SCHMERSAL tec.nicum USA

Services relating to machine safety and industrial safety

SCHMERSAL tec.nicum

Contents

The four global pillars of tec.nicum

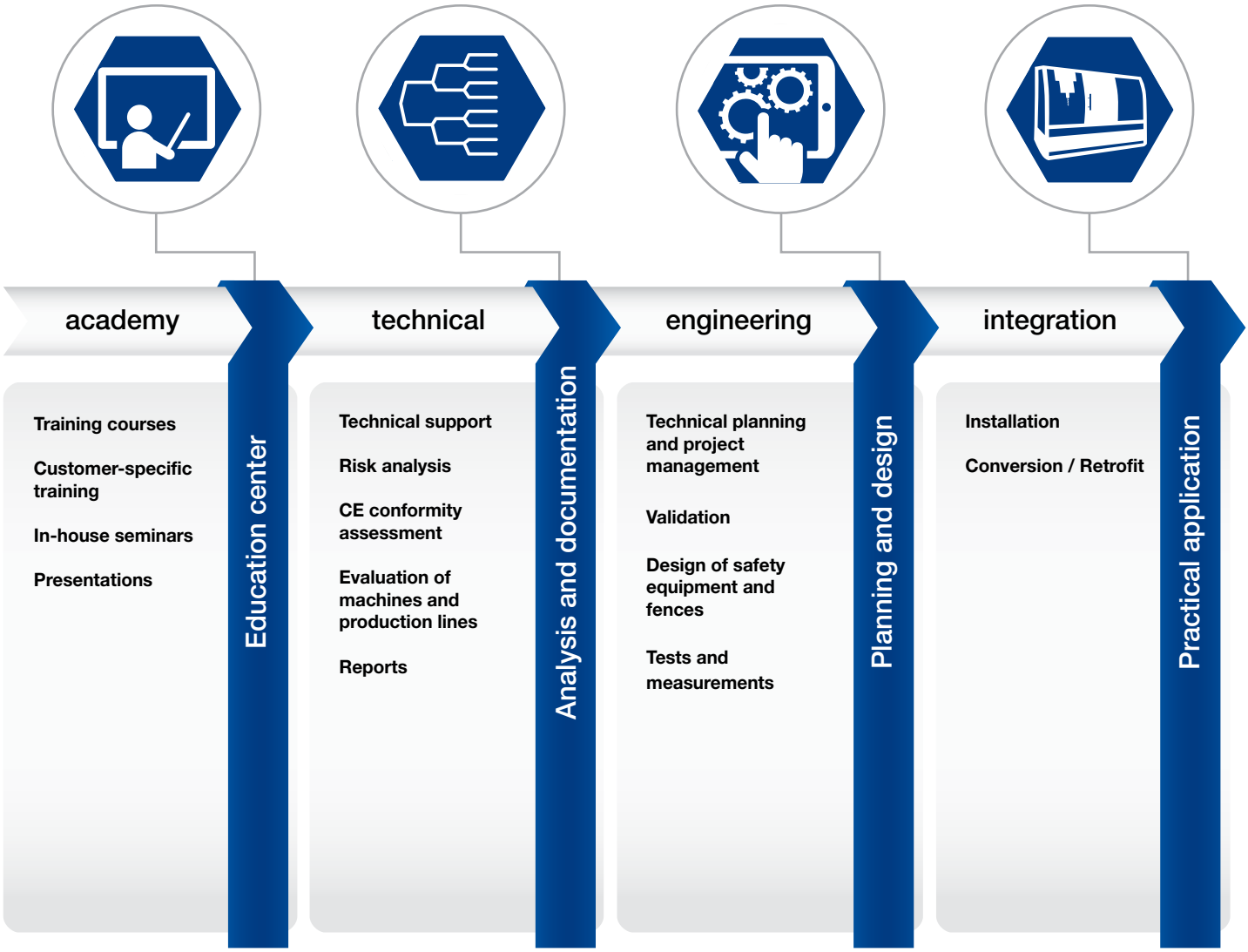
Functional machine safety is a complex theme. There are different requirements for the different roles for handling machines and systems.

The **manufacturers of machines** need to ensure that they comply with the regulations and laws based on regional machinery directives. By contrast, the **end-users** of machines are subject to the regulations in the equipment directives for health, safety and the environment and at the same time, may be subject to specific national requirements, but this is not only an obligation for manufacturers and end-users. **Machine importers and dealers** are subject to specific regulations and it is not unusual for existing applications to be subject to modernization either independently or with the help of **system integrators**, which involves a range of other complexities and clearly defined processes to be complied with.

For these challenging technical issues, more and more companies are seeking advice from qualified specialists. In the Schmersal Group, tec.nicum has been developed to provide services relating to machine and plant safety. The specialists at SCHMERSAL tec.nicum have hands-on practical expertise in the field of safety technology thanks to many years of experience from working with machine builders, facility engineers along with various associations and institutions.

SCHMERSAL tec.nicum offers customers a product and manufacturer-neutral consultation on all the latest statutory guidelines and assist them in designing their machines and workplaces to be safer places. The Functional Safety Engineers at SCHMERSAL tec.nicum are certified by TÜV Rheinland to form a close-knit global network of expert advisers.

tec.nicum offers a broad range of safety engineering services – with core competencies arranged in four pillars:



Education center – tec.nicum academy
Knowledge transfer

Seminars and training courses

Machine safety can be challenging and complex for both machine builder and end user. As an industry solution provider, Schmersal takes pride in providing the necessary skill sets to our customers in order to make them more fluent in machine safety. For many years our motto has been *Turning Workplaces into Safer Places* and we welcome the opportunity to help provide the means to achieve this goal. We understand the value of educating our customers with the knowledge and know-how to properly provide a safer working environment.

The tec.nicum academy offers a series of safety training courses designed to educate people on machine guarding practices and principles consistent with current national and international machine safety standards.

Schmersal has a training center in our new North American headquarters in Hawthorne, NY. Often courses will be scheduled there to run back to back, over several days. Additionally, these courses will be offered in various locations around the country throughout the year; Please see our website for upcoming dates.

We can also tailor the content and duration of sessions to focus specifically on a customer‘s needs for in-house presentation.

TRAINING: General Machine Safety

A review of the concepts of machine safeguarding

Anyone responsible for the design, operation, or maintenance of machines needs an understanding of legal requirements, risk assessment, types of hazards, the several levels of circuit design, and available types of safety equipment and how they all come together for a complete safety solution. Let Schmersal help you take that step into the world of machine safety with this one day course.

Course outline:

- Understanding Regulatory Standards
- Risk Assessment Principles
- Hazard Types
- Risk Reduction
- Safeguarding Principles
- Guarding Principles
- Fixed and Movable Guards
- Reaching and Guard Opening Design
- Types of Safety Interlock Devices
- Emergency Stop Devices
- Stop Categories
- Non-separating safety devices
- Safety Distance Calculations
- Mechanically Linked Relays/Contactors
- Safety Monitoring Relays and Controllers
- Understanding Safety Circuit Design
- Fault Tolerance and Exclusions
- Fluid Power Safety

Duration: 7 hours (One day)

TRAINING: ISO13849 - Understanding and Implementation

A review of the aspects within the ISO 13849 Standard

ISO13849 is a global harmonized standard relating to the risk assessment, design, and performance of safety control systems on machinery. This standard is accepted worldwide as the principle safety control design guideline and it represents a major change in the philosophy of hazard analysis and design of safety related parts of machine control systems.

Course outline:

- Why ISO13849 was created
- How to apply it to a machine
- Understanding Performance Levels (PL)
- Control Categories
- CCF – Common Cause Failures
- DC – Diagnostic Coverage
- MTTFd (Mean Time to Dangerous Failure)
- PFHd (Probability of Dangerous Failure per Hour)
- B10d
- Mission Time
- Symbolic Blocks
- Fault Exclusions
- Validation
- Maintenance
- Documentation
- Calculating Safety Functions
- SISTEMA
- Working Examples

Duration: 7 hours (One day)

TRAINING: Safety Circuits and Wiring
A review of safety Control Categories and wiring safety circuits

Learn the practical use along with the theory of safety related control systems. This is a hands-on course where participants will be challenged to wire a mix of components of differing technologies to meet specific safety control requirements.

Course outline:

- Safety Control Architectures
- Different safety circuit wiring principles
- Perform wiring labs to the different control architectures

Wiring Labs are hands-on implementation of the circuit designs, which will include wiring a variety of keyed interlock switches, coded magnetic switches, safety light curtains, emergency stop, and or electronic switches in a working circuit with appropriate safety controllers and mechanically linked relays.

Duration: 7 hours (One day)

TRAINING: Risk Assessment - Understanding and Conducting
A review of Risk Assessment and performing safety audits on machines

Understanding machine hazards and having the ability to qualify and quantify them, helps you establish a tool to identify machine hazards. This class works with your team to develop a version of a tool that you can use to perform machine safety assessments. Identify the hazards, while presenting ideas on how to remedy those hazards with proper guarding measures is key to having a successful machine safety program.

Course outline:

- Risk Assessment Definition
- ISO12100 Hazards
- Work on a numbering matrix for risk quantification
- Develop Excel Risk Analysis Tool
- Go to machines and perform live risk analysis audits
- Documentation

Duration: 14 hours (Two days)

TRAINING: CE Conformity Assessment
Implementation of the European Machinery Directive

Machine manufacturers have certain legal requirements to meet when providing machines for the European market. This course provides background knowledge in order to be able to pass through a CE conformity assessment procedure as a manufacturer, in accordance with the Machinery Directive (MRL 2006/42/EC).

Course outline:

- Why the CE Mark
- International and European standards related to CE
- Technical Construction File
- Essential Health and Safety Requirements
- Risk Assessment Process for CE
- Action Item Lists
- Relevant Documentation
- Practical exercises

Duration: 35 hours (Five days)

Technical services – tec.nicum technical
Analysis and documentation

Technical support
The experts at tec.nicum can provide expertise and experience for every life-cycle phase of machine and plant construction. We provide information on the applicable regulations and norms on machine and industrial safety and, make recommendations on the relevant norm-compliant protective equipment.

tec.nicum employees are available to their customers on an hourly basis and provide support on your premises, by telephone, or online.

Risk analysis (customer specific)
tec.nicum carries out technical safety inspections on existing machines, systems and product lines. Where adjustments are required to ensure the machines meet the working directives for health, safety and the environment and specific national legislation, tec.nicum can provide recommendations.

For old or modified machines and systems, the tec.nicum engineers evaluate whether the current system or the modifications made will satisfy the applicable technical safety requirements.

When evaluating machines from the operator's perspective, tec.nicum proceeds as follows:

- Analysis of existing documentation
- Description of the machines and the processes
- Checklist of mandatory criteria to be fulfilled

Risk analysis to ISO 12100

Based on ISO 12100, the tec.nicum specialists carry out risk analysis and a comprehensive assessment of all hazards relating to the machines and systems. They also analyze machines for conformity with the applicable standards and norms.

Based on the results of these investigations, we develop recommendations and corrective action, in order to ensure that the machines comply with the various applicable guidelines.

All the results of the investigations are compiled into a comprehensive final report. Priority is given to an optimum balance between appropriate safety and maintaining maximum productivity.

- Risk analysis in accordance with ISO 12100, which serves as the basis for the relevant national standards
- Identification and assessment of risks and hazards
- Reference to functional safety
- Reference to applicable legal regulations, e. g. by means of (standardised) norms
- Working out a plan of action to minimise risk

Technical documentation

The production and maintenance of technical documents is a major principle of machine and industrial safety. Modern quality processes are based on a seamless chain of documentation, which represents a key element of product and process safety, accident prevention and for clarifying liability issues in the event of an accident.

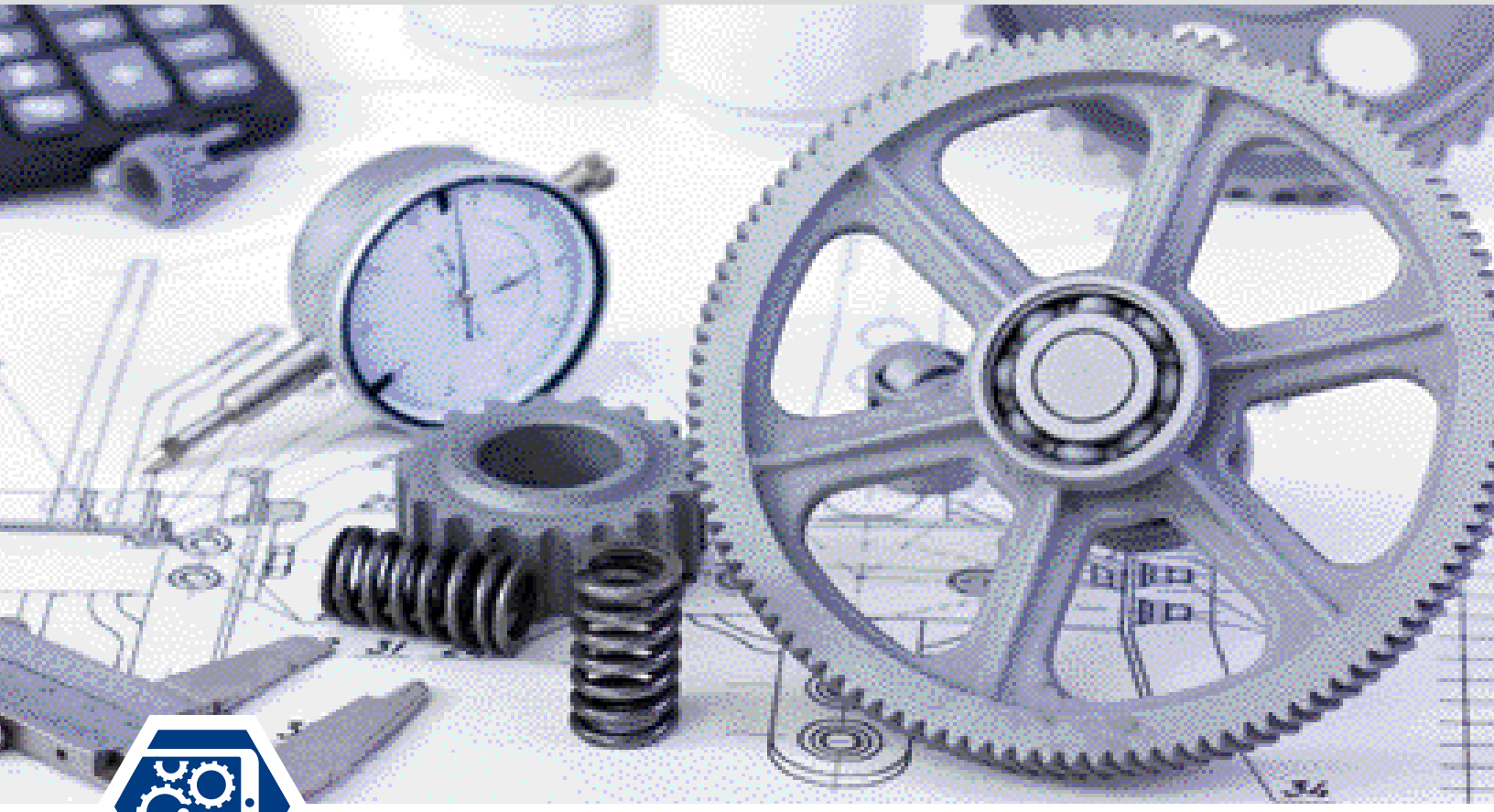
In order to make this process as efficient as possible, tec.nicum develops the necessary technical documentation based on the information provided by the customer. This can contain the following:

- Checklists based on product standards
- Risk analysis
- Evaluation of proposed solutions
- Electrical wiring diagrams including pneumatic and hydraulic processes where applicable
- Electrical measurements
- Design and validation of safety functions and systems
- Technical data, tables, manuals and maintenance schedules
- Drafting of a conformity recommendation. e. g. CE in accordance with the European Machinery Directive

Compliance

Manufacturers wishing to sell machines in specific regions of the world are subject to the local regional trading and quality requirements and increasing requirements in terms of safety technology.

In Europe, this is expressed in Machinery Directive 2006/42/EU. Evidence is provided by complying with EU conformity and the associated CE mark, which is considered a “passport for machines and systems“.



Conception of safety solutions – tec.nicum engineering

Planning and design

Technical project planning

One of the most important phases in the modification of a machine or production line is engineering prior to the conversion work. This lays the foundations for the quality of subsequent implementation. The aim is to develop technical safety solutions for machines and systems.

tec.nicum defines the necessary safety elements and investigates the PL, SIL and PFH_d values required. At the same time, the tec.nicum engineer can show you the best way to implement the modification.

Validation of safety functions to ISO 13849-2

Based on ISO 13849-2, tec.nicum produces all the documents (validation plan, error lists, calculations, etc.) and carries out the validation of safety functions by means of analysis and testing.

tec.nicum checks circuit diagrams for electrical, pneumatic and hydraulic systems and calculates the performance level (PL) and PFH_d for each safety function.

Measurements

tec.nicum engineers can perform stop time analysis to help ensure you are implementing your guarding devices appropriately and at the proper safety distance. Safety Calculations are based on ISO 13855/2010. A statistical way of covering 99.730% of all measured values in normally distributed measurement values is to calculate the mean value ±3 standard deviations. At least ten measurements are required to calculate minimum distance. The highest measured value or the mean plus three standard deviations, whichever is the greater, is used in calculation of the minimum distance.

tec.nicum engineers can also measure electromagnetic capability (EMC) in accordance with the EU EMC Directive.

Implementation – tec.nicum integration

Execution and assembly

Installation of protective equipment and safety fences

tec.nicum has extensive experience in the planning and implementation of complex protective equipment for various industries. These include the food and packaging industry, the automotive industry, paper manufacturing, metal processing and chemicals and pharmaceuticals.

tec.nicum's technical safety solutions are tailored to the individual requirements of the respective industry and the client's application. This involves the planning and installation of fixed or moving protective equipment and complete machine housing in a wide range of materials.

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