

TÜV Rheinland Functional Safety Program

Training: Process Hazard and Risk Assessment

The TÜV Rheinland Functional Safety Program is a unique opportunity to provide evidence of competency in functional safety from an internationally recognised organisation

The PH&RA FS Engineer (TÜV Rheinland) certificate demonstrates competency in the early lifecycle phases with respect to achieving functional safety and provides a transferable skill set enabling staff to fulfill responsibilities and to perform activities to recognised standards of competence, in order to:

- *reduce risks*
- *satisfy legal and regulatory requirements*
- *meet the organisation's safety and business objectives*

By understanding:

- The PH&RA principles and concepts in the internationally agreed standards IEC 61508 and IEC 61511
- The concepts and principles behind international standards that cover the area of PH&RA and how and when to apply them including:
 - Hazard identification (HAZID) – ISO 17776
 - Hazard and operability study (HAZOP) – IEC 61882
 - Event Tree Analysis – IEC 62502
 - Fault Tree Analysis – IEC 61025
- Tolerable risk targets and the concept of reducing risks to As Low As Reasonably Practicable (ALARP)
- The concepts and differences between qualitative, semi quantitative and quantitative risk assessment methods and when and how to apply them
- How to set up, use and apply the most popular safety integrity level (SIL) risk assessment methods:
 - Risk Matrix

- Risk Graph
- Layers of protection analysis (LOPA)
- The Interface between PH&RA and the Safety Requirements Specification

Course Objectives

Colin Easton a globally recognised expert in functional safety leads the course. The course will provide participants with the knowledge for understanding and mastering the application of the most popular and internationally adopted methods and tools for identifying, assessing and managing the hazards and risks associated with their process operations, as well as the confidence to take a more active role in the PH&RA process.

Successful participants, who also have sufficient experience, will achieve the prestigious PH&RA FS Engineer (TÜV Rheinland) certificate.

The course is based around a practical case study that will be developed across the three days of the course taking the delegate from hazard identification through to developing the Safety Requirement Specification (SRS). The course is a modular structure of classroom tuition followed by a case study practical after each session, which will take the participant through the PH&RA process (IEC 61511-1 Lifecycle Phases 1-3). Day four consists of a four-hour two-part proficiency examination with:

Part 1 = 30 multiple-choice questions – 1 Hour

Part 2 = Case Study with 7 milestone questions – 3 Hours

Day 1 Agenda

Will provide an introduction to the background, concepts and principles to be applied during the course, process hazard analysis, risk assessment, allocation of safety functions and process and functional safety compliance and competency management will be discussed and participants will be introduced to the concepts of the international standards that cover this area of risk assessment and risk reduction.

The topics covered are:

- Introduction to TUV Rheinland Functional Safety Program
- PHRA background - IEC 61508 and IEC 61511
- Process, Functional Safety & Competency Management

- Introduction to Concepts and Principles of Hazards, Risk and ALARP
- Application of Risk Reduction Techniques
- Hazard Identification (HAZID)
- Introduction to the Case Study & HAZID – Session 1
- Hazard and Operability Study (HAZOP)
- HAZOP Case Study – Session 2

Day 2 Agenda

Develops on the case study work carried out in day one by taking the output from the HAZID and HAZOP case studies in terms of cause/consequence pairs and safeguards and applying them to Risk Analysis techniques such as RM, FTA and ETA. The second day also includes an introduction to selecting appropriate techniques for Human Error Analysis, such as PHEA, PIF and HEART, to determine the human factors applied in Safety Integrity Level (SIL) Determination.

The topics covered are:

- Risk Matrix (RM) for Determining Risk Reduction Requirements
- Risk Matrix Case Study – Session 3
- Fault Tree Analysis (ETA)
- FTA Case Study – Session 4
- Event Tree Analysis (FTA)
- ETA Case Study – Session 5
- Human Error Analysis (HEA):
 - Predictive Human Error Analysis (PHEA)
 - Performance Influencing Factors (PIF)
 - Human Error Assessment and Reduction Technique (HEART)
- HEART Case Study – Session 6

Day 3 Agenda

Develops on the case study work carried out in day one and two taking the outputs from the studies and applying them to Safety layer Matrix Risk Graph, LOPA, developing the SRS and applying them to the course case study.

. The topics covered are:

- Risk Graph Calibration and Application
- Risk Graph Case Study – Session 7
- Layers of Protection Analysis (LOPA)
- LOPA Case Study – Session 8
- Developing the Safety requirements Specification (SRS)
- SRS Case Study – Session 9
- Format of Exam and preparation and close.

Day 4 Agenda

A four (4) hour two part competency examination comprising:

Part 1 = 30 multiple-choice questions (1 mark each question);

Part 2 = Case Study with 7 milestones for questions (10 marks each question).

The pass score criterion is 75%

Who Should Attend?

Process Engineers, Safety Engineers and managers, Operations personnel and managers Instrument Engineers, and as well as Maintenance engineers and personnel, consultants, advisors, persons involved in management, engineering, operations and safety of process operations as well as persons with HAZID study experience and who are involved in any of the early lifecycle phases for process hazard and risk assessment, allocation of safety layers and safety requirements specification.

Participant eligibility requirements

In accordance with the TÜV Rheinland Functional Safety Program:

- A minimum of 3 to 5 years experience in the field of functional safety.
- University degree or equivalent engineering experience and responsibilities as certified by employer or engineering institution.

Course Provider

Colin Easton MInstMC MIET, FS Senior Expert (TÜV Rheinland) PH&RA & SIS ID
145/09

Prices: From £1950 GBP (Euro €2400) per participant

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