

Course Name

Safety Instrumented Systems & Functional Safety

Sector Name

Instrumentation & Controls

Document Type

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Safety Instrumented Systems & Functional Safety

Course Introduction

Industrial processes can develop hazardous conditions that normal process control alone may not be able to prevent or contain. When critical parameters move beyond safe operating limits, Safety Instrumented Systems provide an independent layer of protection designed to detect dangerous conditions and move the process toward a safe state. The effectiveness of this protection depends not only on individual devices, but on correctly defining safety functions, establishing required integrity, maintaining independence, and ensuring reliable performance throughout the system lifecycle.

Boost Consulting & Training offers this course to develop a practical understanding of Safety Instrumented Systems and functional safety within industrial environments. Participants explore protection layers, Safety Instrumented Functions, SIL concepts, SIS architecture, sensors, logic solvers, final elements, lifecycle activities, testing, failure behavior, and performance verification. Practical exercises connect hazard scenarios with the engineering decisions required to establish and maintain effective safety functions.

The **main concept of this course** is to translate process hazards into clearly defined and dependable safety functions that reduce risk

and continue to provide the required protection throughout their operating lifecycle.

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Target Audience

- ✓ Instrumentation and control engineers
- ✓ Process and functional safety engineers
- ✓ Automation and SIS specialists
- ✓ Engineers responsible for safety-critical industrial systems

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Learning Objectives

- ✓ Explain the principles of functional safety and the role of Safety Instrumented Systems.
- ✓ Distinguish SIS from basic process control and other protection layers.
- ✓ Defining the purpose and components of a Safety Instrumented Function.
- ✓ Interpret Safety Integrity Level concepts and their relationship with risk reduction.
- ✓ Evaluate sensors, logic solvers, and final elements within SIS architectures.
- ✓ Recognize failure modes and factors affecting safety-function reliability.
- ✓ Apply testing, maintenance, and management principles across the SIS lifecycle.
- ✓ Evaluate safety-function performance and identify conditions requiring corrective action.

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Course Outline

✓ DAY 01

Positioning SIS within Process Safety

Understanding Layers of Protection

- ✓ Examine how process design, basic control, alarms, operator actions, SIS, and other protection measures contribute to risk reduction.
- ✓ Distinguish preventive and mitigative protection functions.
- ✓ Identify situations where normal process control cannot provide the required independent protection.

Understanding Functional Safety

- ✓ Connect hazardous process conditions with the need for defined safety functions.
- ✓ Distinguish the Basic Process Control System from Safety Instrumented Systems.
- ✓ Complete a **Protection Layer Mapping Exercise** for an industrial hazard scenario.

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Course Outline

✓ DAY 02

Defining Safety Instrumented Functions

Building a Safety Instrumented Function

- ✓ Identify the sensor, logic solver, and final element path within SIF.
- ✓ Define the hazardous condition, trip criteria, required action, and safe state.
- ✓ Distinguish individual SIFs from the overall Safety Instrumented System.

Developing Functional Requirements

- ✓ Translate hazard information into clear safety-function requirements.
- ✓ Consider trip settings, response time, operating modes, reset conditions, and independence.
- ✓ Complete a **SIF Definition Challenge** based on a realistic process hazard.

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Course Outline

✓ DAY 03

Understanding SIL and SIS Architecture

Interpreting Safety Integrity Levels

- ✓ Understand SIL as a measure of required risk reduction and safety-function integrity.
- ✓ Examine the relationship between failure probability, demand mode, and required performance.
- ✓ Avoid common misunderstandings when applying SIL terminology to devices and complete safety functions.

Evaluating SIS Architecture

- ✓ Compare common sensor, logic solver, and final-element voting arrangements.
- ✓ Examine redundancy, diagnostics, common-cause failures, and independence.
- ✓ Complete an **SIS Architecture Assessment** comparing alternative protection arrangements.

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Course Outline

✓ DAY 04

Managing Failure and Proof Testing

Understanding Safety Function Failure

- ✓ Distinguish dangerous, safe, detected, and undetected failure behavior.
- ✓ Examine how diagnostics, bypasses, overrides, and degraded equipment affect protection.
- ✓ Identify conditions that can compromise the availability or integrity of a SIF.

Applying Proof Testing

- ✓ Understand the purpose and scope of proof testing within functional safety.
- ✓ Evaluate test coverage, test intervals, documentation, and restoration to service.
- ✓ Conduct a **Proof Test Scenario** involving hidden failures and incomplete testing.

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Course Outline

✓ DAY 05

Managing Functional Safety through the Lifecycle

Maintaining SIS Performance

- ✓ Connect operation, maintenance, testing, modification, and documentation with continuing functional safety.
- ✓ Evaluate the effects of unauthorized changes, temporary bypasses, overdue testing, and changing process conditions.
- ✓ Recognize when modifications require formal reassessment of the safety function.

Evaluating a Complete Safety Function

- ✓ Review hazard, SIF requirements, SIL expectations, architecture, testing, and operating evidence as one system.
- ✓ Identify weaknesses that could prevent the required risk reduction from being achieved.
- ✓ Complete a **Functional Safety Lifecycle Case** from hazard identification and SIF definition through architecture, proof testing, operational change, and final performance assessment.



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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Dec. 28, 2026	Jan. 1, 2027	5 days	4950.00 \$	Turkey , Istanbul
April 5, 2027	April 9, 2027	5 days	4250.00 \$	UAE , Dubai
Aug. 2, 2027	Aug. 6, 2027	5 days	4250.00 \$	UAE , Abu Dhabi
Sept. 5, 2027	Sept. 9, 2027	5 days	4250.00 \$	KSA , Al Khobar

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