Assuring a Successful Operator Response to Alarms

Good design is the key to avoiding stale alarms, alarm floods, inaction, and incorrect action.

Operators around the world want their shifts to go smoothly. They want to help avoid dangers to the process, equipment, and people around them. And in times of crisis they want answers. But guidance and successful operator intervention is sometimes difficult — especially when alarm management has not been well designed.

Today’s control systems require little effort to set conditions that raise alarms. In addition, alarms are often set for conditions that are purely informational, where there is not a problem requiring operator intervention. As a result, more and more alarms are generated. In this environment, operators can be overloaded by, or even become complacent about, alarms. All too often poor alarm management design leads to alarm floods — many alarms occurring in just a few minutes — where operators can easily miss critical alarms, respond too late, or respond incorrectly during a plant upset, raising the prospect of an accident or unplanned shutdown.

Regulatory agencies (OSHA, USOD Safety, UK Safety Executive, FDA, and others) increasingly have stepped in to review process plant alarm management practices, using checklists based on standards such as EEMUA-191, EC 6282, and ISA-18.2. In addition, some insurance companies check alarm system performance against these standards to determine a facility’s risk profile and qualification for coverage. They need documentation and assurances that all is well.

Many demands exist for well-designed alarm management, yet few facilities meet the needs adequately. Alarms will continue to be a source for operational pains if these conditions continue:

Operators cannot manage poorly designed alarms — If the automation system does not direct the operator’s attention to key events, plant safety and operation are at risk. How can operator intervention be successful if the system presents too many alarms at once? Problems also can include stale alarms that go unresolved for days or weeks or false alarms that are considered normal. Usually, both are ignored and become background noise. And unfortunately, most facilities are familiar with alarm floods, making it difficult to know which actions to take.

Knowledge is not transferring — When alarms happen, knowledge is the operator’s most important asset. But sharing knowledge among operators is often ineffective. For example, in an alarm situation, junior operators might not have the experience to quickly gain situational awareness. Difficulty also arises during shift handover when the incoming shift needs a complete picture of process disturbances that have recently occurred. Not knowing the alarm timeline and not possessing trustworthy information and guidance lead to continued errors and inefficient operations.

No accountability for alarm modifications — To mitigate operational risk, alarms must be functioning in an expected (controlled and documented) manner, which is often not the situation. Over time it is common to observe unmanaged — and even well-intentioned — changes being made to alarm limits, priorities and other settings, including the indefinite removal (suppression) of alarms from service. To ensure ongoing effectiveness of the alarm system, change management must be in place with transparency and accountability.

Severe and often overwhelming alarm floods continue to be a serious problem. In an Emerson study of actual system event records for 326 systems in 2014-2015, the peak number of alarms observed in a ten minute period averaged 270 alarms.

— Emerson Process Management survey

Human Understanding in Alarm Management

Dealing successfully with alarms comes through experience, analysis, and research. Building on these sources, Emerson has created alarm principles that bring operational success for its users.

System in place that fully supports the operator

With the Emerson solution, many options are available to support operators in alarm situations. For example, the DeltaV™ distributed control system (DCS) is designed to eliminate stale alarms through conditional enabling of alarms based on related conditions, such as preventing a low-pressure alarm on a pump until an upstream pump has been on for sufficient time to generate the expected pressure.

And through its dynamic alarming ability, the system can eliminate alarm floods by detecting equipment malfunctions or process abnormalities and then suppressing or combining the resulting redundant alarms. But even if dynamic alarming is not configured for use at a facility, the DeltaV Alarm Mosaic can (with no configuration required) present multiple alarms in a “big picture” graphical pattern, so the operator can manage alarm floods more effectively, with built-in aids to help in root cause identification.

Educate operators and support them as they educate each other

The DeltaV alarm help system provides documentation to understand the processes for resolving alarms. With one-click access, operators can ensure a prompt and consistent response by calling up the consequence of inaction, the recommended corrective action, and the remaining time available to respond. And privileges can be given to experienced operators so they, during quiet times, can help write alarm help system content, effectively capturing their knowledge and passing it on to others. The DeltaV system, through the Alarm Mosaic, automatically provides an alarm activation history recall that enables operators to review alarms from previous shifts, including presentation of related control actions that preceded or led to their resolution. This assists with future alarm maintenance.

Improve alarm management through accountability and increased transparency

Operational certainty requires heightened awareness whenever alarms are removed from service. The DeltaV system distinguishes temporary operator alarm suppression — called sheeking — from long-term manual removal from service or suppression by designed logic, for increased accountability whenever any alarms are suppressed. Suppression reasons are recorded in event histories and presented to operators in dedicated suppressed alarm lists for maximum awareness. In addition, the system can efficiently and automatically audit alarms to provide operator or management reports. These reports show deviations from configured settings, such as an alarm’s threshold limit or priority.

Contact Emerson to Improve Operational Excellence through Alarm Management

Alarms can require a great deal of operator attention and can impact operational excellence directly. Letting alarm issues wait leads to operator frustration and delayed profits. Emerson has the tools to assist in immediate improvements to operational excellence. Contact Emerson to assist operators in a key part of their jobs: alarm management success.

Learn more at www.emersonprocess.com/operationsperformance