excellence in safety

Services
relating to machine safety and occupational health and safety

tec.nicum
Schmersal Group

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Introduction

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

The manufacturers of machines need to ensure that they comply with the regulations and laws based on regional machinery directives. On the other hand, the operators of machines are subject to the regulations in the work equipment directives for health, safety and the environment and at the same time may have to adhere specific national requirements. But this is not only an obligation for manufacturers and operators. Machine and plant importers and dealers also operate on sensitive ground, as they are subject to specific regulations. And it is not unusual for existing applications to be subject to modernisation, either independently or with the help of system integrators, which involves a range of other complexities with clearly defined processes to be complied with.

For these complex legal and technical issues, more and more companies are seeking advice from qualified specialists.

Our experts design and implement projects and safety solutions in all lifecycle phases, such as development, manufacturing, sales, operation, modernisation (retrofitting) and decommissioning of machines and systems all over the world.

tec.nicum is the service division of the Schmersal Group. Functional Safety Engineers and Machinery CE Experts certified by TÜV Rheinland form a global advice network, having both in-depth knowledge of the regionally, nationally or internationally applicable directives, laws and regulations as well as the technical know-how and many years of experience in the implementation of projects. Services can also be obtained around the world.

tec.nicum's core philosophy is to offer advice that is manufacturer-independent and as objective as possible. The experts at tec.nicum aim to offer their customers competent, product and manufacturer-neutral advice and support them in analysing and designing their machines and workplaces to comply with the standards.

This means that tec.nicum makes a significant contribution to making the industrial world safer – based on our commitment "excellence in safety – we care!"

This brochure gives an overview of the comprehensive range of tec.nicum services.

Heinz Schmersal Philip Schmersal

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Four modules
for machine safety and occupational health and safety

In the Schmersal Group, tec.nicum is the department for services relating to machine and industrial safety. The experts of tec.nicum give advice to both the machine manufacturers and the machine operators.

Functional safety is a complex matter that has to be taken into account when developing, upgrading and converting existing machinery as well as when integrating machinery into overall plants.

Consulting for machine manufacturers
The experts at tec.nicum advise and accompany machine manufacturers throughout the entire conformity certification process, not only in accordance with the European Machinery Directive, but also with other national regulations in the target markets worldwide.

Consulting for machine operators
Regarding machine operators, tec.nicum offers machine- and plant-specific risk assessment services in Europe, which, according to the Framework Directive 89/391/EEC, serves to “improve the safety and health of workers at work”.

Thanks to a worldwide consulting network, the services can be accessed easily and conveniently at your location. The Functional Safety Engineers and Machinery CE Experts certified by TÜV Rheinland have both in-depth knowledge of the regionally or nationally applicable directives, laws and regulations as well as technical know-how and many years of experience in the implementation of projects.

The experts at tec.nicum aim to offer customers competent, product and manufacturer-neutral advice and support them in analysing and designing their machines and workplaces to comply with the standards.

For all of its consultancy and solution strategies, tec.nicum sets great store by objectivity.

academy

- Seminars and training
- In-house training
- Customer-specific workshops
- Demonstration events
- Symposia

consulting

- Safety analysis of machines and production lines
- Conformity assessment and verification
- Risk assessments
- Hazard assessments
- Technical documentation

engineering

- Technical project planning
- Validation of safety functions
- Measurements and tests
- Modernisation of machines
- Safety controller programming

integration

- Conversion / Retrofitting
- Installation of protective devices and fences
- Integration of safety functions
- Maintenance and service

tec.nicum

The range at tec.nicum covers four modules: learning in the academy section, consultancy services in the consulting section, designing safety solutions in the engineering section and practical implementation in the integration section.

Learning
tec.nicum academy

Face-to-face training – In-house seminars – Online training – Workshops

Seminars and training

The tec.nicum academy offers a comprehensive range of seminars and training on machine and plant safety worldwide.

From basic introductory courses to customer-specific topics, training content is carefully matched to the requirements of tec.nicum customers.

An international team of trainers comprising certified safety experts helps to ensure that knowledge is conveyed with consistently high quality.

Whether as face-to-face training at one of our training centres worldwide, as an in-house seminar on site or simply at the comfort of your own desk as an online course, the tec.nicum academy supports manufacturers and operating companies with the expertise needed in the implementation of regional regulatory requirements for the safety of machinery and workplaces.

Training subjects include:

- Conformity assessment procedure
- Machinery Directive 2006/42/EG
- Machine and plant safety standards
- Risk assessment and operating instructions
- Application of EN ISO 13849-1 – SISTEMA basic knowledge
- Practical workshop – working with Sistema
- Validation in accordance with EN ISO 13849-2
- Technical documentation of machines and plants
- Fundamentals of the Industrial Safety Ordinance (BetrSichV)
- Hazard assessment for machines and plants
- New construction, conversion and retrofitting of machines
- Human-robot collaboration
- Automated guided vehicles
- Compact seminar – Explosion protection
- Inspection function with standard optoelectronic safety devices
- Fixed and movable safety guards

You can find the courses currently on offer from the national tec.nicum academy organisations at:
www.tecnicum.com

academy

Machinery CE Expert with TÜV Rheinland Certified Qualification

Seminar highlights of the tec.nicum academy in Germany and Spain

This seminar focuses on certification of tec.nicum customers as internationally recognised experts in the safety of machinery.

Held over four days, the course provides a compact overview of all knowledge required to satisfy legal and normative requirements in the EU single market.

The tec.nicum academy's speakers make it easy for seminar participants to understand the complex compliance assessment requirements of the EU Machinery Directive. Participants will receive all of the information they need to be able to correctly apply CE marks to machinery and systems.

After passing the test, participants will be able to use the title "Machinery CE Expert with TÜV Rheinland Certified Qualification".

The qualification can be evidenced using the globally recognised TÜV Rheinland certificate and the identification number, which can be found in the TÜV Rheinland certificate database.

Content of the seminar (extract)

- European directives and standards
- Current developments in the safety of machinery
- Fundamental health and safety requirements
- Identification of hazards on machinery
- Requirements relating to maintenance and marking on machinery
- Requirements on operating and installation manuals
- Fixed and movable safety guards
- Functional safety of machinery
- Verification in accordance with EN ISO 13849-1
- Validation in accordance with EN ISO 13849-2

Seminar duration: 4 days plus online exam
(TÜV Rheinland® is a registered trademark)

mce . expert
Machinery CE Expert

Consultancy services
tec.nicum consulting

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. They provide information about relevant legislation and standards for machine safety and occupational health and safety, draw up concepts for the safe overhaul of old and existing machines and provide recommendations in terms of the protective equipment suitable in each case and which complies with the standards.

tec.nicum experts provide support on your premises or by telephone or online.

Evaluation of machines (risk assessment)

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 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
- Assessment of the safety of machinery to evidence compliance with the safety requirements relating to the provision of work equipment

Operators who are amalgamating multiple existing machines into a new unit or system must request separate CE conformity in Europe.

tec.nicum would be happy to advise.

consulting

Risk assessment in accordance with EN ISO 12100

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

Based on the results of these investigations, they derive recommendations and corrective action,
in order to ensure that the machines comply with the various applicable directives.

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

- Risk assessment in accordance with ISO 12100, which serves as the basis for the relevant national standards
- Identification and evaluation of risks
- Consideration of special C standards (e.g. EN 415-10 – “Safety of packaging machines”)
- Reference to functional safety
- Reference to applicable legal regulations, e.g. by means of (standardised) norms
- Working out plan of action to minimise risk

Optional: drafting of a conformity recommendation. e.g. CE in accordance with MD in Europe

Consultancy services
tec.nicum consulting

Technical documentation (modular design up to conformity recommendation)

The preparation and maintenance of technical documents is a major principle of machine and industrial safety. Modern systems 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 checks and supplements the necessary technical documentation based on the information provided by the customer.

This can contain the following:

- Checklists based on product standards
- Risk assessments
- Evaluation of proposed solutions
- Electrical wiring diagrams also taking into account pneumatic and hydraulic processes where applicable
- Measurement and test protocols
- Certificates
- Validation documents
- Creation of operating instructions
- Technical data, tables, manuals and maintenance schedules
- Drafting of a conformity recommendation. e.g. CE in accordance with MD in Europe

consulting

CE conformity

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

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

This module combines various service modules with the aim of covering the whole process of evidencing conformity to regional machinery directives.

Evaluation of potentially explosive areas

The requirements of explosion protection apply in many industrial areas, not only in the chemicals industry, but also, for example, in cosmetics and food production where powdered or gaseous ingredients or end products are processed, produced or stored.

tec.nicum offers the following explosion protection services:

- Classification by EX zones
- Documentation of explosion protection measures
- Technical implementation in potentially explosive environments
- Validation of devices based on applicable regulations

Technical planning
tec.nicum engineering

Design and programming

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 a subsequent implementation. The aim is to develop technical safety solutions for machines and systems.

The module includes:
- Electrical, pneumatic and hydraulic circuit diagrams
- Creation of safety concepts and, if applicable, safety layouts
- Software programming

tec.nicum analyses the requisite safety elements and investigates the PL, SIL and PFH_D-values required.
At the same time, specialist tec.nicum personnel can show you the best way to implement the modification.

Calculation of safety functions in accordance with EN ISO 13849-1 or IEC 62061

tec.nicum will moderate and describe the safety functions in cooperation with the customer and verify these functions against the requisite Performance Level.

The following services will be provided:
- Creation of safety functions in schematic/block diagrams
- Description of the safety functions
- Evidence of the Performance Level using SISTEMA or other tools

Operating/mounting instructions in accordance with DIN EN IEC/IEEE 82079-1 and DIN EN ISO 20607

Machinery and system manufacturers must produce an operating or installation manual that meets the requirements of the Machinery Directive before commissioning or marketing. This must be made available to the operating company for proper operation of the machinery or system.

engineering

We prepare operating or installation manuals in accordance with EN 82079. We can also check operating companies' existing manuals and revise them if needed.

After conversions are carried out by operating companies, we work with them to amend the original operating manual or to create an additional description of the conversion.

Validation of safety functions in accordance with EN ISO 13849-2

Based on EN 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 on site.

tec.nicum checks circuit diagrams for the electrical, pneumatic and hydraulic systems and calculates the performance level (PL) and PFH_D* for each safety function. The results of the validation are documented in drawings generated by expert personnel.

* Probability of dangerous failure per hour

Machinery modifications and upgrades (retrofitting)

tec.nicum experts can carry out all kinds of modification and modernisation projects, from planning through commissioning or turnkey handover of the fully-compliant machine.

The engineers proceed as follows:

- Analysis of the state of the art
- On-site recording of all data and areas of action
- Recording of all necessary information (mechanical, electrical, hydraulic and pneumatic)
- Drafting of an initial action list, generic diagrams and sketches (CAD/CAE), including a presentation as part of a first technical meeting
- Agreement of action lists and drafting of guidelines for action
- Draft, design and procurement of materials, safety equipment, control cabinets, safety components, fence systems, etc.
- Installation of equipment and peripherals with subsequent commissioning and approval
- Employee training
- Safety tests and acceptance of the overall installation
- Handover of full project documentation

engineering

Technical planning
tec.nicum engineering

In modification projects, the tec.nicum specialists consider the specific risks and individual requirements such as system availability to ensure the most efficient solution can be developed in the most economic way possible.

Measurements

For example, tec.nicum carries out stop time measurements (STM) on hazardous machine movements in order to calculate what safety distances to hazard areas need to be complied with in accordance with EN ISO 13857. The following measurements are also offered: electromagnetic compatibility, noise, vibrations, etc.

Technical checks

tec.nicum carries out the tests required by IEC 60204-1 and checks whether the requirements for marketing electrical and electronic devices are fulfilled – in Europe, these are the requirements of the Machinery Directive 2006/42/EC:

- Test for consistent safety potential
- Test of the insulation resistance
- Stress test and measurement of residual voltage
- Test of dielectric strength

integration

Implementation
tec.nicum integration

Execution and assembly

Installation of safety guards and safety fences

tec.nicum has extensive experience in the planning and implementation of complex protective equipment for various industries. These include, for example, 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 relevant company. Examples include hygienic safety doors for food processing, process adaptations for potentially explosive areas or protective equipment with special access options.

This involves the planning and installation of fixed or moving protective equipment and complete machine housing using a wide range of materials.

Installation and integration of safety components

The tec.nicum engineers support the mechanical engineers and operators in implementing standard-compliant safety solutions for their machines and systems.

Support during configuration, programming and commissioning:

- Programming and integration of safety PLC
- Configuration and assembly of opto-electronic safety products (AOPD)
- Installation of
  – safety terminal strips, safety mats, etc.
  – safety switches and interlocks
  – safety sensors to meet ATEX requirements
  – safety sensors to meet the requirements of the food industry
- Conversion of control cabinets based on the PL required

excellence in safety

Functional machine safety is a complex business which involves complying with a range of standards and directives. tec.nicum offers all machine manufacturers, operators and distributors a completely product and manufacturer-neutral consultancy on all currently relevant statutory regulations and supports them in ensuring their machines and workplaces are designed to comply with the relevant standards.

tec.nicum services cover four areas, which can be obtained as individual modules or as complete packages:

- **tec.nicum academy – Learning**
- **tec.nicum consulting – Consultancy services**
- **tec.nicum engineering – Technical planning**
- **tec.nicum integration – Practical implementation**

Experts at tec.nicum advise and support customers and clients with training, on-site consultation, documentation and planning and implementation, such as the installation of protective equipment and safety systems.

tec.nicum is the Schmersal Group's service division and comprises a global consultancy network of TÜV Rheinland-certified Functional Safety Engineers and Machinery CE Experts. Services can be called upon around the world. tec.nicum's core philosophy is to offer advice that is independent of manufacturers and as objective as possible.

We strive to develop the best possible safety-related solution for each individual application, to implement it and completely safeguard its intended use – always in line with our commitment **"excellence in safety – we care!"**

- Seminars and training
- In-house training
- Customer-specific workshops
- Demonstration events
- Symposia

- Safety analysis of machines and production lines
- Conformity assessment and verification
- Risk assessments
- Hazard assessments
- Technical documentation

- Technical project planning
- Validation of safety functions
- Measurements and tests
- Modernisation of machines
- Safety controller programming

- Conversion / Retrofitting
- Installation of
  - safety guards
  - safety fences
- Integration of safety functions
- Maintenance and service

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