm control and hazard mitigation is critical to life and plant preservation. In the past, F&G safety system controllers were limited to being hardwired together using analog or contact closures in a conventional — point-to-point — design. Although still acceptable, this design provides limited diagnostics, is inherently not fault-tolerant, and is less flexible to configure. While this configuration provides alarm and fault information, specific details of the event aren't available to the controller because of the simple, binary nature of the communication path.

On the other hand, an F&G safety system in an addressable loop has the F&G devices configured on a bi-directional, fault-tolerant loop topology. This substantially increases the amount of diagnostic information that can be shared with the F&G safety controller. This configuration typically is more reliable because the controller is in constant communication with each device on the loop for alarm and diagnostic information.

An effective F&G safety system should include the ability to export logic for the detection devices in different process areas to the PCS. This lets the process owner know exactly what, where and when events are occurring. However, because the F&G safety system and the PCS remain independent, a failure on the PCS won't affect F&G safety system operation.

Critical Safety Functions

F&G safety systems supplement PCSs by providing critical functions such as warning and containing or mitigating a detected hazard. Although required to operate independently of the PCS, the F&G safety system can be integrated with the PCS to allow communication about an event that may be threatening to personnel or process operations. □

Det-Tronics, based in Minneapolis, is a participating Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. Det-Tronics makes the Eagle Quantum Premier® (EQP) flame and gas safety controller with DLR outputs. EQP is an SIL 2-capable, fault-tolerant, addressable system that integrates with a process control system.

>> Download the Free White Paper!

Download the complete white paper, "Integrating Fire and Gas Safety with Process Control Systems: Why, What and How," from Det-Tronics at **https://goo.gl/Ljz8zE** to get additional information about guidelines from standards organizations, regulatory bodies and industry groups; why fire and gas (F&G) safety systems are needed; and subsystems comprising an F&G safety system, including flame, gas and smoke detection, the safety system controller, and notification and suppression-activation devices.

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