

# Safety of Machinery Training Course (2010)

## CE Marking for Machinery

### Course Purpose

The objective of this course is to give designers of machinery the knowledge and tools to design safe machinery in accordance with European Union Machinery, and associated Directives, and to declare compliance by CE Marking.

### 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 provide a working knowledge of the “new” European Machinery Directive and the Directives associated with it.
- To understand the “Essential Requirements” of Directives and the process of CE Marking.
- Familiarity with Harmonised Standards and their relationship with the “Essential Requirements” of Directives.
- To understand the range of hazards posed by machinery and the related risks.
- To understand the process of risk assessment, risk evaluation and risk reduction.
- To design suitable guarding.
- To become familiar with protective techniques and integrate them into safety related control systems.
- To design appropriate safety related parts of control systems.
- To design a suitable machine control panel based on EN 60204-1.
- To verify that the machine meets with the Essential Health & Safety Requirements of the Directive(s).
- To compile a “Technical Construction File”.
- To draw up a “Declaration of Conformity or “Declaration of Incorporation”.
- To legally apply the EU CE Mark.

### Who will benefit?

This course is designed for machine designers, engineers & managers, in order that they are aware of the legal requirements defined by the Machinery related European Directives and are able to competently employ appropriate technical solutions and legally apply the EU CE Mark.

Note: This training can be delivered in whole or in part to best suit the needs of the attendees.

### Prerequisites

There are no prerequisites for this course.

## Course “Module” Overview:-

### **Europe & Directives – (Module 1)**

#### Objective:-

To develop an awareness of the aims of the European Union and their implementation using European Directives.

To introduce the Directives that call for CE Marking and to examine the essential requirements of the “New” Machinery Directive and the associated directives that may be applied in the machinery industry.

#### Key Topics:-

- Single European Market
- European Directives & their adoption into UK Law
- New Approach Directives, Essential Requirements & the CE Mark
- CE Marking Directives
- “New” Machinery Directive, its Essential Requirements & the implications of Annex IV
- Changes brought about by the “New” Machinery Directive
- Associated Directives:-
  - Low Voltage Directive & its Essential Requirements
  - EMC Directive & its Essential Requirements
  - Pressure Equipment Directive & its Essential Requirements
  - ATEX Directives & their Essential Requirements
  - Use of Work Equipment Directive
  - General Purpose Products Directive

### **CE Marking – (Module 2)**

#### Objective:-

To develop an understanding of the purpose of CE Marking and what manufactures and importers of machinery and associated equipment must do to comply and be able to apply the mark under the “New” Machinery Directive..

#### Key Topics:-

- Purpose of the CE Mark
- How do manufactures and importers of machinery comply?
- The “Authorised Representative” in the EU
- What the CE Mark indicates
- Compiling a Technical Construction File
- Preparing a Declaration of Conformity or Incorporation
- Applying the CE Mark
- The difference between CE Marking & PUWER98
- Enforcement

## European Harmonised Standards – (Module 4)

### Objective:-

To develop an understanding of standards and indicate the relationship between UK, European and International standards.

To examine the purpose of European Harmonised Standards, their development and relationship with Directives and CE Marking.

To introduce the core “Safety of Machinery” standards and new & revised standards being introduced in support of the “New” Machinery Directive and so called “Functional Safety”.

### Key Topics:-

- What is a Standard?
- UK, EU & International Standards
- What is a Harmonised Standard?
- Structure of a Harmonised Standard
- 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

## Hazards & Risks – (Module 5)

### Objective:-

Defining hazards and risks, their relationship and explore types of hazards & risk associated with machinery by typical examples.

### Key Topics:-

- What are hazards & risks?
- How are they related?
- Typical hazards
- Hazardous situations
- Hazardous zones
- Need for Risk Assessment

## Risks Assessment – (Module 6)

### Objective:-

To remove the “mystique” associated with Risk Assessment.

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

Examination of qualitative and quantitative method of risk assessment and how they are most suitably applied.

### Key Topics:-

- What is Risk Assessment?
- Risk Assessment as a problem solving “Tool”
- Types of risk
- Risk Control - Hazard identification, Risk Evaluation & Management
- Methods of Risk Assessment – Qualitative & Quantitative
- What is “suitable & sufficient”?
- Identification of Residual Risks
- Hints & Tips when undertaking a Risk Assessment

## **Risk Reduction – (Module 7)**

### **Objective:-**

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

To examine various hierarchical methods of risk reduction.

### **Key Topics:-**

- Fundamentals & objectives of Risk Reduction
- The “3 step method” of risk reduction
- What is “reasonable practicability”
- Dealing with Residual Risks
- Risk reduction:-
  - by design
  - by guarding
  - by safety controls
  - by information
  - by personal protective equipment
  - by Safe Systems of Work
  - by training, supervision & organisation

## **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.

To understand how to assess the required performance of a safety system in relation to the risks posed by a particular machine and to develop a suitable configuration.

To 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 become familiar with the available safeguards & protective devices and their appropriate application.

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
- The “Safety Relay” – a magic box?
- 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

## Protective Devices & Techniques – (Module 9)

Objective:-

An overview of protective devices available and techniques in their application

Key Topics:-

- Interlock Switches (contact & non-contact)
- Guard Locking devices
- Types of Light Curtains & similar devices
- Application of Light Curtains & similar devices
- Safety Mats and Edges
- Imaging Systems
- Two Hand and Hold-to-Run controls
- Motor Speed Controllers
- Emergency Stops

## Design of Control System Panels – (Module 10)

Objective:-

To set out the principles for planning, design, manufacture, testing and installation of machine control, MCC's and Power Distribution panels.

Key Topics:-

- Standard EN 60204-1
  - Safety of Machinery – Electrical Equipment for Machines
- The Specification
- Planning and Design
  - Risk Assessment
  - Selection of enclosure
  - Environmental Protection
  - Segregation & Separation
  - Layout
  - Power Supply Connections & Protective Earthing
  - Component selection
- Assembly
  - Wiring
  - Dealing with EMI
  - Terminations
  - Markings
- Testing
- Documentation & Compliance
  - Drawings & Manuals
  - Declarations
  - CE Marking
- Installation
  - Location & Access

## 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.

For more details contact:

**Robin J Carver**  
MIET MInstMC CMIOSH MIIRSM  
Chartered Safety Practitioner



30 Copperfield Court  
239 Dickens Heath Road  
Dickens Heath  
Solihull  
B90 1QD  
GREAT BRITAIN

Tele. No. : Int +44 (0)121 745 4064  
Mobile No.: Int +44(0)7860 231 287  
Email: [training@hs-compliance.com](mailto:training@hs-compliance.com)  
Website: [www.hs-compliance.com](http://www.hs-compliance.com)