A simple way to know if your alarm management system is doing its job well

Alarm rationalization of your digital automation control system not only brings significant improvements in plant safety; it can make a big impact to the bottom line by reducing unnecessary plant trips

The automation paradox

In the process automation industry, up to 90% of accidents are attributable to human error. Overwhelmed operators may not react quickly or correctly. The automation paradox states that the more reliable and greater scope of automation, the greater the demand on the operator when it fails.

The capability of today’s automation systems to generate and route alarms to the operator is far in excess of the operator’s capability to process and respond to these alarms. This means “the operator is overloaded beyond his design limit”. He has only so much attention to give and multiple simultaneous alarms happening at too fast a rate that it’s nearly impossible to deal with. We need to manage and design alarm systems with this in mind.

How many alarms are too many?

Here’s a simple way to know if your alarm management system is doing its job well:

Count the total number of alarms that the system activates during the course of a month and divide it by the number of operator hours worked during the same month. If the total comes in at much more than 6 alarms per operator hour, then your system is running at an unnecessarily high level of risk and inefficiency.
That rule of thumb (6 alarms per operator hour) is just a guideline, warns Ken Praprost, alarm management optimization engineer at ABB. It’s far simplified from ISA-18.2, a standard released in 2009 that addresses alarm management in process industries.

“During an “alarm flood” period, you may get alarms at five or ten times that rate,” Praprost says. But six per hour per operator is one metric let you know if there’s a reason to go back to work on the alarm management system.

Should all alarms be an alarm?

In Praprost’s experience, most companies deliver too many alarms, falling into three categories:

- **Nuisance alarms**: Those that go on and off so routinely that they eventually get ignored, like an alarm that sounds whenever process temperature rises above a threshold, even if the process generally takes care of itself before operators intervene. Praprost has frequently seen operations where there are so many standing alarms that they can only be viewed on multiple screens. “And many of these may be for equipment that’s not even in use. The flow is zero, which sets off an alarm that the operators simply have to look at.”
- **Standing alarms**: Those that remain in an active alarm state for a significant period of time.
- **Non-alarms**: Many alarms are really just events or data that someone in the organization had wanted recorded.

In all three instances, operators struggle to identify important alarms, especially when alarms are not prioritized - a common condition everywhere.

Fixing it can improve safety and potentially improve plant performance, Praprost says. “If we can get the alarm system so it’s not providing useless information that operators don’t need to know, the operators can do a better job running the plant. They can avoid lost-production events simply because they didn’t pick out the right alarm from a long list of alarms that all look the same.”
Alarm Management strategy of ABB’s System 800xA

Depending on the needs of your specific plant and business, there are several alarm management functions embedded within ABB’s Extended Automation System 800xA to let you:

- Improve operator’s ability to manage DCS alarms on larger sections of the plant.
- Lower costs
- Reduce the control room footprint
- Consolidate several units into one
- Direct operator attention towards those plant conditions that require assessment, and the information for them to act correctly
- Rationalize alarms using alarm shelving, alarm grouping and alarm statistics
Alarm rationalization process

The main steps to improving an alarm management system are:

- Evaluate documentation and interview operators, engineers and supervisors: Investigate whether the systems operate as required and if personnel know why each alarm is triggered, precisely how to respond to it, and know how easy it is to interact with the system interface.
- Performance assessment: A review of alarm data over an appropriate period of time (usually a few weeks to a month) to determine the rates, frequency of individual alarms, and response times to alarms.
- Benchmarking: Comparison of results with industry guidelines.
- Recommendations for improvement.
- Plan and implement an improvement program.
- Establish an appropriate monitoring and review process.

“One thing we’ve learned is that people like to put an alarm on anything. If we investigate further, we can reclassify many of the alarms as events so they don’t occupy space on the list. Then we reprioritize to identify the true high-priority items,” Praprost says.

There are also strategies for dealing with nuisance alarms, vastly reducing how often they trip while assuring that they do appear when intervention is required.

Evaluating such issues is a process independent of the type of system being used. While it requires some cost, it can be conducted with minimal interruption and meaningful improvements in the way processes are managed.