



## ◀ Safety Integrity Level (SIL) Verification

**Time:** 1<sup>st</sup> Day - 8:30am to 4:30pm  
2<sup>nd</sup> Day - 8:30am to 2:30pm

**CEUs:** 1.4

**Audience:** Control systems engineers, instrument engineers, and process safety specialists

**Course Description:** A two-day course on the performance verification of safety instrumented functions. While the safety integrity level is an important design parameter, the spurious trip rate is the critical parameter for operational reliability. This course discusses the fundamentals of quantifying the probability of failure on demand and the spurious trip rate, including the failure rate data, key factors affecting performance, and the calculation methodology. The course presents a series of examples as workshops to illustrate the important concepts and assumptions implicit in the calculations.

### 1<sup>st</sup> Day

- Overview of SIS standards
- Failure fundamentals-Failure Modes and Effects Analysis (FMEA)
- Introduction to the math for probability of failure on demand and spurious trip rate
- Key Elements
  - Integrity – where do you get data from? What does it mean?
  - Voting/Fault Tolerance – why do you need redundancy? How does it help?
  - Test Interval – how does the test interval affect the integrity?
  - Diagnostic Coverage – what effect does diagnostics have?
  - Common Cause – how is this modeled?
- Periodic Workshops throughout the day
  - How to read manufacture's Certification reports
  - How to model SIF based on LOPA recommendations
  - Understanding mean time to failure and useful life
  - Partial stroke testing and diagnostic coverage

### 2<sup>nd</sup> Day

- Example System
  - Impact of diagnostics and need for compensation measures
  - Calculation walk throughs determining initial SIL and showing the impact of redundancy
- Workshops -- problems worked by students. During the workshop the course instructor will review cases with the attendees and explain how the cases should be modeled and what the results mean from a design and maintenance standpoint.

Course developed by Dr. Angela Summers: •2009 ISA Fellow, •Technical editor for Guidelines for Safe and Reliable Instrumented Protective Systems •1 of 5 US Experts to the IEC 61508/IEC 61511 committee • Working Group Chair, TR84.00.02 (SIL Verification) and TR84.00.04 (Guidance on ISA 84.00.01-2004) • Member: ISA, IEC, API, NFPA, and CCPS • Ph.D. and Engineering Fellow, The University of Alabama • Licensed Professional Engineer in the State of Texas.