ABB Ability™ System 800xA
Effective Alarm Management in Industries Webinar Presentation
April 2020
Presenter introduction: Suhas Kulkarni

25 years serving industrial customers

Title:
Global Service Manager – Food & Beverage, Datacenters & Smart Manufacturing

Background:
I have been working with ABB for past 20 years. During these years I have held various roles in Engineering, Project Management, R&D Program Management and Marketing Functions. I have worked for various Industries like Sugar Plants, Dairies, Iron & Steel, Cement, Mining, Specialty Chemicals, Petrochemicals etc.
Alarm Management Background
- Definition
- Why Do we need to control Alarms?
- What are the issues?
- What is Guidance?

Solutions in ABB Ability System 800xA
- Base offering in System 800xA
- Extended Operations
- AlarmInsight

Questions
Alarms
Definitions and Purpose

**Definition of an Alarm**

Namur NA 102:
Indication requiring immediate response by the operator. The response may be, for example, manual intervention, increased watchfulness or initiation of further investigation.

ISA–RP 77.60.02-2000:
An audible or visible means of indicating to the plant operator an equipment or process malfunction or abnormal condition.

**Purpose of an Alarm System**

EEMUA 191:
– The purpose of an alarm system is to direct the operator's attention towards plant conditions requiring timely assessment or action
– Each alarm should alert, inform and guide
– Every alarm presented to the operator should be useful and relevant to the operator
– Every alarm should have a defined response
– Adequate time should be allowed for the operator to carry out his defined response
When an alarm sounds

Operators need to know instantly what it means and have both the time and the information to deal with it correctly

EEMUA 191 states:
– Each alarm should alert, inform and guide
– Every alarm presented should be useful and relevant to the operator
– Every alarm should have a defined response

Acknowledging or silencing an alarm without investigating it is not an option!
Unfortunately, that’s not always the case

Value-added Engineering

With fewer operators controlling ever-larger process areas, effective alarm management is essential!
Today, many operators face too many alarms

Without a properly configured alarm system, even the most skillful operator may run into difficulties

- Often turn off acoustic alarms
- Acknowledge alarms without acting
- Missed alarms can cause incidents or near-incidents
- Suppress alarms for long periods
- May not even know what a particular alarm means
What are issues?

- Alarm Load
- Burst Alarms
- Poor Design
- Poor Nuisance Alarm Handling
- Poor Management
What are issues?

Alarm Load

Symptoms
– High number of alarms per operator per minute
  • 1 per minute is unacceptable
  • Highest seen 40 per minute
– Operators accept alarms without review

Effects
– Devaluing of the Alarm System
– Decision making impaired
  • Poor operator responses
– Adds to operator stress
– Masks high priority alarms
  • More outages
  • Loss of protective layer
What are the issues?
Alarms Bursts

Symptoms
- High number of alarms from a single cause e.g.
  - Compressor trip
  - Shutdown/Startup
- Often see 100+
- Occasionally see 500+

Effects
- Incorrect/delayed diagnosis of causal event
  - Incorrect response to incident
  - Delayed response to incident
What are the issues?
Nuisance Alarm Handling

Symptoms
– High number of alarms per operator per minute
  • Repeating alarms
  • Instrument Fault alarms
  • System alarms

Effects
– Alarms defeated
  • Safety alarms
  • ‘Unofficial’ defeats
– Ignoring the alarm system
– Poor control room environment
– High operator stress
– Devaluing of work request system
What are the issues?

Poor Design

Symptoms
- High numbers of high priority alarms
- Safety alarms not differentiated
- No defined operator response
- Standing Alarms
  - Out of use or standby equipment

Effects
- Operators respond to inappropriate alarms
  - Delayed or no response to important alarms
- Inconsistent or incorrect operator response
What are the issues?

Poor Management

Symptoms
– Alarms disabled inappropriately
  • Without risk assessment
  • Without regular review
– Alarms ignored
– Faulty alarms not addressed

Effects
– Removal of a layer of protection
  • Safety
  • Environmental
  • Economic
– Regulator attention!
What Guidance is available?

ASM (Abnormal Situation Management) Consortium

ISA 18.2: “Alarm Management for the Process Industries”

HSE: “Better Alarm Handling”

What Guidance is Available
Design Principles – Primary KPIs

**Metric**

- Average alarm rate
- Maximum alarm rate

**Benchmark value**

- Less than 1 per 10 minutes
- Less than 10 per 10 minutes
What Guidance is available

Performance Levels

See: EEMUA 191:2007 section 4.1.2 and Appendix 13
# System 800xA Alarm Management overview

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# System 800xA Alarm Management overview

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## Alarm History and Reports:

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- Long-term Alarm storage and analysis  
- Alarm system KPI reports  
- Web and e-mail distribution of reports  

## Alarm Operations:

- Alarm Grouping  
- Alarm Shelving  
- Basic Alarm Analysis  
- Alarm Helper  

## Maintenance
Proactive, operator-friendly alarm-list presentation

The better the alarm list, the quicker the problem gets resolved

- Operators more proactive
- Can acknowledge all visible alarms
- Enter and record comments in the events list
- Navigate directly to the relevant events list
- View live status presentation
- Make comments to alarms and events directly in the Alarm Lists
Proactive, operator-friendly alarm-list presentation

**View live values in the alarm list**

**Alarm comments**

Easy-to-use System 800xA alarm lists encourage operators to take a proactive approach to recording and dealing with unexpected events.
# Operator Filters

<table>
<thead>
<tr>
<th>Ack/Pri</th>
<th>State</th>
<th>Active Time</th>
<th>Object Name</th>
<th>Object Description</th>
<th>Condition</th>
<th>SubCondition</th>
<th>Message</th>
<th>Class</th>
<th>Current Value</th>
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<tbody>
<tr>
<td>2</td>
<td>ACT</td>
<td>13:10:41:59:421</td>
<td>L1330</td>
<td>Level Tank1</td>
<td>Low</td>
<td>Low</td>
<td>Less than 20.00</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ACT</td>
<td>13:10:41:41:171</td>
<td>L1213</td>
<td>Level Pre-Heater</td>
<td>Low</td>
<td>Low</td>
<td>Less than 20.00</td>
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Predefined Filters
Automatic alarm structuring
Enables simple and safe alarm delegation

Take advantage of the Functional Structure

- Make usage of the Functional Structure:
  - Simplifies alarm list engineering – just add on top of already-engineered structures
  - Fast and cost-effective (engineering is already done)
  - Operators only need monitor alarms for their ‘own’ objects
  - Adding a new object alarm automatically updates the alarm list
Alarm hiding

Reduce distractions from nuisance alarms

- Set up during the engineering phase
- Suppresses alarms that are not relevant
  - Expected or based on a known process state e.g. low flow during controlled shutdown
- Never visible to operators, only an indication in the faceplate

Operators only see alarms that require attention or action on their part
Alarm hiding
Configuration

Browse or simply write the tag name to define which object to include.

Generate consistent documentation in Excel format without effort.
Alarm Response navigation
Gives fast access to essential information

**Fast, direct access to alarm-related information**

- Operators activate Alarm Response navigation via the Alarm and Event list or the object context menu
- Right-click to specific information on what the object is and does, and to react correctly
- One click access to the object’s faceplate, graphic display, operating manual or live video image
- System Configuration Console offers users the option of simple configuration of default behavior
- Rules can be configured in the Workplace Structure, or in an object basis
Alarm Response navigation
Fast navigation from an alarm

Operators have detailed information needed to correctly handle the alarming situation
# System 800xA Alarm Management overview

## Highlight Alarm Operations

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| **Alarm Operations:** | | |
|-----------------------||
| - Alarm Grouping | | |
| - Alarm Shelving | | |
| - Basic Alarm Analysis | | |
| - Alarm Helper | | |

| **800xA Base System:** | | |
|-----------------------||
| - Alarm and Event lists with advanced filtering capabilities | | |
| - Alarm Hiding | | |
| - Alarm Response Navigation | | |
| - Alarm comment | | |
| - Configurable Alarm Colors | | |
Alarm grouping
Replacing long lists

Helps operators handle tasks with undistracted attention

- One single alarm is presented instead of several individual
- Generally related to a common process unit or a similar operator response
- Helps operators understand the implications of a particular alarm
- Easy to define, configure and manage via context menus
Alarm grouping

Configuration
Alarm shelving
Removing distractions in temporary situations

Helps operators handle stressful situations calmly and effectively

- Temporarily removes an alarm from the main list to a ‘shelf’ list
- Operator decides whether or not to shelve an alarm
- They can concentrate on tasks judged to require their immediate focus
- Alarm itself is not affected – it still requires attention from the operator

A valuable tool that helps operators work with maximum efficiency
Basic Alarm Analysis

- A tool that assists in analyzing and optimizing the alarm system
- Analysis according to EEMUA 191 of the performance of the alarm system
- An alarm analysis service performs continuous calculations of metrics according to ISA 18.2 and EEMUA 191
- Very simple configuration, just add an alarm analysis object to an object with an alarm list
- Use pre-made graphic elements to visualize the metrics.
Basic Alarm Analysis

Key Performance Indicators

Pre-made, easy to use graphics simplify understanding

- Top 20 alarms
- Number of alarms over time
- Top 20 Longest in alarm
- Alarm priority distribution
- Number of standing alarms over time
- Disabled / Inhibited / Shelved / Hidden alarms
- Alarm Performance Benchmark

Helps users optimize functions for maximum safety and efficiency
Alarm Helper

Help operators to make the right decision

- Guides and describes appropriate responses to the alarms at hand
- Makes it easier for operator to take the right actions – thereby acting safely and ensuring robust operation
- Available directly from the operators user interface, right click from alarm lists or process graphics.
- Configuration made easy by support for import from Excel.
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Alarm History and Reports

Long-term storage of alarms and events for analysis

- Alarm Performance KPI reports for Alarm Historian database according to EEMUA 191 and ISA 18.2
- Available on web or distributed via email
- Easy access from Operator Workplace
- Ideal for system management to communicate alarm system health in the organization
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AlarmInsight
Full-scale alarm management

Extensive analysis functions and visualization tools
- Based on 800xA Alarm Operations and 800xA Alarm History and Reports
- For enterprise solutions, consolidates data from multiple control systems, different vendors and assets
- Common tool for alarm management benchmark reports
- Operations experts wanting specific alarm information and managers needing to see overviews find that AlarmInsight meets both their demands.

Solutions for System Engineers and Alarm Engineers
- AlarmInsight Monitor:
  - KPI-Report: automatic KPI reports (daily, weekly, monthly)
  - Alarm Analysis: set filters, analyze and generate reports
  - Event Log Viewer: set filters, find root cause and sequence of events
  - Expert Tool: service tool for ad-hoc, deep-dive analysis supporting improvement work: used in all phases (client)
- AlarmInsight Manager:
  - Alarm Rationalization Tool: Alarm Rationalization and Continuous Alarm reviews; Management of change; Master Alarm Database (SQL)
  - Alarm Change Recorder: Monitor changes to alarms values and attributes; track changes during operation and modifications
AlarmInsight

Full-scale alarm management

Alarm Reporting

Alarm Rationalization Tool

Meets the demands of experienced operators and managers needing to see alarm overview and advanced KPI's
# System 800xA Alarm Management overview

Features detailed by License item

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## System 800xA

**System Responsible**

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  - Alarm system KPI reports  
  - Web and e-mail distribution of reports

**Operator**

- Alarm Operations:  
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- 800xA Base System:  
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### 3.3 Extended Operations

| C280 | Alarm Operations, < 2000 Tags  
Alarm Grouping, Alarm Shelving and Basic Alarm Analysis, Alarm Help aspects.  
(Alarm Hiding and Alarm Response are parts of the base system) |
| C281 | Alarm Operations, < 5000 Tags  
Alarm Grouping, Alarm Shelving and Basic Alarm Analysis, Alarm Help aspects.  
(Alarm Hiding and Alarm Response are parts of the base system) |
| C282 | Alarm Operations, > 5000 Tags  
Long-term alarm storage and analysis, alarm system KPI reports,  
web and e-mail distribution of reports |

Included in 800xA Base System

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System 800xA Alarm Management – summary
Greater availability and improved safety

Dramatically improves operator response to alarms

- Know at once what an alarm means and how to best deal with it
- Optimizes their ability to monitor processes
- Can be entrusted with larger sections of the plant without compromising safety
- Protects the plant, the individuals, and the environment
- Lowers costs and allows control-room consolidation for greater efficiency
Questions?