Setting the Standard for Automation™

ISA

Introduction to Alarm Management for Packaged Systems

ISA18.2 Standards Committee - Working Group 7

Speaker:
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About the Speaker
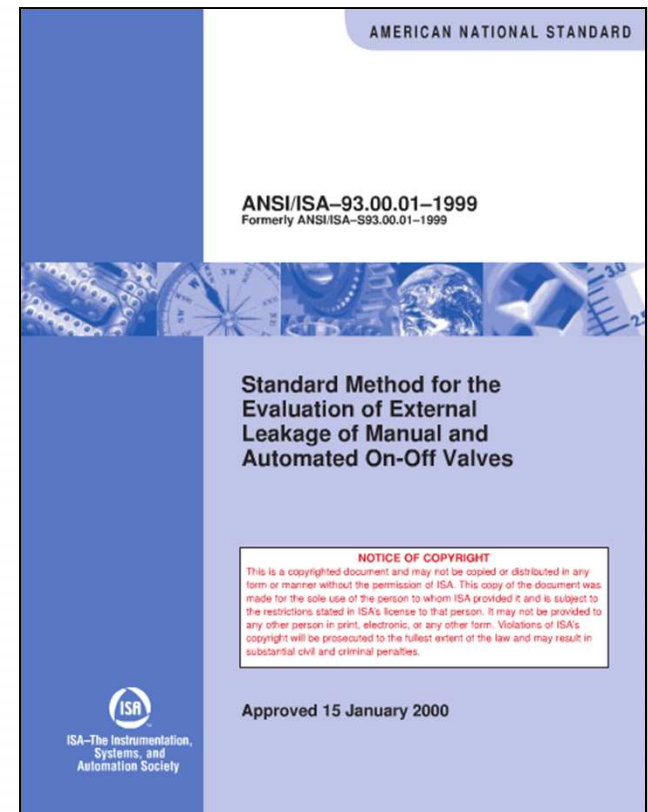
Graham Nasby, P.Eng., PMP

- Senior I&C Engineer with Eramosa Engineering
- Director of ISA Water/Wastewater Industries Division
- General Chair for 2012 & 2013 ISA Waster/Wastewater Symposiums
- Member of the ISA18, ISA101 and SCC/IEC/TC 65 standards committees

- Co-Chair of ISA18.2WG7 working group on Alarm Management for Packaged Systems

- Has published over 30 papers and articles on automation topics
- In 2011 received Control Engineering magazine's "Leaders Under 40" award
- Recipient of ISA Keith Otto Award for best InTech magazine article of the year for his "SCADA Standardization" article in the May/June 2011 issue.
- Recipient of 2013 ISA award for 2012 Technical Division Volunteer Leader of the Year
- Background in various industry sectors including municipal water/wastewater

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Presentation Outline

- What is Packaged Equipment
- Packaged equipment benefits
- The SCADA interfacing challenge
- Why this makes alarming problematic
- Why does this happen

- Introducing ISA18.2-WG7
- Committee Goals
- Committee Timeline for Technical Report
- About the ISA Standards Process
- Current WG7 Progress So Far
- Draft Table of Contents
- Call for Volunteers

AMERICAN NATIONAL STANDARD

ANSI/ISA–93.00.01–1999
Formerly ANSI/ISA–S93.00.01–1999

Standard Method for the
Evaluation of External
Leakage of Manual and
Automated On-Off Valves

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Approved 15 January 2000

ISA—The Instrumentation, Systems, and Automation Society

What is Packaged Equipment

- Equipment made by a specialized vendor for a specific task
- Typically employs its own vendor-provided control system (PLC, microcontroller, small-DCS, or relay logic)
- Has to be interfaced with the central SCADA/DCS for monitoring, alarming and/or sending it remote commands/permissives/interlocks

- Examples:
  - Automatic Bar Screen in a sewage plant headworks
  - Dewatering press
  - Duplex sump pump package
  - Packaged sewage lift station
  - Drinking water chlorination system
  - High speed filter in a water plant
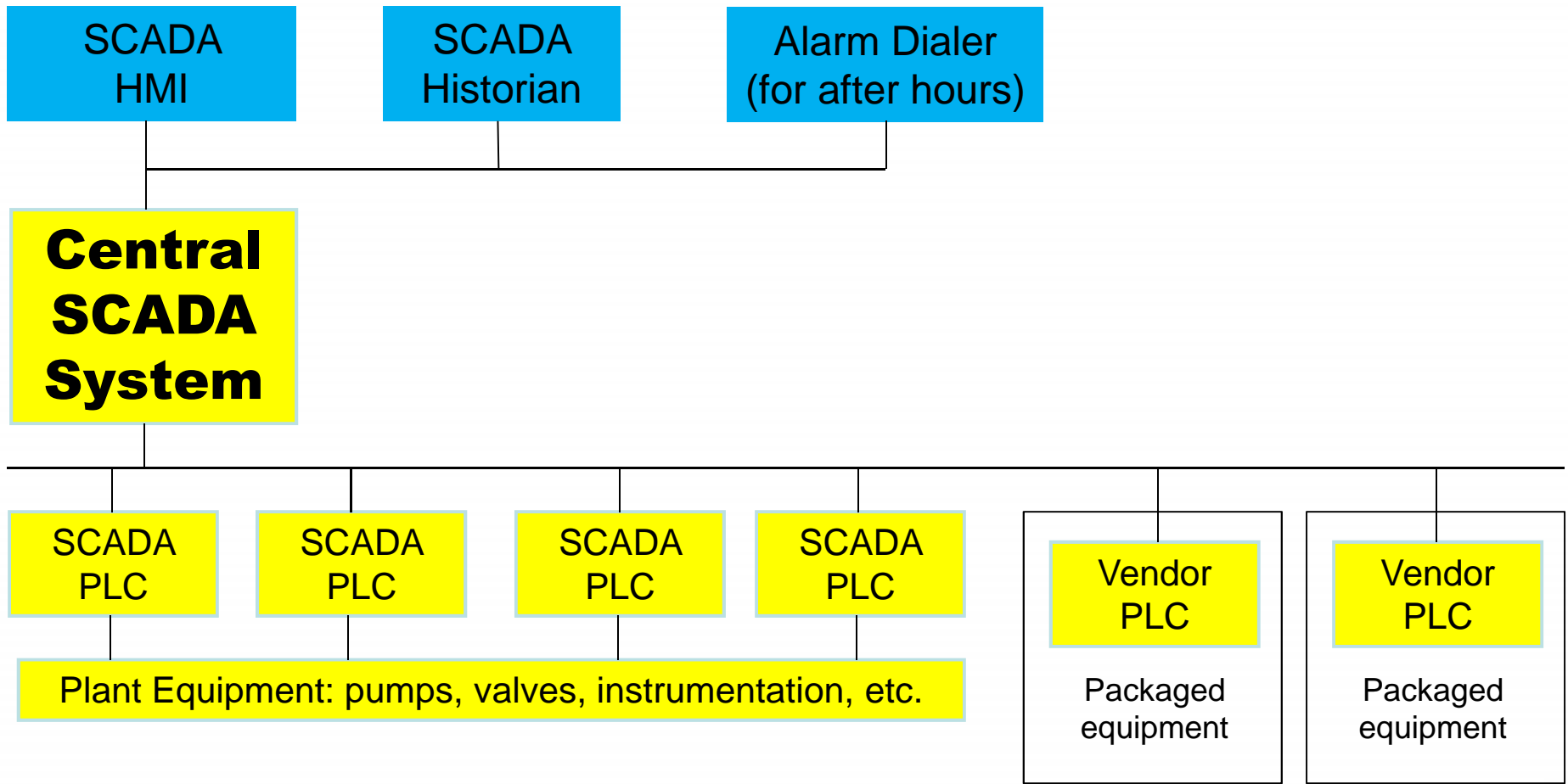 - UV disinfection system

Packaged Equipment Benefits

- Off-loads design, fabrication, and warranty to another entity

- Vendor of packaged equipment can often make it better than you can
- Equipment is optimized for its particular task
- Capitalizes on the years of experience vendor this type of equipment

- Can sometimes be acquired cheaper than building it yourself
- For support & warranty, the vendor has specialized service techs available

- Packaged equipment can often reduce design risk, since it makes use of proven designs and have been used in the field before

Packaged Equipment in Plants

- A typical example

| SCADA HMI | SCADA Historian | Alarm Dialer (for after hours) |

Central SCADA System

| SCADA PLC | SCADA PLC | SCADA PLC | SCADA PLC | Vendor PLC | Vendor PLC |

Plant Equipment: pumps, valves, instrumentation, etc.

Packaged equipment | Packaged equipment

Common Packaged System Problems

- Limited ability to customize: what you want vs. vendor defaults
- Vendor control system is often a black box – you can't touch it
- Limited connectivity to plant SCADA system for monitoring/alarming
- Often hard to get "status" information – process values & equipment state

- For warranty/support reasons, the system integrator often cannot modify or adjust how the vendor control system is programmed
- Customization of the vendor PLC is often expensive or not possible

- In many construction projects, the controls/alarming details of packaged systems are often left to the end of the project when any changes are very expensive and hard to do.

Packaged Systems Alarming Issues

- Often hard to configure alarms on systems – vendor defaults vs. optimum
- Limited interface connectivity and "black box" vendor PLCs common

- Limited flexibility for:
  - Sending alarms to central SCADA/DCS
  - Configuring which alarms go to SCADA vs. local only vs. both
  - Local vs. remote alarm acknowledgement
  - Local vs. remote reset of latched alarms
  - Ability to disable local alarm horns, lights and annunciators
  - Ability to add, modify or remove alarms
  - Ability to set alarm priority, classification, and type
  - Ability to set alarm dead-band, on-delay, off-delay, power up delays
  - Ability to suppress alarms based on equipment state

Why Does this Happen

- Detailed I&C design is often done later in the plant design process

- Packaged systems are usually specified by mechanical & process engineers, often with little input from automation engineers
  - I&C details, control system, and alarming details not included in specs

- Vendors often do not want to change their standard designs
  - There is often little to no business advantage for them to do so
  - Vendors like to re-use their standard PLC/software programs
  - Vendors do not want to support multiple versions of their software
  - It costs them money, so it has to be identified up front before they bid

- Making changes to vendor-PLC programming after contracts have been signed is often very difficult/expensive. Sometimes not even possible.

ISA Standards Committees to the Rescue….

ISA18.2 Working Group 7
"Alarm Management for Packaged Systems"

About ISA18.2 Working Group 7

- *"Develop a standard, recommended practice, or technical report on the application of ANSI/ISA-18.2 for process plants utilizing multiple packaged equipment systems, expanding on multiple clauses of ANSI/ISA-18.2"*

- Committee of volunteers to write a document to:
  - Provide guidance on how to do alarm management with packaged systems
  - Outline reasons/benefits for both end-users & packaged system vendors
  - Provide some guidance with respect to interfacing techniques
  - Identify and discuss common issues
  - Discuss pros/cons of different approaches to solving these issues
  - Provide guidance on how to implement the ISA18.2 work processes with respect to packaged systems
  - Provide examples

WG7 Committee Structure

- ISA Standards Department
  - ISA18 "Alarm Management" Standards Committee
    - ISA18.2 Working Group 7

- WG7 has:
  - Co-chairs:
    - Graham Nasby, P.Eng, PMP - Eramosa Engineering
    - Joe Alford, PE, PhD – Eli Lilly (retired)
  - Clause Editors
    - To be determined in late-2013
  - Information Members

- WG7 was formed in December 2012. As of July 2013: 36 committee members
- Committee membership is open to new members

Goals and Timeline for ISA18.2-WG7

- Rough Timeline
    - December 2012 – WG7 receives it charter: approved by ISA18
    - May 2013 – Kick-off conference call
    - Jun-Oct, 2013 – Revise Table of Contents
    - Oct 2013 – assign clause editors
    - 2014 – successive rounds of drafts & monthly conference calls
    - 2015 – formal drafts with review/comment cycles
    - late-2015 – formal ballot with full ISA18 committee & publication

- Meetings
    - Monthly conference calls – 3rd Thursday of the month at 12noon Eastern
    - Semi-annual in-person meetings (ISA Fall & Spring meetings)

How the committee works…

ISA18.2 WG7
"Alarm Management for Packaged Systems"

How Standards are Developed

- Standards are generally developed by standards committees
- Need to look at the terms of reference for the committee and what organization it is associated with
- Some "standards committees" are better than others

- Characteristics of a "good" standards committee / organization:
  - Openness
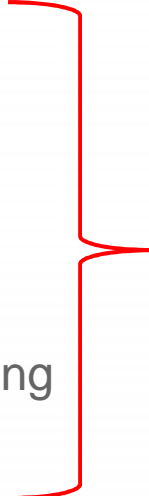 - Lack of Dominance
  - Balance
  - Consensus
  - Right of Appeal

ISA Standards

Accredited by the American National Standards Institute (ANSI) to develop industry standards following approved procedures to ensure openness and fairness in considering the views and needs of end-users, suppliers, regulators, and others involved in each topic area.

- 162 published standards, recommended practices and technical reports
- 133 committees and subgroups
- More than 3500 participating individuals
  ….from over 40 countries,
  ….and representing more than 2000 companies and organizations.
- In person committee meetings 1-2 times per year as needed
- Extensive use of teleconferences and web meetings

Standards Documents Terminology

- What a standards committee produces as a document has several forms
- Here is the "official terminology"

- **Standard**
  - Contains "shalls" – called "normative/mandatory" statements (called clauses)
  - Often contains "shoulds" – called "informative/non-mandatory" clauses
  - says "what you need to do" but not "how"

- **Technical Report**
  - Provide guidance on "how" to do something

- **Recommended Practice**
  - Provide guidance on "how" you "should" to do something

ISA18.2 WG7 will probably be producing a TR or RP

Benefits of Using Published Standards Docs

- Ease of access – all team members can easily get access to document

- Easier to enforce performance against published standard than a custom-one off spec as part of construction contract documents

- Higher quality documents, as a result of standards committee document development approach – consensus-based, multiple reviews

- Improves communication – common terminology & ideas
- Provides practical application of expert knowledge
- Harnesses years of experience
    - avoids need to start each project from the group up
- Improve design with less "custom" effort

More Benefits of Published Standards

- Standards help achieve operational excellence by
  - Lowering training costs
  - Improving performance
  - Lowering maintenance costs
  - Reducing downtime
  - Enhancing operability

- Return on Investment
  - Lower installation and startup costs
  - Reduce need to maintain large inventories
  - Enable interchangeability of components
  - Improve design with less "custom" effort
 - Increase safety
  - Increase security

ISA 18.2: Alarm Management

ANSI/ISA-18.2-2009,
   Management of Alarm Systems for the Process Industries
   Alarm: *An audible and/or visible means of indicating to the operator an equipment malfunction, process deviation or abnormal condition* <u>*requiring a response*</u>.

Methodology for identifying, rationalizing and designing alarms to be a powerful tool for operations, and eliminating non-useful alarms
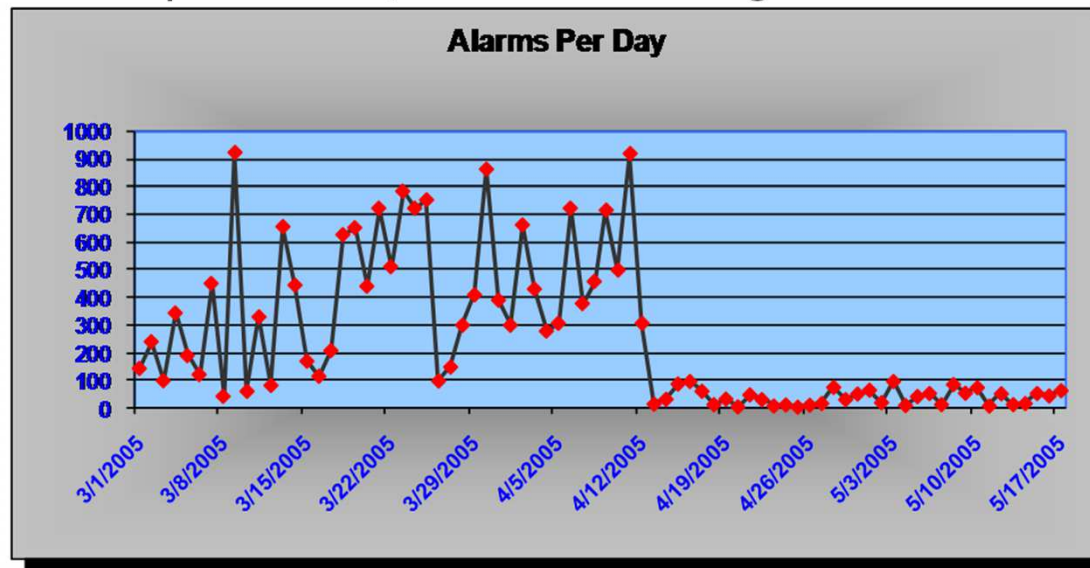
Typical example of results of 18.2 being implemented (showing before/after)

ISA 18.2: Alarm Management (cont'd)

ANSI/ISA-18.2-2009,
Management of Alarm Systems for the Process Industries

- Addresses the development, design, installation, and management of alarm systems in the process industries

- Defines the terminology and models to develop an alarm system – and the work processes to effectively maintain it throughout its lifecycle

- Currently in international development to become IEC 62682

ISA18.2: The First 6 Technical Reports

- The ISA18.2 alarm management standard was published in 2009

- 6 Technical reports are being published by the ISA on how to implement the core ISA18.2 work processes:

  - TR1 – Alarm Philosophy Documents – to be published in early-2014
  - TR2 – Alarm Identification & Rationalization – to be published in early-2014
  - TR3 – Basic Alarm Design – to be published in early-2014

  - TR4 – Advanced & Enhanced Alarm Design – published in late-2012
  - TR5 – Monitoring and Audit for Alarm systems – published in 2012
  - TR6 – Applying 18.2 to Batch and Discrete Processes – published in 2012

ISA18.2 WG7 Progress So far

- WG7 charter granted in December 2009

- Kick-off meeting on May 27, 2013

- First in-person workshop: June 10, 2013 in Raleigh NC

- Monthly conference calls starting July 18, 2013

- Timeline: 2-3 years
  – Refine Charter & scope documents
  – Develop draft table of contents ← WE ARE HERE
  – Assign Clause Editors
  – Informal Conference calls to review drafts & suggest edits
    – Draft sections re written offline by editors / writers over 1-2 year period
  – Formal review & comment rounds, as many rounds as required
  – Formal review and ballot by full ISA18 standards committee
  – Publication

WG7 Draft Table of Contents

1. Scope
2. Normative References (e.g., ISA18.2)
3. Definitions
4. Introduction

5. What is a Packaged System
6. Advantages of Packaged Systems
7. Common Problems
8. Common Alarming Problems
9. Vendor Warranty/Scope Issues
10. Common Plant Architectures

11. Advantages of proper pkg'd alarm design
12. Alarm Management Concepts (Intro)
13. Packaged System Interfaces (intro)

14. Alarm Philosophy Documents
15. Alarm System Specs
16. Alarm Identification
17. Alarm Rationalization
18. Alarm Design Techniques

19. Alarm Routing and Response
20. Showing Alarms vs. Status on HMI
21. Packaged System Interfacing Details
22. Alarm System Implementation

23. Operations
24. Maintenance
25. Monitoring & Assessment
26. Management of Change
27. Audit
28. References
29. Bibliography

WG7 Committee - Call for Volunteers

- ISA Standards are developed by volunteer standards committees
- Committee membership is balanced mix of end-users and other member types

- For individuals involved in standards development:
  - Expand your knowledge base
  - Identify resources for your work
  - Network with other professionals

  - Enhance your leadership skills
  - Ensure that your ideas and viewpoints are considered in the development of standards that could impact your work and/or your company's operations
  - Opportunity to share ideas and thoughts with leaders in your field
  - Have fun

Summary

- The use of packaged equipment in plants has many advantages
- However, interfacing and properly alarming packaged systems can be tricky, and requires coordination between vendor and SCADA/DCS designers
- There is currently no really good industry best practices document for doing this

- The ISA18.2 alarm management standard represents alarming "gold standard"
- The ISA has created a standards committee working group to produce a technical report on how to best to apply 18.2 concepts to packaged systems
- Committee was formed in Dec 2009, has 2-3 years timeline to create report
- Committee is looking for volunteers to help develop consensus-based document

- For more information on the ISA18.2 WG7 committee contact:

Graham Nasby

Co-chair, ISA 18.2 WG7

ISA Working Group: Alarm Management for Packaged Systems

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or visit www.isa18.org