



CMSE®  
Certified Machinery Safety Expert

CMSE

PILZ  
THE SPIRIT OF SAFETY







# Become a CMSE® – Certified Machinery Safety Expert

Machinery requirements have changed significantly over the past number of years with the increasing use of automation and robotic systems, resulting in the need for intelligent machinery safety strategies. The additional requirements of legislation have also played their part in the use, maintenance, and operation of machinery.

With machinery being designed, modified and upgraded to meet these requirements, it is necessary for companies to ensure that their relevant personnel have the knowledge required to make informed decisions on machinery safety.

CMSE has been specifically developed to provide the market with an expert level training in the area of machinery safety and to enable those who complete the training to prove their competence through independent certification.

## **Become a Qualified Safety Expert**

Drawing on extensive experience and knowledge in the area of machine safety, a 4-day machinery safety expert training course has been developed to meet this requirement. Divided into 5 modules, the course provides the key requirements that need to be considered in relation to machinery safety.

### **Topics include**

- Safety Legislation
- Machinery Standards and Regulations
- Risk Assessment
- Occupational Health and Safety
- Safety Systems and Electrical Safety
- Functional Safety: Safety Control, Pneumatic and Hydraulic Systems

*"I successfully participated in the Certified Machinery Safety Expert Training – certified by TÜV NORD. In small groups and through practical exercises, complex topics were taught by highly qualified experts. During breaks I was able to exchange my experience with others on a professional level. In everyday use I feel competent in safety and can implement my knowledge."*

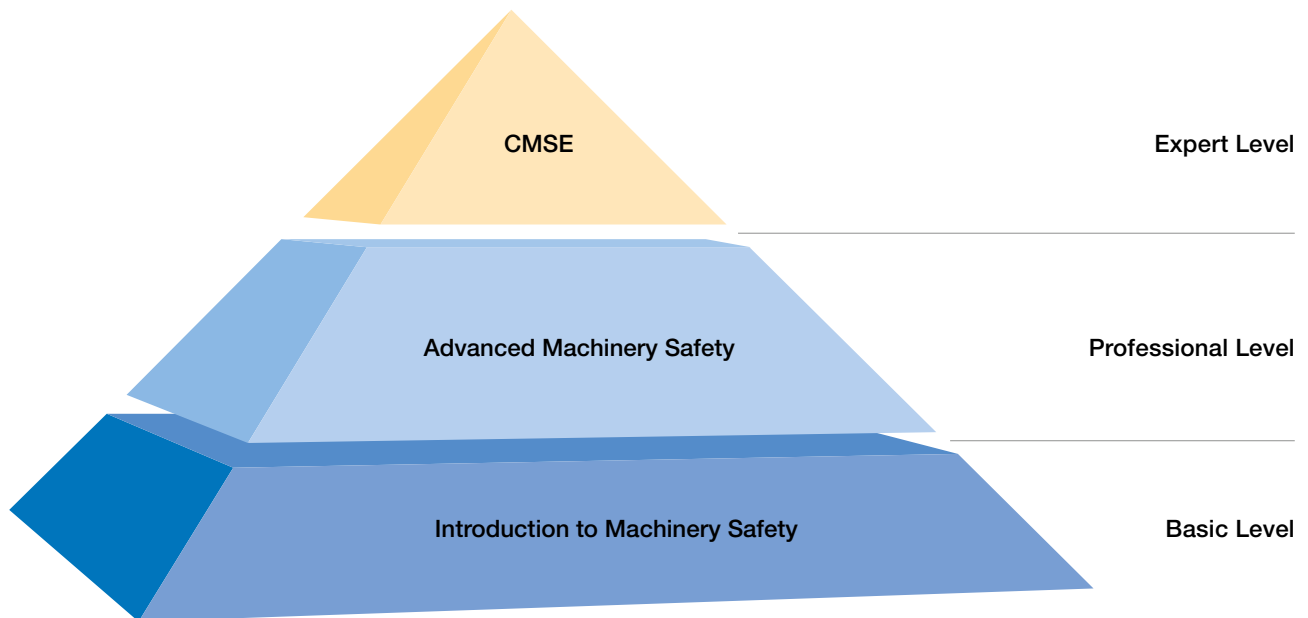
Kaspar Bausch  
CEO, Bausch Prototypenbau, Aachen, Germany



# CERTIFIED



# Progress to the Expert Level



## Become an Expert of the Complete Machinery Safety Lifecycle

Certified Machinery Safety Expert certification will provide you with the competence for the safeguarding of machines and plants. You will gain comprehensive knowledge of the lifecycle, from risk assessment, to the creation of safety concepts, and application of functional safety principles, leading to the concrete implementation of compliance strategies.

CMSE is a globally recognised qualification enabling a 360° approach to Machinery Safety.

## Your Benefits at a Glance

- Achieving CMSE is the optimum way to demonstrate your competence in machinery safety
- Internationally recognized TÜV NORD certificate
- Gain an important competitive edge in the industry
- Add to your professional development
- Benefit from the practical work, taught by experienced experts and certified by TÜV NORD
- Become the recognised expert in your own workplace for machinery safety
- Enable employers to be recognised for their proactive approach to machinery safety
- Be part of a global expert community



## Knowledge Gives the Competitive Edge

The CMSE modules, while standardised for global application, will contain some variation to account for regional requirements e.g. CE Marking in Europe, OSHA in USA, etc.

### Module 1

#### Introduction to Safety

- Fundamentals of safety
- Motivation for consideration of machinery safety
- Introduction to relevant safety legislation
- Responsibilities of key players and duty holders
- Introduction to Safety Management Systems

### Module 2

#### Machinery Safety Legislation

- Legislation in relation to machinery and work equipment design, construction and maintenance with a regional focus
- Conformity requirements and procedures for placing machinery on the market, sale of machinery and putting machinery into service
- Equipment and Workplace Regulations
- Occupational Health and Safety considerations in relation to machinery, including ergonomics, noise, vibration and chemical agents



### Module 3

#### Risk Assessment

- Risk assessment according to international standard ISO 12100 and best practice
- Methodologies for risk assessment based on real examples
- Step-by-step procedure for risk assessment completion

- Application and use of other relevant machine standards within the risk assessment process
- Introduction to risk reduction following risk assessment completion

#### Practical workshop for risk assessment with worked examples

### Module 4

#### Mechanical Guarding

- International standards requirements relevant to machine guarding
- Guard definitions, types and application examples
- Analysis of safety distances according to ISO 13857

- Complimentary protective measures e.g. emergency stop devices requirements
- Safety related control system applications

#### Safety Components and Technologies

- Overview of safety components, requirements and application
- Specification and usage, advantages and disadvantages e.g. interlocking devices, light curtains, two hand control

#### Electrical Safety

- Detailed review of international standard IEC 60204-1: Electrical equipment of machines
- Electrical design considerations – from incoming supply to proper verification
- Safe use and maintenance of electrically powered machines

### Module 5

#### Functional Safety of Control Systems

- Detailed review of ISO 13849 standard requirements
- Functional Safety control systems specification, design and validation
- Determination of performance levels (PL) and SIL levels related to safety functions
- Architecture selection and practical examples of category realisation
- Software lifecycle requirements and application
- Verification and Validation techniques
- Introduction to IEC 62061 standard
- Worked examples of PL and SIL validations

#### Functional Safety of Pressurised Fluid Systems

- Requirements from ISO 4413 (Hydraulic) and ISO 4414 (Pneumatic) standards
- Measures required implementing hydraulic and pneumatic systems safely
- Considerations for hydraulic and pneumatic components
- Design of safety related parts of fluid control systems in accordance with ISO 13849-1
- Worked examples of hydraulic and pneumatic safety system

#### Functional Safety workshop with worked examples

# SAFETY





# TÜV NORD Certification for your Success

## Achieving CMSE certification

As CMSE (Certified Machinery Safety Expert) training is certified by TÜV NORD, the eligibility of potential participants must be determined. This is achieved by completing a course application detailing professional experience, subject knowledge, and relevant qualifications.

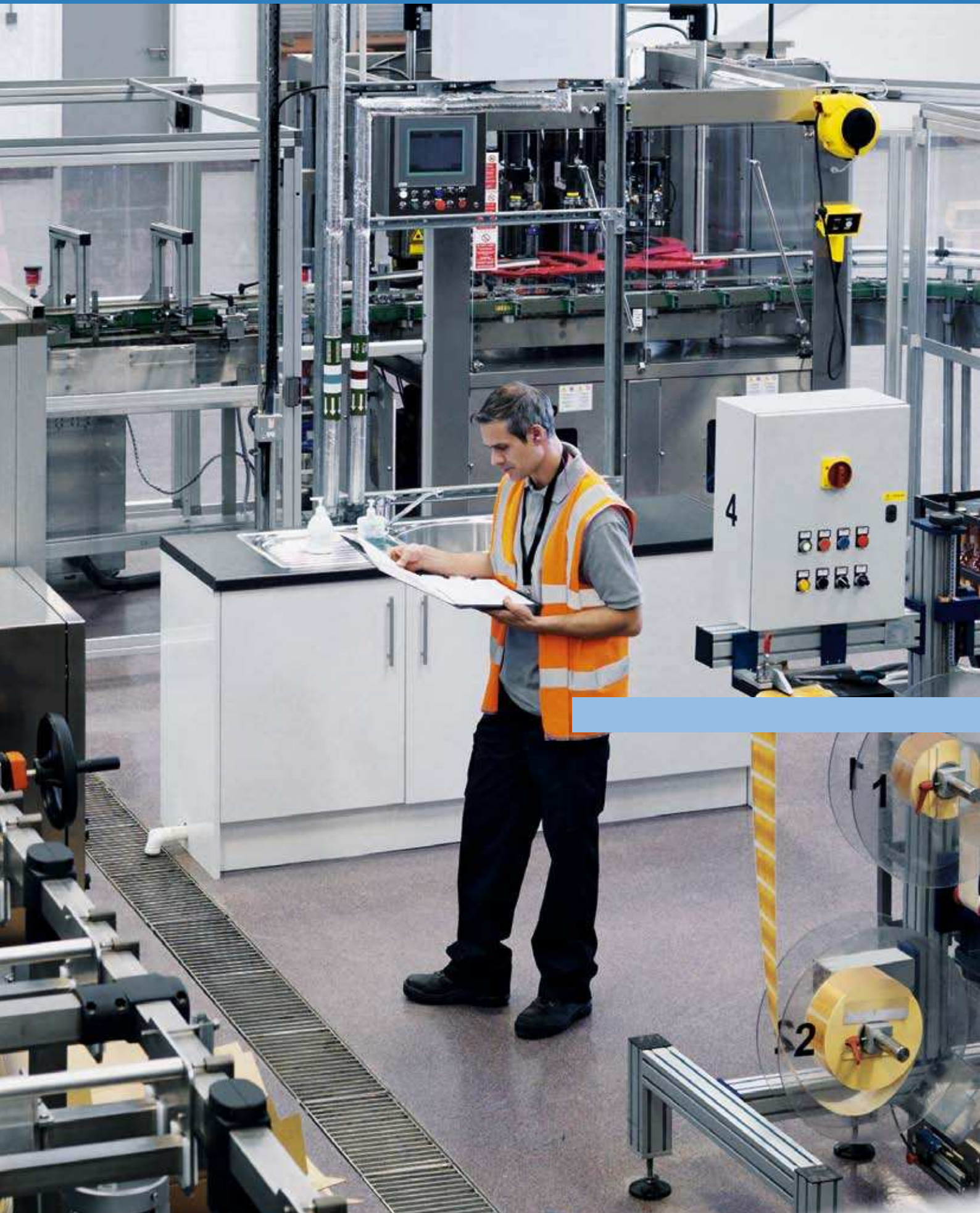
At the end of the training, participant understanding of the five modules will be verified through a multiple choice examination. Due to the pass rate required to achieve the certification, an in-depth knowledge and understanding of the course content is required. Based on the test results, successful participants will be awarded a TÜV NORD certificate. Participants who are not successful in the examination will have the opportunity to repeat the test at a later date.



## Who should attend this certification training?

The course is aimed at professionals involved in machine specification, design, construction, maintenance and/or upgrades, such as Automation, Electrical, Mechanical Engineers, Machine Designers, Maintenance Personnel, Project Engineers, Safety Engineers and Health and Safety Managers.

# EXPERT





# Profit from your Knowledge

This qualification, which benefits both the individual and the employer, serves to highlight competence in the area of machinery safety. In order to develop advanced concepts designed at an early stage (functional safety) in the machine lifecycle, you will require a deep understanding of standards and regulations, matched with national and international requirements.

Successful attendees will learn the legal and statutory requirements for assessing, maintaining and ensuring compliance of new and existing machinery. You will also enhance your capability in the specification, design implementation and validation of machinery safety systems.

Employers must ensure that their employees are fully competent to carry out their duties in machinery safety. Satisfying health and safety requirements with an extra level of compliance/assurance ensures employers can be confident that their obligations are met. On-site machinery safety experts will impart knowledge to other staff giving added value to employers. Moreover, having certified on-site machinery professionals strengthens positioning in the market as well as demonstrating a company's commitment to safety.

CMSE certification is targeted at professionals who require a thorough understanding of the safety lifecycle. It will benefit those who actively lead, coordinate and review the more complex and demanding activities in machinery safety. It is the international machinery safety certification and an industry-wide recognised level of competence.

For further information, please visit [www.cmse.com](http://www.cmse.com), or alternatively, contact us at your local CMSE office which can be found on the back cover.

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