On-line Auditing of Alarm Systems

The right alarm auditing tool can tell you where the opportunities are and how much payback there might be

*By Brian Gibson, P. Eng., Machine Automation, Inc.*

It seems like everyone is talking about alarm system rationalization or re-engineering projects these days. And why not? Investigations have shown that abnormal conditions and poor alarm management can cost a facility up to 8% of total throughput.*

But sometimes these rationalization projects have trouble getting off the ground. Management worries about whether the costs will outweigh the benefits. And in today’s world of lean companies there may not be the time or personnel to do this investigation and re-engineering. A quick and easy step is available to justify the alarm rationalization project. And that step is the installation of an on-line alarm auditing tool.

In a “no-time” environment, an alarm auditing tool can tell you where the opportunities are and how much payback there might be for your company. An effective application will provide immediate metrics on how many alarms are being presented to the operators and how often. Your plants are running at less than peak efficiency if your operators cannot correctly interpret alarm data due to the quantity and/or frequency of alarms. Measuring the magnitude of the problem is the first step in determining potential payback.

For example, is it reasonable to assume that an operator can manage more than 20 ongoing alarms even if the alarms have not occurred recently? This places significant demands on operators to recall why those tags are in alarm. Perhaps these alarms can be ignored for the moment, and perhaps the operator knows that corrective action has been taken. Or perhaps not. If your plant is presenting your operators with too many on-going alarms, what can you reasonably expect from your operators?

Another condition, called Alarm Bursts, can occur even when a plant does not have many tags in alarm. This condition occurs when tags are going into alarm at a rate faster than is reasonable to interpret and react. Not all Alarm Bursts are going to have a catastrophic effect on plant operations, but the important point is that Alarm Bursts are an incident of lower plant stability, where human judgment can be impaired by information overload. Capturing the time and magnitude of Alarm Bursts with an auditing tool is a good first step to resolving how to re-engineer the alarms to avoid a re-occurrence. A good auditing tool will support this investigation graphical sequence of events displays, integrated with operator actions and process measurement.
Perhaps more important for the pharmaceutical industry than for other industries, a record of alarms and operator actions correlated with measured values can be used for training and validation purposes. A root cause for many alarms is inefficient or inadequate operating procedures. By reviewing process trends with operator actions and alarms superimposed, procedures can be “tuned up” to limit the effects of process upsets, and tie operator actions to alarms in a very direct way.

An example of an alarm audit application is AlarmAnalyst. (Note: See below for sample screen shots of the application.) Using this software, anyone can quickly determine where the plant stands against best practices in alarm management. Interactive displays provides immediate information on:

- Overall alarm rates and their frequencies
- Total alarm duration and standing alarm totals
- Burst rates, top 10 alarms and graphical sequence of events
- Devices in which operators are spending a lot of time manually controlling

Advance capabilities also include pattern recognition to weed out process relationships, cross correlation and complete integration of process trend data from process historians.

“We view alarms as process inefficiencies and often see customers achieving 90% reduction in alarm rates,” states Jon Dun, lead engineer at Machine Automation Inc. “This has an enormous effect on improving working conditions for operators as well as providing increased levels of plant safety and throughput.”

Machine Automation is a developer of plant optimization and auditing software. For more information on AlarmAnalyst and Machine Automation, please visit our website: www.machineautomation.org.


AlarmAnalyst is a registered trademark of Machine Automation Inc.
**Fig 1:** Shown are hourly alarm rates (upper chart) and an event distribution (lower chart). The event distribution shows the quantity of alarms and operator actions by occurrence.

**Fig 2:** Graphical sequences of events make it easy to see relationships between alarms.
Fig 3: Total integration of process trends, operator actions and alarms.

Fig 4: Upper chart shows burst rates over a 1-day interval. This provides key information on when operators are being overloaded with alarms.