

The Application of EN ISO 13849-1 to the design of Safety Related Parts of Control Systems for Machinery

(1 day training course)

Course Purpose

The purpose of this course is to give designers of safety related control systems for machinery, the knowledge and tools to develop state of the art “Functional Safety Systems” and the appropriate application of standards EN ISO 13849-1 and practical methods of establishing the required system integrity and subsequent verification and validation of the design.

Course Accreditation

This course has been recognized by TÜV Rheinland as a “Level 3” program of study and meeting the quality management and quality system elements as defined by EN29004-2 / ISO9004-2.

Course Objectives

Learning objectives of this course:-

- To develop a working knowledge of standards EN ISO 13849 and its relationship with EN 62061 & EN 61508;
- To understand the meaning of acronyms such as SIL, PL, MTTF_d, DC, CCF, etc.
- To become familiar with functional safety techniques their integration into machinery control systems;
- To establish a design control management system over the development of the safety related control system;
- To determine the performance requirements for a machines safety related parts of its control system;
- Analysis of the design of a safety related control system;
- To be able to verify and validate the performance of the safety related control system using both qualitative and quantitative methods of assessment;
- To establish control over the operation, modification, maintenance & repair of a functional safety system.

Who will benefit?

This course is designed for control system designers, in particular those responsible for the configuration and maintenance of the safety related parts of control systems for machinery.

Topical Outlines:-

Introduction to Directives & Standards – (Modules 1 & 4)

Objective:-

An overview of the “New” Machinery Directive, it's essential requirements and the application of “Safety of Machinery” Standards.

Key Topics:-

- “New” Machinery Directive, and its Essential Requirements
- Safety of Machinery Standards – A, B & C type standard relationships
- An overview of the Safety of Machinery “core” standards
- “Functional Safety” – the relevance of EN 61508, EN 62061 & EN ISO 13849

Introduction to Risks Assessment & Risk Reduction – (Modules 6 & 7)

Objective:-

Assessing risks associated with machinery and their application environment and how control over the risks may be applied.

“Seamless” application of risk assessment in determining the Performance Level required of a safety related control system.

To develop an understanding of the methods and processes of risk reduction related to risk assessment and hierarchical methods of risk reduction.

Key Topics:-

- What is Risk Assessment?
- Types of risk
- Risk Control - Hazard identification, Risk Evaluation & Management
- Methods of Risk Assessment – Qualitative & Quantitative
- The “3 step method” of risk reduction.

Design of Safety Related Control Systems – (Module 8)

Objective:-

To develop a clear understanding of the purpose, requirements and realisation of the safety related parts of control systems and assess the required performance of a safety system in relation to the risks posed by a particular machine. To develop a suitable configuration and understand how a complete safety system should encompass the electrical, pneumatic, hydraulic and mechanical parts of the control system.

To understand the need for quantified verification and validation of safety related control systems and the changes taking place in connection with so called “Functional Safety” (as implemented by EN 61508, EN 62061 & EN ISO 13849-1).

To be able to control and manage the design and application of safety related control systems.

Key Topics:-

- The safety systems concept
- Resistance to Faults - Redundancy & Diagnostics
- Configuration of a safe related control system
- Understanding “new” terminology & acronyms such as SRP/CS, SIL, PL, DC, etc.
- Designing safety related control systems – electrical, pneumatic & hydraulic
- Electronic & Programmable Logic in safety related systems
- Implications of the replacement of EN 954-1 by EN ISO 13849-1
- What is “Black Box” technology & the application of EN ISO 13849
- Selection & application of safeguards & protective devices
- Managing the design of safety related control systems
- Estimating the systems required performance
- Quantified verification of complete safety related control systems
- Estimating actual performance against required performance of the system
- Verification & Validation of Safety Related Control Systems

Supplementary – Surgery

Objective:-

An opportunity for the attendees to introduce their “real” problems, machines and equipment, discuss and to apply and implement the knowledge gained under guidance of the presenter.

Note: the supplementary units are subject to the needs of the attendees and the venue. Surgery may require attendees wishing to bring drawings, documentation, photos, etc, and for on-site training, access to the equipment would be an advantage. Preparation is essential.

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