SIS TECH

Course Catalog

Alarm Management

PHA Fundamentals and Facilitation

LOPA Fundamentals and Applications

Safe Automation in the Process Industry

SIL Solver Enterprise, SIL Verification Tool

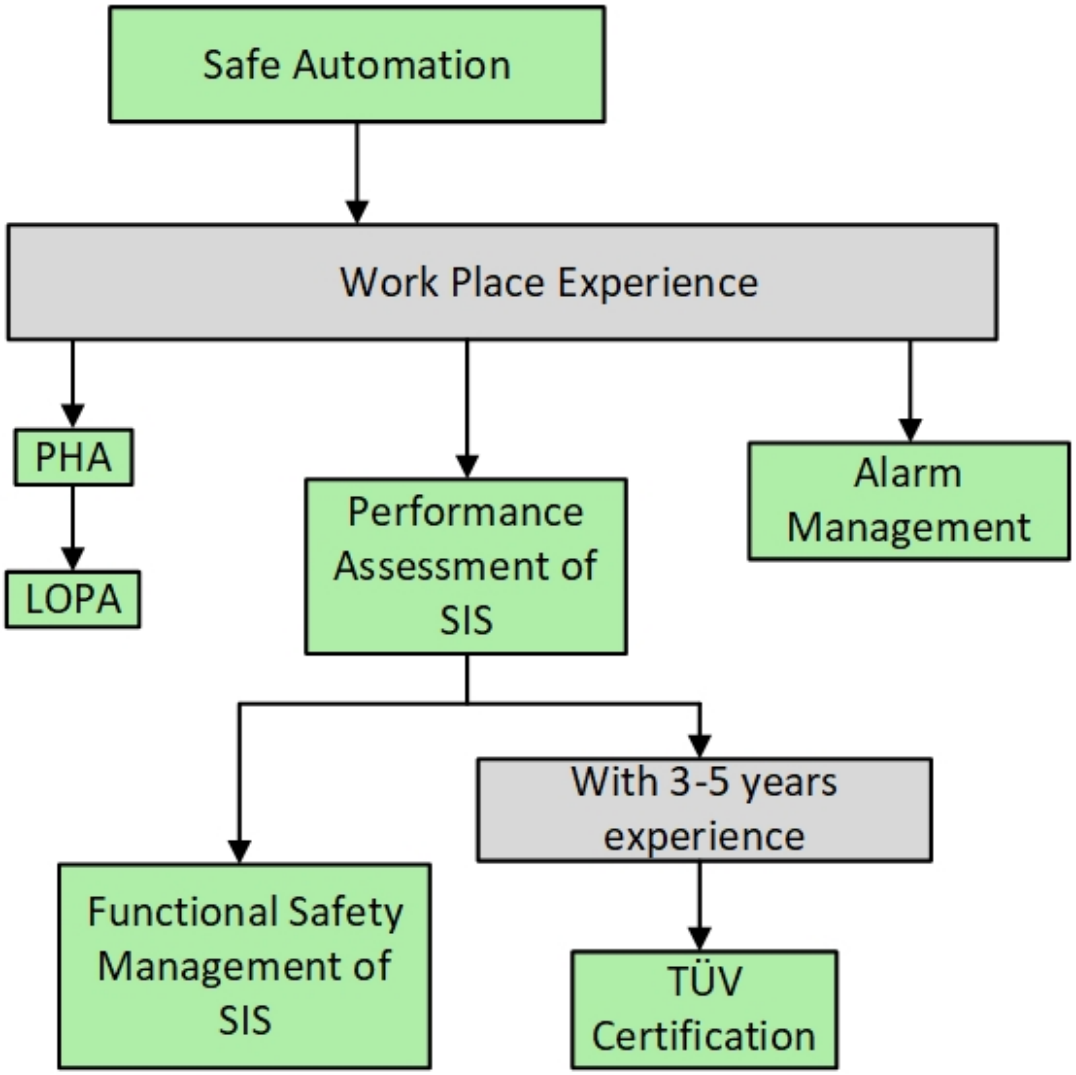
Performance Assessment of Safety Instrumented Systems

TÜV Functional Safety Engineer

Functional Safety Management of Safety Instrumented Systems

We're Proven-In-Use®

Suggested Course Path



Dr. Angela Summers

Dr. Summers has over twenty years of process, environmental, and safety instrumented system (SIS) design experience. Dr. Summers is a US representative to the international IEC 61508/61511 committee, is chair of the TR84.02 and TR84.04 committees and has authored a book on instrumented protective systems for CCPS. She is a recognized expert in the automation field and serves as a technical consultant on many other industrial standards.

William Hearn

Bill Hearn is a TUV Functional Safety Expert with more than 30 years of engineering and project management experience focused on instrumentation, process measurement, and safety systems. His experience ranges from managing major project installations to performing risk assessments and drill down compliance audits. He was a member of the API Task Group on Tank Overfill Prevention and actively supports several ISA Working Groups.

Watson Dupont

Watson has more than 30 years of process safety management experience. He has extensive knowledge in project operations, environmental, and safety where he gained experience with numerous risk mitigation techniques and PSM compliance.

Eloise Roche

Eloise has 24 years chemical industry background, largely in automation and functional safety managmement. She specializes in safety controls, alarms, and interlocks (SCAI) and is a member of USTAG to IEC 61511 committee and multiple ISA 84 working groups. She is a Certified Functional Safety Expert.

Safe Automation in the Process Industry

Time: Three days: 8:30 am to 4:30 pm
CEUs: 2.3

Audience: Process engineering, process automation, and process safety personnel

Description: *Safe Automation in the Process industry* is a three-day course designed to orient attendees to the principles of safe automation, including the practices and terminology used in the design and implementation of instrumented safeguards. Experienced personnel can also benefit from awareness of more recent developments in safe automation terminology, updated standards, and techniques on sharing these concepts with newer employees.

This course will introduce the key concepts and practices necessary to design and implement safe automation, including the following topics:

- Safe automation lifecycle process
- Safe automation fundamentals, including application program, HMI, procedure and personnel systems
- Instrument justification and alarm management
- Designing automation for functional safety
- Control and safety system hardware selection (e.g., instrumentation, logic solvers, auxiliaries)
- Controlling systematic error in automation systems, including designing for security
- Safe automation metrics

The course participants will gain an understanding of the following:

- Relationship between inherently safer design and functional safety.
- How safe automation is included in the standard project work process.
- How operating objectives and inherently safer design principles are incorporated into reliable automation design.
- Fundamentals of safety function specification.
- Essentials of alarm management, including instrument and alarm justification.
- How automation network design impacts cybersecurity of the systems.
- Selecting automation devices that are fit for purpose and reliable.
- Establishing metrics for automation performance
- Key instrumented safeguard management practices, including bypass management, change management, maintenance planning, automation organization planning, auditing, etc.

Instructor: Eloise Roche is a Senior SCAI Consultant with expertise in and passion for sustainable process safety lifecycle management, effective assessment of instrumented protection systems, and related curriculum development and delivery. Competencies include PHA and LOPA facilitation, SCAI specification and verification, and functional safety assessment and auditing.

PROCESS HAZARDS ANALYSIS: Fundamentals and Facilitation

Time: 1st Day - 8:30am to 4:30pm 2nd Day - 8:30am to 3:30pm
CEUs: 1.4

Audience: Process safety specialists, risk analysts and process engineers; Designed for future facilitators. Participation as a team member in previous PHA's is a plus.

Description: This course covers the fundamentals of how to facilitate a Process Hazard Analysis (PHA) during process design and execution, on operating units, and as part of a management of change review. The lecture presents the fundamentals of the PHA process, facilitation skills, and assessing risk. The course includes multiple workshops to reinforce key concepts.

1st Day	2nd Day

• Facilitation Guidance
  o Facilitator Role
  o Meeting Preparation
  o Laying the Ground-Rules
  o Understanding Team Dynamics
• Process Hazard Analysis (PHA) Overview
  o OSHA/EPA Requirements
  o PHA Methodologies/Techniques
• Identifying Resources
• Gathering Process Safety Information
• Basic Assumptions
• Understanding Noding
• Deviations (Guidewords and Parameters For HAZOP)
• Developing Design Intent
• Identifying Causes
	• Consequences and Severity
	  o Safety
	  o Environmental
	  o Economic
	• What Are Safeguards
	  o Administrative vs engineered
	  o Proactive vs reactive
	• Understanding and Evaluating Risk
	  o Different risk endpoints
	  o Different methods for evaluation
	• Writing of Recommendations
	  o Specific
	  o Achievable
	• Developing Reports

Instructor: Watson Dupont has more than 30-years of experience with Amoco/BP and over 4-years with SIS-TECH. Watson started his career as a process engineer working his way up to Process Safety Manager for the Whiting refinery expansion project. He has extensive knowledge in projects, operations, environmental, and safety where he gained experience with numerous risk mitigation techniques and PSM compliance audits. Watson has a strong background in environmental projects, providing leadership and coaching to site personnel, which yielded effective compliance. He has experience with EPA negotiations, as well as OSHA and State environmental regulations.

LAYERS OF PROTECTION ANALYSIS: Fundamentals and Application

Time: 1st Day - 8:30am to 4:30pm 2nd Day - 8:30am to 3:30pm
CEUs: 1.4

Audience: Process safety specialists, risk analysts, process engineers, control system specialists, and production engineers. Participation in previous PHA's is a plus.

Description: This course covers the fundamentals of the LOPA process, how to assess whether a safeguard is an IPL, the different risk definitions, how the math works, and the management processes needed to validate assumptions. Includes multiple workshops to reinforce key concepts.

1st Day	2nd Day

• Risk Management
  o Process risk measurements
  o PHA Workshop
• Risk Criteria
  o Hazardous and harmful events
  o Enabling conditions and conditional modifiers
  o LOPA criteria
  o Frequency workshop
• Independent protection layers (IPL)
  o Types
  o Assessing independence
  o Independence workshop
• Core Attributes
  o Core attributes workshop
	• LOPA Methodology
	  o Initiating cause frequency
	  o IPL risk reduction
	  o Independence of control and instrumented safeguards
	  o LOPA IPL workshop
	• IPLs and side effects
	  o Understanding secondary consequences
	• Multiple LOPA workshop examples

Instructor: Bill Hearn is a TÜV Rheinland Functional Safety Expert and a SIS-TECH Fellow with more than 30 years of engineering and project management experience focused on instrumentation, process measurement, and safety systems. After service in the US Army, Bill's career spanned DuPont, Westinghouse and Washington Group while providing project management and instrumentation engineering expertise at the Department of Energy Savannah River facility. His experience ranges from managing major project installations to performing risk assessments and drill down compliance audits.

SIL Solver Enterprise®

Audience: SIL Solver users
Time: 8:00am to 3:30pm
CEUs: 0.75

Audience: Control system specialists, instrumentation and electrical personnel, and SIS design specialists

Description: The SIL Solver® Enterprise course is designed to introduce new users to SIL Solver Enterprise and how it is used to verify the safety integrity level (SIL) and spurious trip rate (STR) of safety instrumented functions (SIF). The course is 50% lecture and 50% hands on practice. Participants must bring a laptop computer with WiFi access.

The lecture provides an overview of SIL Solver® features, including how to use it, software constraints and assumptions, and advanced features that make the calculations more efficient. Attendees get hands-on practice by doing calculations on a series of case studies. The course instructor will review each case study at the conclusion of the workshop with the attendees and explain how the cases is modeled and what the results mean from a design and maintenance standpoint.

Outline:

1. Identifying the SIF to be modelled
2. How to navigate
   - Creating projects
   - Building functions
   - Using datasheets
3. Variables that impact the calculation
   - Fail dangerous rate and spurious trip rate
   - Voting
   - Test interval
   - Mean time to restoration
   - Diagnostic coverage & diagnostic interval
   - Proof test coverage and overhaul interval
   - Common cause factor
4. Data sheets and user options
   - Where SIL Solver data comes from
   - How to build your own data sheets
   - How to backup your data sheets
5. Basic and advanced features
6. Report printing

Instructors:

Bill Hearn is a TÜV Rheinland Functional Safety Expert and a SIS-TECH Fellow with more than 30 years of engineering and project management experience focused on instrumentation, process measurement, and safety systems. After service in the US Army, Bill's career spanned DuPont, Westinghouse and Washington Group while providing project management and instrumentation engineering expertise at the Department of Energy Savannah River facility. His experience ranges from managing major project installations to performing risk assessments and drill down compliance audits.

Eloise Roche is a TÜV Rheinland Functional Safety Expert and a SIS-TECH Senior SCAI Consultant with more than 25 years expertise in and passion for sustainable process safety lifecycle management, effective assessment of instrumented protective systems, and course development and delivery. Competencies include PHA and LOPA facilitation, SCAI specification and verification, and functional safety assessment and auditing.

Performance Assessment of Safety Instrumented Systems

Time: 1st Day - 8:30am to 4:30pm 2nd Day - 8:30am to 3:30pm
CEUs: 1.4

Audience: Control system specialists, instrumentation and electrical personnel, and SIS design specialists

Description: This course covers the verification of SIL and spurious trip rate for safety instrumented functions. Includes calculation methodology, failure rate data and key design parameters. Example workshops reinforce key concepts and illustrate calculation complexities.

1st Day	2nd Day
1. Overview of SIS standards 2. Failure Modes and Effects Analysis (FMEA) 3. Math • Probability of failure on demand • Spurious trip rate 4. Key Elements • Device failure rate – safe and dangerous • Voting/fault tolerance • Test Interval • Proof test effectiveness and overhaul interval • Diagnostic coverage • Common cause 5. Periodic Workshops throughout the day • How to read manufacturer certification reports • How to model SIF based on LOPA recommendations • Understanding mean time to failure and useful life • Partial stroke testing and diagnostic coverage	1. Group exercises • Impact of diagnostics and need for compensation measures • Calculation demonstration showing the impact of redundancy 2. Individual Workshops • Various case studies are modeled by attendees to illustrate different types of calculation complexities

Instructors:

Bill Hearn is a TÜV Rheinland Functional Safety Expert and a SIS-TECH Fellow with more than 30 years of engineering and project management experience focused on instrumentation, process measurement, and safety systems. After service in the US Army, Bill's career spanned DuPont, Westinghouse and Washington Group while providing project management and instrumentation engineering expertise at the Department of Energy Savannah River facility. His experience ranges from managing major project installations to performing risk assessments and drill down compliance audits.

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Functional Safety Management of Safety Instrumented Systems

Time: Day 1 8:30 am to 4:30 pm Day 2 8:30 am to 4:30 pm Day 3 8:30 am to 4:00 pm
CEU: 2.3

Audience: Control system specialists, instrumentation and electrical personnel, and SIS design specialists, who want to prepare for TUV certification

Description: This 3-day course explains how hazards and risk analysis methods are used to identify the need for risk reduction from administrative and engineered safeguards. When a safety instrumented system (SIS) is required, the assigned risk reduction must be demonstrated through proof of compliance to the requirements of the international standard, IEC 61511. This standard establishes lifecycle requirements for designing and managing SISs to achieve order of magnitude ranges of risk reduction known as safety integrity levers (SIL) 1-4. The course supplements IEC 61511 requirements with additional guidance from other industry publications.

The course is designed to provide the attendee with an understanding of the functional safety management system, how to perform the hazards and risk analysis to identify the need for an SIS and to assign the SIL, how to design the SIS to meet the specified SIL, how to verify that the SIL is achieved, and how to develop an operating plan to maintain the SIL throughout the SIS life.

DAY 1 – GETTING STARTED	*DAY 2 – RISK ANALYSIS TO DESIGN*	*DAY 3 –VERIFICATION AND OPERATING BASIS*
• Module 1 - SIS Standards Overview • Module 2 - Planning • Module 3 - Process Risk and Protection Layers • Module 4 - Establishing Risk Evaluation Criteria	• Module 5 - Layer of Protection Analysis (LOPA) • Module 6 - Safety Requirements Specification Part 1 • Module 7 - Safety Requirements Specification Part 2 • Module 8 - Selection of Devices	• Module 9 - Data Estimation • Module 10 - Design Decisions • Module 11 - Verification Example • Module 12 - Operating Basis

Instructors:

Angela Summers is a TÜV Rheinland Functional Safety Expert and president of SIS-TECH Solutions with more than 20 years expertise in safety instrumented systems, process engineering and environmental engineering. She has published more than 50 papers on topics related to process safety, has written chapters for engineering handbooks and was lead editor for the Center for Chemical Process Safety book, *Guidelines for Safe Automation of Chemical Processes*.

Bill Hearn is a TÜV Rheinland Functional Safety Expert and a SIS-TECH Fellow with more than 30 years of engineering and project management experience focused on instrumentation, process measurement, and safety systems. After service in the US Army, Bill's career spanned DuPont, Westinghouse and Washington Group while providing project management and instrumentation engineering expertise at the Department of Energy Savannah River facility. His experience ranges from managing major project installations to performing risk assessments and drill down compliance audits.

TÜV Rheinland Functional Safety Engineer Certification

Time:	Day 1	8:30 am to 4:30 pm	Day 2	8:30 am to 4:30 pm	Day 3	8:30 am to 4:00 pm	
	Day 4	8:30 am to 11:30 am	Test	1:00 pm to 5:00 pm			
CEU:		2.3					

Audience: Control system specialists, instrumentation and electrical personnel, and SIS design specialists, who want to prepare for TUV certification

Description: This 3½ day course explains how hazards and risk analysis methods are used to identify the need for risk reduction from administrative and engineered safeguards. When a safety instrumented system (SIS) is required, the assigned risk reduction must be demonstrated through proof of compliance to the requirements of the international standard, IEC 61511. This standard establishes lifecycle requirements for designing and managing SISs to achieve order of magnitude ranges of risk reduction known as safety integrity levers (SIL) 1-4. The course supplements IEC 61511 requirements with additional guidance from other industry publications.

The course is designed to provide the attendee with an understanding of the functional safety management system, how to perform the hazards and risk analysis to identify the need for an SIS and to assign the SIL, how to design the SIS to meet the specified SIL, how to verify that the SIL is achieved, and how to develop an operating plan to maintain the SIL throughout the SIS life.

DAY 1 – GETTING STARTED	*DAY 2 – RISK ANALYSIS TO DESIGN*	*DAY 3 –VERIFICATION AND OPERATING BASIS*
• Module 1 - SIS Standards Overview • Module 2 - Planning • Module 3 - Process Risk and Protection Layers • Module 4 - Establishing Risk Evaluation Criteria	• Module 5 - Layer of Protection Analysis (LOPA) • Module 6 - Safety Requirements Specification Part 1 • Module 7 - Safety Requirements Specification Part 2 • Module 8 - Selection of Devices	• Module 9 - Data Estimation • Module 10 - Design Decisions • Module 11 - Verification Example • Module 12 - Operating Basis
DAY 4 –REVIEW AND TEST	• Why TÜV Rheinland FSE • Lifecycle Overview	• Test

Instructors:

Angela Summers is a TÜV Rheinland Functional Safety Expert and president of SIS-TECH Solutions with more than 20 years expertise in safety instrumented systems, process engineering and environmental engineering. She has published more than 50 papers on topics related to process safety, has written chapters for engineering handbooks and was lead editor for the Center for Chemical Process Safety book, *Guidelines for Safe Automation of Chemical Processes*.

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Certifications

Safe Automation in the Process Industry, Process Hazards Analysis: Fundamentals and Facilitation, Layer of Protection Analysis: Fundamentals and Applications, Performance Assessment of Safety Instrumented Systems, and Functional Safety Management of Safety Instrumented Systems are offered through the Mary Kay O'Connor Process Safety Center, part of Texas A&M University. Every attendee of a course taught through the Center receives a certificate of completion and CEU from Texas A&M.

TÜV Rheinland Functioanl Safety Engineer is a 3 ½ day course with ½ day test. The applicant is certified by TÜV Rheinland, so it requires a test and application fee to be paid to TÜV Rheinland in addition to the course fee. The course pre-requisite is experience and knowledge in implementing instrumentation and controls. The applicant must prove the course pre-requisite as part of the application to TÜV Rheinland. The applicant must have a minimum of 3 years of experience and an engineering degree or equivalent engineer level responsibilities as certified by their employer. A comprehensive test requires applications of the key learning points to case studies.

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713-909-2100

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