Safety Instrumented Systems (SIS) For Process Industries Using IEC 65 and IEC 6508 Training

Description

Course Description

This 5 day course focuses on the management, planning and execution of automatic safety systems in accordance with IEC 61511, the newly released international standard for process industry safety controls.

The course manual provided with this course includes all material presented in the course and provides details beyond the scope of 5 days of training.

The modular format of the manual allows our presenters to adjust the subject material covered in the 5 day course to meet the needs of participants whilst the manual will serve as a reference for future studies.

Course Objective

Upon completion of this course, you will gain the following:

- Take away a checklist that you can use to quickly access if your plant complies with the latest international safety standards
- Walk away with a solid fundamental knowledge of IEC 61511 and IEC 61508 which you can apply immediately to your plant
- Ability to comply with the IEC 61511 and IEC 61508 standards thus signifying that your company is following the best available safety practices for a process company
- Get a practical understanding of the key sections of IEC 61511 and 61508 without wading through hundreds of pages of standards documents
- Be able to determine required SIL ratings using at least 3 different methods as listed in IEC 61511 This has the potential to save costs by avoiding needlessly high specifications for your trip systems
- Be able to configure safety systems to minimise or avoid spurious trips and create the potential to

reduce production losses.
- Know what can be done and what should not be done with PLC's and smart sensors
- Know how to take advantage of smart positioners and other self testing devices to reduce down time needed for proof testing
- Have overall knowledge of the key design and procedural requirements of IEC 61511 to ensure your safety systems comply with the best international codes of practice.
- Know how to set up function safety management procedures to meet international standards and be well prepared for independent assessments.
- The ability to plan and integrate all stages of a safety system project.
- Know how Hazop studies are performed and be able to define safety system requirements during Hazop studies.
- Know how to allocate safety tasks to both instrumented and non-instrumented protection layers to reduce dependency on a single method of protection.
- Be able to quickly estimate feasibility and costs of safety measures during Hazop studies.
- Take the mystery out of the IEC 61511 and 61508 Standards
- Demonstrate personnel competency in the latest international standard
- Gain financial advantage for your company by eliminating high installation costs
- Gain insight into these valuable topics from an independent, unbiased, company with a significant track record in presentation of effective training solutions.

Who Should attend?

- Instrumentation and control engineers and technicians
- Design, installation and maintenance engineers and technicians in the process industries
- Sales professionals employed by end users
- Engineering firms
- System integrators
- System consultants

Course Outlines

INTRODUCTION

- What Is a Safety Instrumented System?
- Confusion in the Industry
- Technology Choices
- Redundancy Choices
- Field Devices
- Test Intervals
- Certification vs. Prior Use
- Industry Guidelines, Standards, and Regulations
- IEC 61508, 9
- IEC 61511

DESIGN LIFECYCLE

- Findings of the HSE
- Design Lifecycle

- Hazard & Risk Analysis
- Allocation of Safety Functions to Protective Layers
- Develop Safety Requirements Specification
- SIS Design & Engineering
- Installation, Commissioning, and Validation
- Operations and Maintenance
- Modifications
- Decommissioning

PROCESS CONTROL VS. SAFETY CONTROL

- Control and Safety Defined
- Process Control – Active/Dynamic
- Safety Control – Passive/Dormant
- Separation of Control and Safety Systems
- Common Cause and Systematic/Functional Failures

PROTECTION LAYERS

- Prevention Layers
- Process Plant Design
- Process Control System
- Alarm Systems
- Procedures
- Shutdown/Interlock/Instrumented Systems (Safety Instrumented
- Systems – SIS)
- Physical Protection
- Mitigation Layers
- Containment Systems
- Scrubbers and Flares
- Fire and Gas (F&G) Systems
- Evacuation Procedures
- Diversification

DEVELOPING THE SAFETY REQUIREMENT SPECIFICATIONS

- Accidents Caused by Incorrect Specifications
- Management Systems
- Procedures
- Scheduling of Assessment
- Participation of Key Personnel in the Review Process
- Responsibilities Not Well Defined
- Training and Tools
- Complexity and Unrealistic Expectations
- Incomplete Documentation
- Inadequate Final Review of Specification
- Unauthorized Deviation from Specification
- IEC 61511Requirements

- Documenting the Specification Requirements

DETERMINING THE SAFETY INTEGRITY LEVEL (SIL)

- Who's Responsible?
- Which Technique?
- Common Issues
- Evaluating Risk
- Safety Integrity Levels
- SIL Determination Method #1 (ALARP)
- SIL Determination Method #2 (Risk Matrix)
- SIL Determination Method #3 (LOPA)

CHOOSING A TECHNOLOGY

- Pneumatic Systems
- Relay Systems
- Solid-state Systems
- Microprocessor/PLC (Software-based) Systems
- Issues Related to System Size
- Issues Related to System Complexity
- Communications with Other Systems
- Certified vs. Prior Use

INITIAL SYSTEM EVALUATION

- Why Systems Should be Analyzed Before They're Built
- Where to Get Failure Rate Information
- Failure Modes
- Degree of Modeling Accuracy
- Modeling Methods
- The Real Impact of Redundancy
- Analysis of a Relay System
- Analysis of a Non-redundant PLC System
- Analysis of a TMR System
- Field Devices
- Fault Tolerance Requirements
- Engineering Tools Available for Analyzing System Performance

ISSUES RELATING TO FIELD DEVICES

- Importance of Field Devices
- Sensors
- Final Elements
- Redundancy
- Design Requirements for Field Devices
- Installation Concerns
- Wiring of Field Devices

ENGINEERING A SYSTEM

- General Management Considerations
- General Hardware Considerations
- General Software Considerations

INSTALLING A SYSTEM

- Factory Acceptance Testing (FAT)
- Installation
- Validation/Site Acceptance Tests (SAT)
- Functional Safety Assessment/Pre-startup Safety Review (PSSR)
- Training
- Handover to Operations
- Startup
- Post Startup Activities

FUNCTIONAL TESTING

- The Need for Testing
- Establishing Test Frequencies
- Responsibilities for Testing
- Test Facilities and Procedures

JUSTIFICATION FOR A SAFETY SYSTEM

- Safety System Failure Modes
- Responsibilities for Justification
- How to Justify
- Lifecycle Costs
- Lifecycle Cost Analysis
- Optimizing Safety, Reliability, and Lifecycle Costs