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Editorial

Everything remains in the flow

International crises and wars change many things, sometimes even everything, and of course have an impact on trade and the global economy. Disrupted supply chains, material shortages, price increases - these are challenges that companies are facing simply because of the Corona pandemic. And with the Ukraine war, the situation has become much more acute in many places.

But even in these times, there are areas in which the exchange of goods between states proceeds in "business as usual" mode. Fortunately! However, even with a normal course of events, it is necessary to follow certain rules. In his article on pages 4 to 7, our guest author Michael Loerzer, Regulatory Affairs Specialist, explains which regulations must be observed when placing machines on the market in the USA.

In England, Wales and Scotland, on the other hand, completely new rules apply: Since Brexit, new labeling is required for all products launched there. TÜV Rheinland has now for the first time certified a Schmersal product range in accordance with UKCA requirements. Read more on page 3.

The Machinery Directive applies generally to the placing of machinery on the market in Europe. This guideline is presently being comprehensively revised. We will inform you about the status of this process on page 11.

Internally, too, everything should remain in a state of flow as far as possible. And there are rules for this, too - especially when automated guided vehicles are used in a manufacturing plant to transport goods and materials. On pages 12 to 15, our guest author Ulrich Hochrein, Head of Safety Engineering Services at Edag Engineering Group AG, explains which rules these are.

By the way: In the face of supply bottlenecks and material shortages, modernising existing machines is often a viable solution. On page 8 to 10, you will find out how you can easily retrofit older machines in terms of safety.

We wish you an informative and stimulating read!

Sincerely
Your editorial team



Market access in the UK: Schmersal Group receives certificate for solenoid interlocks

TÜV Rheinland issues first UKCA certificate for Schmersal



First UKCA certificate for Schmersal: Jörg Eisold (l.), Schmersal Group, and Gebhard Bouwer, certifier at TÜV Rheinland UK Ltd.

TÜV Rheinland, as an testing body officially recognised by the UK Government Office for Business, Energy & Industrial Strategy BEIS, has issued the first certificate for the testing of the AZ300, AZM300 and AZM300-AS solenoid interlocks of the manufacturer Schmersal in accordance with UKCA requirements.

UKCA stands for United Kingdom Conformity Assessment. Since the official Brexit, this new labeling is required on products sold in England, Wales and Scotland. The UKCA mark thus replaces the CE mark of the EU domestic market, which is currently accepted for product approval on the UK market until the end of 2022. "We were very aware that the UK market is significant for many of our customers and that, as a testing institute, we need to provide fast and hassle-free support here with regard to the latest regulatory requirements," said Thomas Steffens, Head of the Functional Safety & Cybersecurity Testing and Certification Body at TÜV Rheinland Industrie Service GmbH.

Testing for Schmersal for more than 20 years

TÜV Rheinland has been testing safety switchgear and systems from the worldwide operating Schmersal Group, headquartered in Wuppertal, for more than 20 years. For product manufacturers, UKCA certification involves a considerable amount of additional effort. With the Schmersal team, TÜV Rheinland was able to successfully implement the acknowledgement process and the conformity assessment for UKCA certification of the AZ300, AZM300 and AZM300-AS solenoid interlocks in a timely manner.

Following the successful pilot project with the AZM300 solenoid interlock, Schmersal will now systematically have other products certified in accordance with UKCA; first the solenoid interlocks of other series and then also electronic safety switches, safety relay modules and safety light grids. "Our goal is to equip Schmersal's most common and most requested products with the UKCA certificate by January 1, 2023, so that our customers can place their machines on the market in the UK in compliance with the directive," says Jörg Eisold, head of testing, standards committees and association work at the Schmersal Group. "Given our extensive product range, this is an ambitious schedule. But we hope to achieve this goal with the support of all the third-party agencies involved in the certification process. The positive experience we have had with TÜV Rheinland in the AZM300 pilot project makes us very optimistic."

TÜV Rheinland Certification since September 2021

Thomas Steffens of TÜV Rheinland adds: "As a testing institute, we know how difficult it often is for manufacturers to develop custom-fit market access solutions that take into account conformity requirements." Since September 2021, TÜV Rheinland has been an "Approved Body" for, among other things, the Supply of Machinery (Safety) Regulations 2008 and can therefore carry out UKCA certification for manufacturers of safety products in accordance with Annex IV of the Machinery Directive, thus supporting access to the UK market. ■



Placing machines on the market in the USA

Different legislation and standards - a comparison between EU and USA

Between the United States of America and the European Union, there are significant differences between legal systems that regulate the placing on the market of products, devices as well as machinery.

In the European Union, certain harmonisation legislation regulates the placing on the market of machinery (2006/42/EC) and low-voltage electrical equipment (2014/35/EU). Such legislation exists in the United States of America only for certain aspects such as electromagnetic compatibility (EMC) of equipment (CFR Title 47 Part 15 Subpart B). Instead, electrical safety and machine safety are regulated by specific occupational health and safety codes and by certification and field acceptance procedures. This technical article provides you with an overview. →



Occupational health and safety regulations, contract law and product liability law

The question often arises as to what specific differences exist with the EU with regard to the placing on the market of low-voltage electrical equipment as well as machinery in the United States of America. Basically, electrical safety and machine protection are regulated in the so-called "OSHA Standards" CFR Title 47 Part 15 [1] (CFR: Code of Federal Regulation). These regulations are anchored in occupational health and safety, so these requirements do not apply when it comes to placing on the market. Thus, the owner/operator is responsible for compliance with these requirements.

In this respect, it seems logical that machine and plant owners/operators include compliance requirements in their purchase contracts or specifications in the following manner:

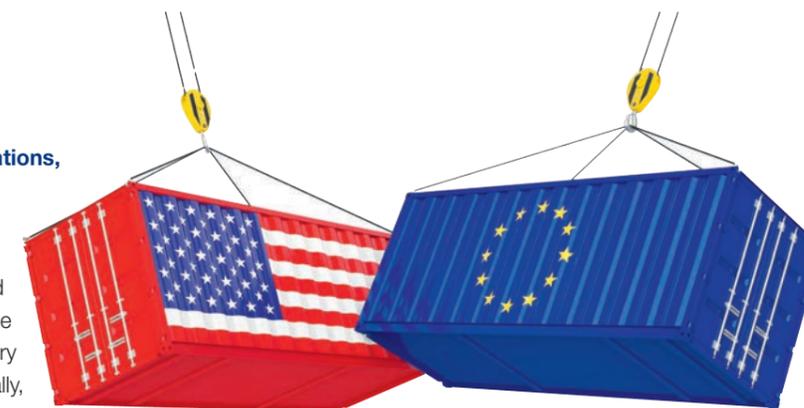
"Compliance and Conformance to Law." Seller and Buyer at all times shall comply with all applicable federal, state, and local laws and regulations. Seller warrants that if properly operated, the machine shall conform to OSHA requirements (CFR Title 47 Part 15 [1]), as set forth in the specifications."

These contractual conditions are legally binding when signed by both parties. It is also conceivable that machine owners/operators will include in the contracts specific technical rules to be observed.

Examples:

- NFPA 70 "National Electrical Code (NEC)" [2] in conjunction with
- NFPA 79 "Electrical Standard for Industrial Machinery" [3]
- UL LLC Outline of Investigation for Machinery [4]
- UL 508 "Industrial Control Equipment" [5]
- UL 508A [6]

In addition, the specifics of U.S. product and producer liability must be considered. The main difference is the special assertion of claims for punitive damages - also known as "punitive damages". These "punitive damages" are known as a special form of pain and suffering compensation. The U.S., in particular, has established this claim variant to use money to have a preventive effect and to account for an increased level of reprehensibility.



This particular form of punitive damages is widely used in the United States. A mandatory prerequisite for such "punitive damages" is first of all a damaging event that is characterised by reprehensible features. For example: if a possible bodily injury is tolerated, which could have been avoided e.g. with separating protective devices. In this respect, it is imperative that the locally applicable safety standards are known. A list of standards can e.g. be found on the UL website [7]. Of great importance - also with regard to the "punitive damages" mentioned - is the topic of warnings and operating instructions. Here as well, special standards apply in the USA with ANSI Z 535.4 [8] and ANSI Z 535.6 [9].

Requirements for the import of electrical equipment in the USA

In general, the electrical safety aspect in the USA is regulated in the federal regulation CFR Title 47 Part 15 Subpart S „Electrical“ [9]. This regulation is an occupational health and safety regulation and consequently does not regulate the placing on the market of low-voltage electrical equipment, but rather its use. These regulations refer to specific product groups. OSHA standards are issued and overseen by the federal Occupational Safety and Health Administration (OSHA), which is part of the Department of Labor. These regulations are less abstract compared to Annex I of the Low Voltage Directive 2014/35/EU.



However, as indicated, the U.S. does not have uniform law in this area either. U.S. states and territories may impose regionally applicable requirements that supplement and/or supersede the aforementioned common occupational safety and health regulations (OSHA standards). Part 1910.303 defines the "General Requirements":

"CFR Title 47 Part 1910.303(a) (Approval): The conductors and equipment required or permitted by this subpart (Subpart S) shall be acceptable only if approved, as defined in Sec. 1910.399."

The term "acceptable" is defined as follows in Part 1910.399:

„An installation or equipment is acceptable to the Assistant Secretary of Labor, and approved within the meaning of this subpart S:

- (1) If it is **accepted, or certified, or listed, or labeled**, or otherwise determined to be safe by a nationally recognized testing laboratory recognized pursuant to § 1910.7; or
- (2) With respect to an installation or equipment of a kind that no **nationally recognized testing laboratory [NRTL]** accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another Federal agency, or by a State, municipal, or other local authority responsible for enforcing occupational safety provisions of the National Electrical Code, and found in compliance with the provisions of the National Electrical Code as applied in this subpart;"

In this respect, low-voltage electrical equipment can be imported without any problems, but there is a risk for the owner/operator that they will either not be allowed to commission a system with non-NRTL-certified equipment and components or, in case of doubt, they will be put out of operation in the event of subsequent complaints. The so-called AHJs (authority having jurisdictions) in the respective states are responsible for these permits. In addition, there may be problems with mutual recognition of test results. Moreover, this certification machinery also represents a kind of trade barrier [11].

The National Electrical Codes NFPA 70 [2] and NFPA 79 [3], which is based on IEC 60204-1, are technically relevant for electrical installations and electrical equipment of machines. These installation guidelines acquire legal effect through the above federal regulation CFR Title 47 Part Subpart S, however, not on the importer side but on the owner/operator

side. The owner/operator therefore has an interest in regulating these specifications contractually, so the European machine builder should pay very close attention to the technical details in the specifications.

Requirements for the import of machinery and equipment in the USA

The aspect of machine guarding is also regulated exclusively by occupational health and safety regulations in CFR Title 47 Part Subpart O "Machine guarding" [11]. Consequently, when importing a machine, there are likewise no binding regulations under public law for the European machine builder. Therefore, here the focus must be put on the contract, too. In addition, a large number of possible U.S. regulations possibly also need to be considered from a technical point of view (e.g., ASTM, ASME, RIA). These often do not have an ISO equivalent either. It is to be welcomed that at least the topic of risk assessment has found its way in and has been published as ANSI/ISO 12100. →



Summary

European machine builders should take a close look at the applicable regulations before entering the US market. This applies in particular in conjunction with the contracts concluded. Here, it should be checked in detail which actual requirements the customer has specified as the subsequent owner/operator. From the machine builder's point of view, it may be advisable to have a so-called "field evaluation" [13] carried out by an NRTL in accordance with NFPA 79. This reduces the risk of local officials of the respective AHJ refusing to accept such machines. ■

Globalnorm GmbH offers comprehensive information services and consulting on these global market access requirements for many countries and regulatory topics (e.g. electrical safety, machine protection).
www.globalnorm.de

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Which consequences have modifications on used machines?

Possible solutions for new hazards using the example of prolonging the overtravel

When modernising machinery, you have to verify, whether this might result in a “substantial modification” to equipment according to the Machinery Directive (Maschinenrichtlinie, MRL). In the event of a new hazard or increased risk, this may require additional protective measures - which, however, can often be implemented with little effort. We will go into more detail on this topic in the next issues.

Machines often have a long life cycle. In times of ever shorter product cycles, the challenge is often to adapt, expand or improve the performance of existing machinery.

More often than not this brings up the term “substantial modification.” Even though this term is no longer explicitly found in the Product Safety Act [1], a used machine that has undergone a performance increase, a functional change or a change in intended use must nevertheless also be examined for new hazards.

In addition, the Ordinance on Industrial Safety and Health [2]) also requires the operator/owner of a machine to conduct a regular risk assessment. According to §3 clause 7, the state of the art and the findings on the general accident situation must always be taken into account.

If this results in a new hazard or an increase in risk (see EN ISO 12100 [3]) and if these cannot be sufficiently minimised with simple protective measures, other measures must be taken. In particular, the machine must in this case be treated as a new machine – and thus the current relevant standards must be applied [4]. The interpretation paper of the BMAS [5] counts, in addition to fixed guards, movable and non-separating guards among the simple protective measures, if this “does not require significant intervention in the existing safety-related control of the machine” [5]. In the end, however, each case must always be considered individually.

Based on this interpretation paper [5], the following diagram is intended to support the decision as to when a machine modification requires further action.

As mentioned above, a substantially modified machine is treated as a new machine. This means that the organisation responsible for the modification according to the ProdSG [1]

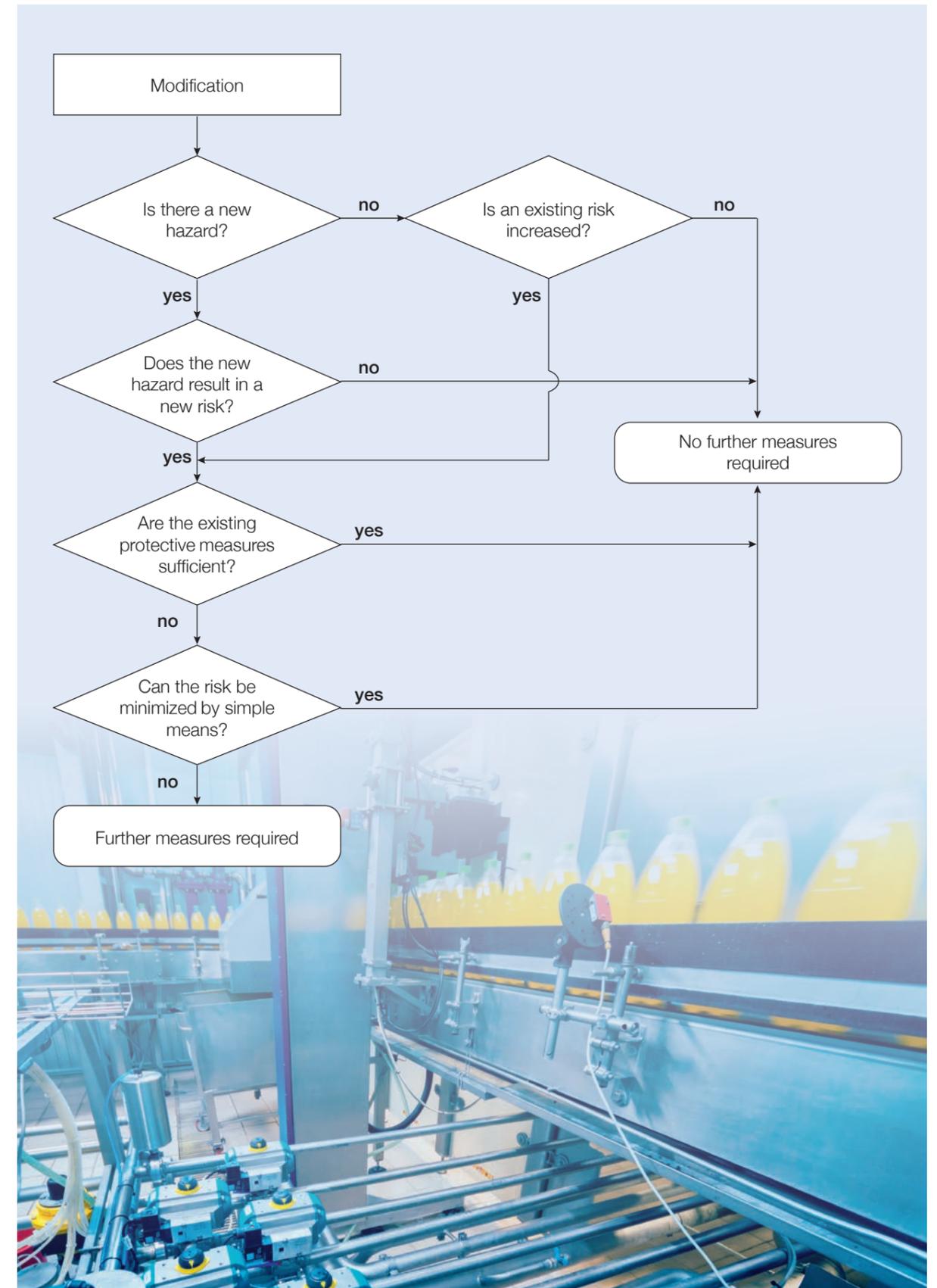
becomes the “manufacturer” and hence must fulfill all manufacturer obligations. This includes the complete compliance assessment procedure and the preparation of all relevant documentation to prove it.

How do you manage the risk in terms of safety?

An example of a newly created hazard would be an increase in overtravel e.g. caused by an increase in the speed of the drives. If the overtravel is too long to avoid a hazard when the operator approaches (EN ISO 13855 [6]), the position monitoring of the movable separating protective device alone is no longer sufficient. In order to protect the operator from the hazard, it is necessary to use a safety interlock which prevents the guard from opening until the hazard from the overtravel movement no longer exists. In general, the standstill of the movement can be assumed as a safe condition here.

The selection of a suitable interlock is described in DIN EN 14119 [7]. This standard also provides important information on the subject of manipulation of protective devices, because it is precisely coasting movements - and the supposedly safety associated - that can tempt users to bypass protective devices in order to maximise the machine’s production output.

In addition to the selection of the suitable interlock device, the safe detection of the standstill is also important. What are the options here? →



(Continued on page 10) →

Time relay

The simplest option is a time relay. Here, the interlock is only released when a preset, usually empirically determined time has elapsed from the request. In terms of control, this requires the fewest modifications, since no sensors are required on moving parts or the drive. However, the preset time often impacts productivity of the machine. In addition, if the drive fails to stop, access to the hazardous point may nevertheless be granted after the set time has elapsed.

Standstill monitor

A standstill monitor either monitors the drive's current consumption or determines the speed and thus the standstill of the machine by means of sensors (proximity switches, encoders). The time between the request and the permitted access is as dynamic and as short as possible while maintaining security - allowing efficient production.



Safety controller

In addition to the functionality of a standstill monitor, a safety controller usually offers other options. On one hand, further axis monitoring functions described in DIN EN 61800-5-2 [8], such as safe speed in setup mode, can be conveniently implemented here. On the other hand, further safety functions of the machine can also be easily mapped and linked via the safety controllers. ■



- (1) Act on the Provision of Products on the Market* (Produktsicherheitsgesetz - ProdSG) of 27.07.2021
- (2) Ordinance on Safety and Health Protection in the Use of Work Equipment (Betriebssicherheitsverordnung - BetrSichV) of 03.03.2015
- (3) Safety of machinery - General principles for design - Risk assessment and risk reduction
- (4) "Blue Guide" - Guide on the implementation of EU product rules
<http://ec.europa.eu/DocsRoom/documents/4942/attachments/1/translations/de/renditions/native>
- (5) Product Safety Act / 9. ProdSV (German Machinery Ordinance) Interpretation paper on the subject of "Substantial Modification of Machinery" (BMAS notification of 09.04.2015 - IIIb5-39607-3 - in GMBI 2015, No. 10, pp. 183–186)
- (6) Safety of machinery - Positioning of protective devices with respect to approach speeds of parts of the human body
- (7) Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
- (8) Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional safety

Machinery Directive becomes Machinery Ordinance

Comprehensive revision of the MD takes technical progress into account

The Machinery Directive (MD) applies to all machinery placed on the EU market. It was first published in 1989, but a number of updates followed, such as in 1998 and 2006. A comprehensive revision of the regulation is now due: The EC Directive is now to become an EU Machinery Ordinance.

Technical progress over the past 15 years has made it necessary to thoroughly revise the MD. Aspects such as industrial security, artificial intelligence and the challenges of digitalisation must be taken into account in order to maintain the safety level in industrial manufacturing.

Here is an overview of the main changes brought about by the new Machinery Ordinance:

- The scope of application is basically unchanged
- As before, the definition of manufacturer also includes the manufacture of machines for own use. Thus, the more extensive typical manufacturer's obligations also apply to the self-used machines.
- Alignment of the directive with the NLF (New Legislative Framework) guidelines
- The demarcation from other directives has been improved (RED-RL)
- The possibility of digital operating instructions is introduced (with restrictions)
- The regulation includes a definition of "substantial change" to a machine
- Requirements for cybersecurity (Protection from Corruption) have been included - security becomes a mandatory element for the safety of machines

- The definition "safety component" is essentially retained, but also extended to software insofar as it fulfills the other criteria for safety components in an analogous manner - software is now a safety component
- All standards harmonised since then become obsolete and must be "re-incorporated"

The EU Commission presented the draft for the revision of the Machinery Ordinance on April 21, 2021. This proposal is now the basis for further discussions. It is currently anticipated that the Machinery Ordinance will be adopted in mid-2022.

As things stand, the Machinery Ordinance will come into force with a cut-off date - i.e. without a transition period and 30 months after it has been passed by the EU Parliament. The current draft also will allow the provision of machinery in accordance with the Machinery Directive on the domestic market only for a maximum of twelve months after the expiry of the old MD. This means that one year after the deadline, machines in stock at dealers could no longer be marketed, even though they were properly placed on the market according to the old MD.

Represented by the associations, Schmersal has tried to assert the interests of the mechanical engineering industry in the design of the Machinery Ordinance. This includes, among other things, the introduction of the Machinery Ordinance with an adequate transition period and the deletion of the passage that machinery placed on the market in the European Single Market in accordance with the current status of the Machinery Directive may only be made available for twelve months. ■



tec.nicum will follow the further development regarding the Machine Ordinance closely and will keep you informed!

Safety-related integration of automated guided vehicles (AGVs)

What legal requirements must be taken into account when planning AGV systems?

Automated guided vehicles count among the major key technologies for a “changeable production.” This article discusses various aspects to consider for safely integrating an AGV.



The requirements for production systems are high and diverse: Quality requirements, product traceability, energy efficiency and, of course, low production costs are at the top of the list. The variety of types is increasing and we want to be able to manufacture different products at the same production site within short notice or to adapt the production to changing parameters. The goal is a “flexible production system.” Previously rigidly planned storage systems with corresponding capacity and internal transport routes must be adaptable very quickly, as must the actual production processes.

Automated guided vehicles count among the major key technologies for a “changeable production.” The whole subject is not new; after all, the first systems were already in use in the USA in 1954 at the Mercury Motor Freight Company in Columbia, South Carolina. Even though the triumphant advance of AGVs has been unsteady and at times even pro-

nounced dead, today we are experiencing very high growth rates. New production planning systems can hardly do without AGVs if they want to make production flexible.

Likewise, automated guided vehicles are used in a wide variety of applications, ranging from large hospitals, medium-sized manufacturing, automotive, packaging logistics, to heavy industry and port logistics, and many other applications. Accordingly, the number of AGV manufacturers and system integrators is growing steadily.

Important aspects for the safe integration of an AGV

However, when integrating such an automated guided vehicle system, there are important aspects that need to be considered in order to get a performant and safe system. After all, such systems also involve larger investments, and of course you want to see an ROI within a reasonable time-frame.

In contrast to “traditional” machines, AGV systems have some special features.

- The automated guided vehicles (AGVs) are usually delivered as incomplete machines.
- However, the complete AGV system constitutes a large “entirety of machinery” for which conformity must be issued. The responsibility for this should be clarified at an early stage among the various players involved.
- In addition to technical requirements of the internal market directives, the overall machine also directly concerns occupational health and safety directives and their national legal implementations.
- The safety aspects of the occupational health and safety directives are not harmonised and national implementation may vary even within Europe.
- The AGV workspaces often correspond directly to the workspaces of employees.
- There are relevant interfaces to the production infrastructure / operating environment (shop floor, installed equipment, operative structure, ...).
- There are operating states in which the AGVs are self-sufficient and partially cascaded with machines.
- The requirements regarding the operating organisation and the awareness of the employees usually has a stronger impact on the safety of the overall system than with other machines. →

An early consideration of all relevant aspects is mandatory for a safe overall AGV machine. Therefore, you should plan carefully, consider the requirements and select the suitable AGV according to these specifications.

The planning has to consider the following aspects:

- Length of the AGV routes, which must be reached
- Number of required AGVs
- Average required travel speeds of the AGVs
- Where are the driving areas: Can / must fast-travel areas be established?
- What is the core task: Material transport or use as manufacturing platforms?
- Required AGV payload?
- Alternating loads /centres of gravity / overhanging loads?
- Floor condition: Friction values, unevenness, inclines/declines ...?
- Are load handling devices necessary on the AGVs, if so which ones?
- Number and location of charging stations, non-contact charging, charging required at processing stations?
- Number of maintenance stations
- Track guided or freely navigating AGV?
- Type of navigation and fine positioning
- Positioning accuracies of the vehicles within the work stations
- Coordinated operation of several AGVs necessary?
- Performance of the internal safety functions
- AGV communication features
- Openness and accessibility of the control system

An experienced AGV manufacturer or AGV integrator will clarify the important aspects in the planning phase and take them carefully into account in the implementation. To do this, they must be well positioned in various domains: good planning, simulation, automation and, of course, machine safety. If even one segment is not sufficiently considered, the system can become a money pit.

Occupational health and safety requirements must also be observed

If we look at the safety aspects, we can see that when integrating AGVs into the production environment, in addition to the usual safety requirements for machines, we also have to deal with the occupational health and safety specifications of the respective location, which is rarely the case with traditional machine topics. What is more, these legal requirements, which are derived from occupational health and safety law, are not as consistently harmonised as those of the EU internal market directives and the supporting EN safety standards. The respective country-specific requirements must be observed here. →



For German operating sites, the Workplaces Ordinance (Betriebsstättenverordnung) including the relevant technical regulations are "ASR1-2 Room dimensions and movement areas," "ASR-A1-8 Traffic routes" and "ASR-A2-3-1 Escape routes and emergency exits, escape and rescue plan." Here, the integration of an automated guided vehicle could possibly have repercussions on the requirements of the above-mentioned regulations, e.g. regarding escape route widths.

New C standard for AGVs

According to the Machinery Directive and the relevant safety standards, the machine manufacturer has received a "fresh set of instructions" since the end of 2020: a C standard "EN ISO 3691-4 Industrial trucks – Safety requirements and verification – Part 4: Driverless industrial trucks and their systems." The market had to wait a long time for this standard; after all, its predecessor, EN 1525 from 1997, a first-generation safety standard, was really no longer state of the art.

The new set of rules includes important requirements for the automated guided vehicles, the pick-and-place points and the overall system.

An important criterion of the standard is the distinction between different operating areas. There are four different types of operating areas for which specific requirements must be met:

- Operating range
- Operating hazard area
- Restricted area
- Closed area

Within these areas, different safety requirements are placed on the AGVs. Safety distances, travel speeds, safety labeling and specifications for active and passive human detection devices are assigned to the individual operating areas.

In addition to the general requirements of the operating areas, there are other relevant criteria that must be observed. For example, in the absence of escape facilities - like in a block warehouse that is loaded using AGVs - human detection devices must be active, and must reliably detect a person up to 180 mm in front of surrounding interfering contours. →

Appendix A, tables 1 and 2 detail all relevant relationships with clearance dimensions, active / passive human detection devices, allowable speeds, required labeling / markings, and restart procedures. Similarly, for many control solutions, the performance regarding the individual safety functions of the AGVs is specified. For example, PLr=d is specified for the human recognition systems on the AGVs and any switchover devices that may be present.

Additionally, test specifications for standing and lying obstacles are defined for the human detection systems. Other aspects include specifications for warning systems, technical documentation and operating instructions, emergency stop devices, operating modes, requirements for load handling attachments, towing and trailer operation. ■



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<https://www.edag.com/de/safety>

tec.nicum seminars AGV

This year, **tec.nicum** is offering one-day seminars on the topic of "Automated Guided Vehicles and their safety-related integration into the production environment" in cooperation with EDAG-PS Sicherheitstechnische Dienstleistungen.
Speaker: Ulrich Hochrein

The next seminar will take place on
17. May 2022 in Wuppertal

Another seminar on this topic is planned for
13. September 2022 in Wettenberg.

Further information and registration at this link:
www.tecnicum.com/academy/

New tec.nicum seminar: Machinery CE Expert®

Machine safety expert in just four days

The tec.nicum academy has added a new advanced training offering to its programme: in a four-day seminar, participants can qualify as “Machinery CE Expert®” (MCEExpert). After completion of the training, there is the option of taking an exam conducted under the supervision of TÜV Rheinland®, which can also be done in online format. The qualification is internationally recognised.

The classroom course conveys in a compact form all knowledge required to meet the legal and normative requirements in the EU internal market. The participants receive the necessary expert knowledge to implement a CE conformity assessment procedure for machines and systems with all relevant sub-steps.

Upon successful completion, participants can prove their acquired qualification for machine safety by means of a certificate issued by TÜV Rheinland®. You will be authorised to use the title “Machinery CE Expert® with TÜV Rheinland® verified qualification.

In the online certificate database “Certipedia”, TÜV Rheinland® provides information on all tested product features, services, companies, systems and personnel certifications (www.certipedia.com). The description of the seminar “Machinery CE Expert®” as well as the individual identification number of each graduate can be viewed and verified in the “Certipedia.”

The participation costs for the course amount to EUR 2,900.00, including the fees for the examination conducted by TÜV Rheinland®. ■



Programme

1st course day

European directives and standards

- Introduction to product safety law
- Machinery Directive 2006/42/EC
- General principles and terms
- Requirements for “partly completed machinery”
- Technical documentation, EC declaration of conformity, CE marking

Risk assessment according to EN ISO 12100

- Conformity of production lines and large plants
- Conducting the risk assessment according to EN ISO 12100

Basic safety and health requirements

Term definition: “State of the art”

2nd course day

Identification of hazards on machinery

- Mechanical hazards
- Hazards from materials and substances
- Ergonomics requirements
- Fire and explosion protection on machinery
- Other hazards
- Hazard due to mobility and lifting operations
- Requirements for special types of machinery

Requirements for maintenance, labeling of machinery

- Information, warnings and labeling on machinery

Requirements for the operating and installation instructions

3rd course day

Identification of hazards on machinery

- Pneumatic and hydraulic hazards
- Noise and vibration hazards
- Radiation hazards
- Electrical hazards

Separating & non-separating protective devices

- Requirements for the electrical equipment of machinery
- Requirements for control equipment

Requirements for the maintenance of machinery

4th course day

Functional safety of machinery

- Introduction: “Functional safety of machinery”

Verification according to EN ISO 13849-1

- EN ISO 13849-1: Safety-related parts of control systems - “Verification”
- Terms & definitions, general principles for design
- Defining the Performance Level (PL)
- Calculating safety functions

Validation according to EN ISO 13849-2

- EN ISO 13849-2: Safety-related parts of control systems - “Validation”
- Validation procedure
- Validation by means of analysis / inspection

tec.nicum academy
Seminar programme 2022 – 2023

The **tec.nicum academy** provides a comprehensive training and seminar programme on topics relating to machine and plant safety.

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 Mail mdahm@tecnicum.com

Seminar topics	Wuppertal	Kirkel	Wettenberg	Bremen	Inhouse
NEW					
Qualification as TÜV “Machinery CE Expert® - MCEExpert”	20.03.2023 to 24.03.2023	05.12.2022 to 09.12.2022	30.05.2022 to 03.06.2022	05.09.2022 to 09.09.2022	on request

Seminar topics	Wuppertal	Ulm	Wettenberg	Bremen	Online	Inhouse
Law						
Machinery Directive 06/42/EC - CE conformity evaluation procedure	17.11.2023	on request	24.01.2023	on request	17.03.2023	on request
Legal aspects of machine safety for managers (halfday seminar)	09.11.2022 26.10.2023	on request	on request	on request	22.06.2023	on request
Legal aspects of machine safety for purchasers, designers, project coordinators (halfday seminar)	05.05.2022 14.11.2023	on request	on request	on request	23.06.2023	on request
Basics of occupational health and safety for managers	10.11.2022	28.06.2022 07.07.2023	on request	on request	06.10.2022 29.09.2023	on request

Continued on page 18)

Seminar programme 2022 – 2023 (Continued from page 17)

Seminar topics	Wuppertal	Ulm	Wettenberg	Bremen	Online	Inhouse
Standards - Regulations						
Risk assessment for infection prevention	Dates on request: mdahm@tecnicum.com oder jruda@tecnicum.com					
Risk assessment and operating instructions	06.05.2022 15.11.2023	03.07.2023	03.05.2022 13.11.2023	on request	03.11.2022 17.02.2023	on request
Validation according to EN ISO 13849-2 (halfday seminar)	23.06.2022 16.06.2023	01.12.2022 24.11.2023	on request	on request	24.02.2023	on request
Application of EN ISO 13849-1 getting started with SISTEMA	14.06.2022 14.06.2023	29.11.2022 22.11.2023	on request	on request	25.10.2022 10.02.2023	on request
Practical workshop working with SISTEMA	15.06.2022 15.06.2023	30.11.2022 23.11.2023	on request	on request	on request	on request
Basics of the Ordinance on Industrial Safety and Health (BetrSichV)	27.10.2022 16.11.2023	04.07.2023	04.05.2022 25.01.2023	on request	24.05.2022 15.05.2023	on request
Risk assessment for machinery and equipment	26.01.2023	19.09.2022 05.07.2023	on request	on request	23.05.2022 30.01.2023	on request
Technical documentation of machines and equipment	on request	20.09.2022 06.07.2023	23.01.2023	on request	15.09.2023	on request
New construction, conversion, retrofitting - from manufacturer to owner/operator? (halfday seminar)	06.09.2022 13.09.2023	on request	on request	on request	on request	on request

Seminar programme 2022 – 2023

Seminar topics	Wuppertal	Ulm	Wettenberg	Bremen	Online	Inhouse
Application						
Basics of safety engineering - separating and non-separating protective devices	08.09.2022 07.09.2023	on request	02.06.2022 25.05.2023	on request	on request	on request
Electromagnetic compatibility EMC / EMEC in practice protective devices	Dates on request: mdahm@tecnicum.com oder jruda@tecnicum.com					
Safe fluid power - safe implementation of EN ISO 13849-1	Dates on request: mdahm@tecnicum.com oder jruda@tecnicum.com					
Automated guided vehicles and their integration into the production environment	17.05.2022 16.05.2023	on request	13.09.2022 12.09.2023	on request	07.03.2023	on request
Safety in integrated robotic manufacturing plants	18.05.2022 17.05.2023	on request	14.09.2022 13.09.2023	on request	08.03.2023	on request
Human-robot collaborations	19.05.2022 18.05.2023	on request	15.09.2022 14.09.2023	on request	09.03.2023	on request
Explosion protection compact seminar	17.11.2022	19.09.2022	31.05.2022	29.09.2022	on request	on request
Products						
Safety control PSC1 basic workshop	03.05.2022		27.09.2022			
Safety Control PSC1 expert workshop	04.05.2022		28.09.2022			
Basics and inspection of opto-electronic protective devices according to BetrSichV (seminar objective: Competent person)	Mühldorf 26.10.2022					

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