



SAFETY INTEGRITY LEVEL (SIL) VERIFICATION

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

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, including calculation of the probability of failure on demand (PFD) and spurious trip rate (STR). This course covers fundamental concepts, such as failure modes and effects, failure rate data, key design parameters, and the calculation methodology. The course presents a series of examples as workshops to illustrate the important concepts and assumptions implicit in the calculations.

1st 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 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

2nd Day

- Example System
 - Impact of diagnostics and need for compensation measures
 - Calculation demonstration showing the impact of redundancy
- Workshops -- problems worked by students. Various cases will be modeled showing how changes to design and maintenance strategy affect results.

About the Course Developer

Dr. Angela Summers is president of SIS-TECH, a specialty engineering and consulting company. She has more than 20 years of experience in safety instrumented systems (SIS), process engineering, and environmental engineering. She is an active participant in industrial practice's committees, such as CCPS, API, ISA and IEC, and has published over 50 papers on topics related to process safety and instrumented system design. She has written chapters on SIS for engineering handbooks and was lead editor for the Center for Chemical Process Safety book, *Guidelines for Safe and Reliable Instrumented Protective Systems*.



12621 Featherwood Drive • Suite 120 • Houston, Texas 77034
Tel: (281) 922-8324 • Fax: (281) 922-4362
www.SIS-Tech.com