CFSE

ENDORSEMENT PROGRAM

The CFSE endorsement program helps current holders of CFSE and CFSP certification build /demonstrate expertise and knowledge in specific focus areas of functional safety.

What is CFSE?

Having trained and competent people is a requirement for compliance with international safety standards IEC 61508, IEC 61511 / ISA 84, and IEC 62061. These standards require proof of qualification that personnel performing analysis, design, realization, operation, and maintenance activities for Safety Instrumented Systems (SIS) are competent.

The Certified Functional Safety Expert (CFSE) program helps individuals gain the knowledge and skills necessary to become recognized experts in the application of safety systems. It provides a methodology for demonstration of requisite skills and competence via a review of the applicant's experience and the satisfactory completion of a proficiency exam. Passing the CFSE exam requires a solid in-depth knowledge of functional safety.

What is a "CFSE Endorsement?"

Introduced in 2000, CFSE was the first personnel functional safety certification program in the industry, and remains the most prestigious and sought after program to this day. In order to keep up with changes in functional safety and to continue to meet the needs of its members, the CFSE Governance Board has introduced an endorsement program. The endorsement program allows candidates to build on their existing broad base of functional safety knowledge by developing and demonstrating expertise in specific focus areas:

- Functional Safety Management (FSM)
- Process Hazard Analysis (PHA)
- Consequence Analysis
- Likelihood Analysis
- SIF Design
- SIL Verification
- SIL Target Selection / LOPA
- Safety Requirements
- Proof Test Planning
- Maintenance Data Analysis
- Application Software
- Factory Acceptance Testing/Installation, Commissioning, and Validation
- SIS Safety Validation / Site Acceptance Testing
- SIS Operation & Maintenance
- Alarm Management
- Control System Cybersecurity

CFSE Endorsement Program™

Why Participate?

Participation in the endorsement program can provide many benefits to you and/or your company:

- Professional growth and development
- Acquire / Demonstrate expertise in specific areas of functional safety
- Make yourself a more valuable safety engineer
- Fulfill continuing education requirements
- Standout in the field of safety
- Keep up with changes in technology and best practices
- Differentiate yourself from other safety practitioners

Who Should Participate?

Only existing CFSEs or CFSPs are eligible to participate in this program. Candidates should also have a desire to master new skills in the field of functional safety. The following list includes, but is not limited to those you may be interested in pursuing this program:

- Loss prevention professionals
- Process safety coordinators
- Plant risk analysts
- Control engineers and their management
- System integrators

How to Earn a CFSE Endorsement

Passing an endorsement examination demonstrates proven capabilities and subject matter expertise beyond that which is required for the CFSE or CFSP credentials. To successfully earn an endorsement:

- Complete a brief online application and registration (www.cfse.org)
- Pay the registration / examination fee: $249.00 USD
- Select the specific area of endorsement for examination (e.g., SIL Verification)
- Complete the online examination (40 multiple choice questions)
- Score 80% or greater in the proficiency exam

The focus of the CFSE program has always been on developing usable knowledge and skills, rather than simply passing a test. Optional preparatory training classes are offered by our partners in both on-demand (web-based) and in-person formats.

A detailed look at the CFSE Endorsement options:

FUNCTIONAL SAFETY MANAGEMENT

- Understand the purpose of FSM and expected results from a good FSM program
- Describe the essential elements of document control
- Know FSM auditing techniques
- Draw and explain an example of the Safety Lifecycle
- Describe a personnel competency evaluation system for functional safety

CONSEQUENCE ANALYSIS

- Understand how consequence analysis fits into overall risk analysis
- Describe common quantitative consequence analysis techniques
- Understand receptor vulnerabilities
- Understand possible incident outcomes
- Evaluate the impact of dispersion variables

PROCESS HAZARD ANALYSIS

- Demonstrate knowledge of common PHA techniques and their associated strengths and weaknesses
- Understand the purpose and objectives of a PHA program
- Describe minimum PHA documentation
- Understand tolerable risk criteria, meaning, and usage in the PHA process
- List hazard identification techniques

LIKELIHOOD ANALYSIS

- Demonstrate ability to identify valid independent protection layers (IPL)
- Describe the attributes of an IPL
- Understand the proof testing requirements for protection layers
- Estimate probability of failure for a protection layer
- Describe rules for human reliability analysis

SIF DESIGN

- Understand the impact of various types of redundant architectures on reliability, availability, maintainability, etc.
- Understand SIS equipment justification
- Describe the impact and significance of functional safety “Certification” for a product
- Describe the requirements for an Limited Variability Language (LVL) software process
- Explain how different proof testing techniques impact diagnostic coverage

CFSE Endorsement Program™

SAFETY REQUIREMENTS

- Understand the minimum requirements of an Safety Requirements Specification (SRS) and its purpose
- Define typical requirements such as “process safety time”
- Know when an SRS is required in the Safety Lifecycle
- Understand the impact of SRS changes in other Safety Lifecycle activities
- Understand SRS requirements that are added before and after conceptual design

PROOF TEST PLANNING

- Understand the tradeoffs in various proof testing techniques
- Understand the concept of proof test coverage
- Describe proof test result documentation requirements
- Demonstrate ability to calculate the impact of proof test coverage on PFDavg and SIL achieved
- Understand lifecycle cost impact of proof testing

MAINTENANCE DATA ANALYSIS

- Understand proof test “as found” documentation requirements
- Recognize common problems in failure data analysis
- Demonstrate ability to calculate failure rates from a complete set of field failure data
- Define minimum incident documentation requirements
- Describe failure mode taxonomies for common instrumentation

APPLICATION SOFTWARE

- Understand various types of software classifications
- Describe the process requirements for LVL software
- Explain the process requirements for Fixed Program Language (FPL) programming
- Understand software testing techniques
- List minimum documentation requirements for various types of software

FACTORY ACCEPTANCE TESTING / INSTALLATION, COMMISSIONING, AND VALIDATION

- Describe the purpose and objectives of the installation and commissioning process
- Understand installation requirements and verification techniques
- Write a commissioning/validation test for common instruments
- Describe commissioning/validation test documentation requirements
- Understand FAT versus SAT requirements and objectives

SIS OPERATION AND MAINTENANCE

- Describe the objectives of an SIS operation and maintenance process
- Ability to estimate “Maintenance Capability” and its impact on PFDavg
- Describe the essential requirements of an effective maintenance capability program
- Describe the impact of delayed proof testing
- Understand proof test coverage and how it effects the reliability of a SIF

SIL TARGET SELECTION / LOPA

- Understand common SIL target selection techniques and the strengths and weaknesses of each
- Calculate frequency of an incident using quantitative Layer of Protection Analysis (LOPA) techniques
- Show how LOPA can used to complement other SIL target selection techniques
- Demonstrate ability to estimate probability of failure for a layer of protection
- Calculate required risk reduction using quantitative tolerable risk criteria

SIL VERIFICATION (SIF VERIFICATION)

- Understand architecture constraints and when they apply
- Explain the concept of SIL Capability
- Demonstrate ability to calculate simple PFH / PFDavg for a set of equipment
- Describe the various sources of failure rate data
- Know when to use “cycle test” data

ALARM MANAGEMENT

- Understand the alarm management lifecycle: similarities, differences and connections to the functional safety lifecycle
- Explain considerations for treatment of safety-critical alarms (rationalization, classification, prioritization, management-of-change, human machine interface design)
- Evaluate risk reduction / probability of failure on demand (PFD) of alarms used as an independent protection layer
- Optimize the effectiveness of alarms used as safeguards and layers of protection

CONTROL SYSTEM CYBERSECURITY

- Understand differences between IT security and control system security
- Describe how cyber security practices and principles can be applied to safety instrumented systems (SIS)
- Evaluate cyber security risk
- Define the key considerations for creating secure SIS architecture

For more information regarding the CFSE Endorsement Program, please visit: www.cfse.org