

TÜV Rheinland Functional Safety Program

Functional Safety Technician Machinery Course

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

The certified FS Technician (TÜV Rheinland) certificate demonstrates competency in the fundamentals of Functional Safety for Machinery and provides a skill set that is transferable from one work situation to another and enables staff to fulfill responsibilities and to perform activities to recognised standards of competence on a regular basis, in order to:

- *reduce risks*
- *satisfy legal and regulatory requirements*
- *meet the organization's business objectives.*

By understanding:

- The principles and concepts of the machinery standards IEC 62061, ISO 13849 including ISO 12100 and associated type A, B1, B2 and C standards
- Risk assessment using ISO 12100:2010 for the determination of necessary measures for the reduction of risks at machines.
- The requirements of ISO 13849 and IEC 62061 2nd Edition, regarding the use of standard components in safety functions, proof of safety, verification, and validation of safety functions. Examples for proof of FS.
- Safety functions of Machines, Start/re-start interlock, start functions, Emergency off, emergency switching off, stop categories muting and their realization according to the different safety categories.
- Circuit and schematic requirements for connection of safety devices according to the different safety categories.
- Requirements for validation documentation to demonstrate that systems, have been fully tested checked and approved.

Course Objectives

Successful participants, who also have sufficient functional safety experience, will achieve the prestigious FS Technician (TÜV Rheinland) Functional safety of Machinery certification.

The course will provide Two days of classroom tuition and practical guidance, mixed with practical exercises based on real life examples. Day three consists of a 90-minute proficiency examination with 50 multiple-choice questions

The required pass rate is 70% across both exams

Day 1 Agenda

Will introduce the machinery standards, the underpinning legislation and the concept of functional safety lifecycle and competency. The topics covered are:

- Legal Regulations, Standards, Categories and Definitions
- Overview of Standards
- Characteristics of a Safety Function
- Conformity Assessment
- PUWER Assessment
- ISO 12100 Risk Assessment and Risk Reduction
 - Risk Assessment, Performance Level & SIL Determination
- Standards for Functional Safety of Machinery - ISO 13849-1
 - Design Considerations and Categories
 - Safety Functions
 - Validation Tools:
 - Basic Safety Principles
 - Well-tried principles
 - Well-tried components
 - Fault Considerations and Exclusions
 - Evaluation of achieved Performance Level
 - Worked Examples - ISO 13849
- Standards for Functional Safety of Machinery - IEC 62061
 - Design process of a Safety Related Control System
 - Specification of the Safety Function (SF)
 - Design of a Safety Related Control System
 - Use of predesigned subsystems

- Basic Subsystem Architectures (A, B, C & D)
- Software
- Validation
- Example of a structured design of a SCS
- Worked Examples - IEC 62061 Design Process

Day 2 Agenda

Introduces a selection of the more commonly applied protective devices used on machines and the associated design requirements. The topics covered are:

- Protective Equipment for Machinery
- Safety Distances
- Separating Safety Equipment - Guards
- Interlocking and Guard Locking Devices
- Position and Proximity Switches
- Installation and Application
- Pressure Sensitive Edges, Bars and Bumpers
- Two-hand and Enabling Control Devices
- Circuit Examples Interlocking Devices
- Electro Sensitive Protection Equipment
- Pressure Sensitive Mats and Floors
- Safety Related Functions
- Power Drive Systems
- Start and Restart
- Hold to Run Control
- Emergency Stop, Emergency Switching Off, Stop Categories
- Muting and Muting Override
- Circuit Design

Day 3 Agenda

90 Minute - 50 multiple-choice question exam

The required pass rate is 70%

Primary Standards

ISO 12100: 2010 – Safety of Machinery – General Principles for Design

ISO 13857: 2008 - Safety Distances

IEC 62061:2021 – Safety of machinery – FS of safety-related control systems

ISO 13849-1,2: 2015 – Safety Related parts of Control Systems

ISO 13855: 2010 – Approach Speeds

ISO 13850: 2015 – Emergency Stop

EN 60204-1: 2018 – Safety of Machinery: Electrical Equipment

EN 61496-1,2: 2013 – Electro-Sensitive Protective Equipment

EU Machinery Directive 2006/42/EC Machinery Directive

Who Should Attend?

Instrument, Electrical, Mechanical, Operator, Process and Safety Technicians, as well as Operating and Maintenance personnel who are involved in machinery from risk assessment, design, installation, commissioning, validation, operations, and maintenance.

Participant eligibility requirements

In accordance with the TÜV Rheinland Functional Safety Program:

- A minimum of 2 years' experience working on industrial machinery.
- Vocational Certificate in a relevant engineering discipline **or** equivalent experience and responsibilities as certified by employer.

Course Provider

Colin Easton Eur Ing, CEng FInstMC MIET, RFSE, CASS RFSA, FS Senior Expert (TÜV Rheinland) PHRA, SIS & FS for Machinery ID 145/09.

Prices: From £1,300 GBP per participant

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