Safety Instrumented Systems and Functional Safety Training Course

30 May – 3 June 2027
Chicago

AGILE LEADERS
Training Center

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Ref: 1351_199866 **Date:** 30 May – 3 June 2027 **Location:** Chicago **Fees:** 12000 Euro

Overview

Safety Instrumented Systems and Functional Safety Training Course is a one-week advanced course for functional safety, instrumentation, process safety, operations, maintenance, and assurance personnel who leave with a Functional Safety Lifecycle Assurance Plan. Participants apply IEC 61511 lifecycle governance, safety instrumented function definition, safety integrity level decisions, safety requirements specification, SIS architecture verification, validation, proof testing, and performance monitoring. Agile Leaders Training Center presents safety instrumented systems through traceable lifecycle evidence and risk-reduction decisions.

Who Should Attend

- Functions responsible for functional safety governance and lifecycle planning
- Teams responsible for instrumentation, control, and SIS engineering
- Personnel responsible for process hazard analysis and risk-reduction allocation
- Operations and maintenance functions responsible for proof testing and bypass control
- Assurance teams responsible for verification, validation, assessment, and audit evidence

The course assumes participants work with process hazards, instrumentation, operations, or assurance and leaves out product certification, detailed software programming, and exam preparation.

Departments and Industries

The course supports departments and industries that specify, operate, maintain, or assure safety instrumented systems.

- Oil, gas, chemicals, and process manufacturing
- Power generation, utilities, and energy operations
- Pharmaceutical, food, and materials processing
- Instrumentation, automation, engineering, and project functions
- Process safety, operations, maintenance, and technical assurance teams

Learning Objectives

By the end of this course, participants will be able to:

- Analyze hazards and allocate risk reduction to protection layers
- Build safety instrumented function and SIL decision records
- Evaluate safety requirements specifications and SIS architectures
- Use verification and validation evidence across lifecycle stages
- Prioritize proof testing, bypass, maintenance, and change controls
- Build a Functional Safety Lifecycle Assurance Plan

Course Agenda

Day 1: Functional Safety Lifecycle Context

- IEC 61511 Functional Safety Lifecycle Map
- Hazard Scenario and Consequence Definition Worksheet
- Independent Protection Layer Allocation Matrix
- SIS BPCS and Alarm System Boundary Diagram
- Functional Safety Management Roles Chart

Day 2: SIF and SIL Requirements

- Safety Instrumented Function Definition Template
- Risk Graph and LOPA SIL Selection Methods
- Target Failure Measure Decision Record
- Safety Requirements Specification Checklist
- Cause and Effect Logic Matrix

Day 3: SIS Design and Verification

- Sensor Logic Solver and Final Element Architecture
- Hardware Fault Tolerance Review Method
- Common Cause and Systematic Failure Checklist
- SIL Verification Calculation Workflow
- Design Verification Traceability Matrix

Day 4: Validation and Operational Assurance

- Factory Acceptance and Site Acceptance Test Plan
- SIS Validation Protocol and Evidence Record
- Proof-Test Interval and Coverage Review
- Bypass Override and Impairment Control Register
- Management of Change and Performance Monitoring Dashboard

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Day 5: Functional Safety Assurance Practice

- Exercise: Hazard Scenario and Risk-Reduction Allocation
- Exercise: SIF SIL and Requirements Specification Review
- Exercise: Architecture and SIL Verification Evidence
- Exercise: Validation Proof Testing and Change Control
- Capstone Exercise: Functional Safety Lifecycle Assurance Plan

Practical Exercises

The course uses suggested activities from chemical processing, energy, utilities, pharmaceuticals, and manufacturing operations.

- Suggested activity: define a hazard scenario, identify protection layers, and document allocation of risk reduction to an SIF.
- Suggested activity: review a safety requirements specification and test its traceability to hazard and SIL decisions.
- Suggested activity: evaluate an SIS architecture and record verification assumptions, failure measures, and evidence gaps.
- Suggested activity: build a Functional Safety Lifecycle Assurance Plan covering validation, proof testing, bypasses, change, monitoring, and assessment.

FAQs

What are safety instrumented systems and functional safety?

Safety instrumented systems use sensors, logic solvers, and final elements to perform defined safety functions, while functional safety manages whether those functions achieve the required risk reduction throughout their lifecycle.

Who suits safety instrumented systems training, and what does it assume?

Safety instrumented systems training suits engineering, process safety, operations, maintenance, and assurance personnel and assumes experience with process hazards, instrumentation, or operational controls.

How does functional safety training differ from general process safety training?

Functional safety training concentrates on instrumented risk reduction, SIF requirements, SIL decisions, SIS architecture, lifecycle evidence, and performance; general process safety training addresses a wider management system and hazard-control scope.

How is a safety integrity level selected for a safety instrumented function?

A safety integrity level is selected by defining the hazardous scenario, estimating required risk reduction, crediting valid independent protection layers, and documenting the target performance needed from the safety instrumented function.

Why are proof testing and change control important for SIS performance?

Proof testing and change control preserve SIS performance by detecting dangerous hidden failures, managing impairments and bypasses, maintaining configuration integrity, and updating lifecycle evidence when plant or operating conditions change.

Conclusion

The course connects hazard analysis, risk-reduction allocation, SIF definition, SIL decisions, requirements, architecture, verification, validation, and operational assurance. Participants take back a Functional Safety Lifecycle Assurance Plan with responsibilities, evidence, controls, assessments, and review points. The plan changes how SIS decisions remain traceable from hazard scenarios through operation, maintenance, modification, and performance review.