

Marking of Automated Guided Vehicles/ Transport Systems – Single Machine or Assembly of Machines

Within the meaning of Directive 2006/42/EC

ICS: Descriptors

Four thick, white, curved lines sweep across the lower half of the page from left to right, creating a dynamic, abstract graphic element.

Content

Legal Note	4
Introduction	5
1 Terms	6
2 Assembly of Machines	8
3 Case 1: Production-related but not safety-related context	
3.1 Case 1, Ex. A: Production-related but not safety-related context CONTROL LEVEL – two systems, two independent fleet managers	11
3.2 Case 1, Ex. B: Production-related, but not safety-related context CONTROL LEVEL – two systems, one fleet manager	11
3.3 Explanation of Case 1; Case 1 Ex. A; Case 1 Ex. B	12
4 Case 2: AGVs with a production and safety-related context in connection with safe machines and overlapping work areas	13
5 Modification of a machine	15
5.1 As in case 1, subsequent addition of individual machine without safety-related context	16
5.2 As case 2: Subsequent addition of single machine or PCM with safety-related context	18
References	19

Legal Note

The content of this brochure has been carefully researched and compiled but does not replace legal advice in individual cases. No responsibility is taken for the correctness and completeness or for any changes that may occur in the meantime.

The guide is intended only as a point of reference and provides only an overview of the assessment for placing on the market within the meaning of Directive 2006/42/EC of automated guided vehicles/transport systems. It makes no claim to completeness or to the exact interpretation of the existing legal provisions. It should not replace the study of the relevant directives, laws, and regulations. Furthermore, the special features of the respective products and their different possible applications must be considered.

Therefore, a multitude of other constellations are conceivable for the examples, assessments, procedures, and measures mentioned in the guidelines.

Introduction

This brochure is intended for manufacturers, authorized representatives, importers, and distributors of automated guided vehicles (AGV)/ Automated Mobile Robots (AMR) and Automated Guided Vehicle Systems operators of AGV installations and decision-makers in the context of AGV projects.

Two fictitious examples are chosen to illustrate the placing on the market in the sense of the Machinery Directive 2006/42/EC (MRL) and the resulting different labelling obligations. These are only two possibilities for placing AGVs on the market. The basis of the CE Marking and the creation of the EU Declaration of Conformity is the performance and documentation of a conformity assessment procedure, e.g., according to 2006/42/EC, Article 5(1), or other regulations, which is to be applied to the machinery or to the product "totality of machinery".

In addition to these two examples of placing on the market, for both variants the subsequent addition of further AGVs / AMRs to the existing machine / assembly of machines and the possible resulting "substantial modification of the existing machine" are also shown for both variants.

1 Terms

For the purposes of this document, the following terms, among others, shall apply.

Single machine

A single complete machine within the meaning of Directive 2006/42/EC.

Assembly of machine

A linking of individual machines to form an Assembly of machine in accordance with Directive 2006/42/EC.

AGV/ AMR¹

Automated Guided Vehicle (AGV) or Autonomous Mobile Robot (AMR)

Automated Guided Vehicle System

Consists of at least one AGV and a superordinate system control, which can be integrated in the vehicle or located externally.

Safety-related context

One speaks of a safety-related context, which is characterized by the fact that the safety of the entirety is ensured, for example, by a safety control system based on the machinery (entirety of machinery) or via safety components that do not belong to this control system, such as fixed guards. For example: If an event occurs at a machine or partly completed machine that can lead to a hazard at other machines or partly completed machines in the plant, a higher-level safety concept must be implemented to minimise the hazard.

Manufacturer

Natural or legal person within the meaning of Directive 2006/42/EC.

User

Person(s) installing, operating, adjusting, maintaining, cleaning, repairing, or moving machinery.

External participant

Machines or partly completed machines that are not AGVs and are in a safety-related context of the totality of machines.

Example: Robot cell, transfer point continuous conveyor.

EC/EU Declaration of Conformity

A machine in the sense of Directive 2006/42/EC can fall under other directives with a conformity assessment procedure. This may also be an EU directive, e.g. EMC 2014/30/EU. In the context of this document, the designation EC/EU Declaration of Conformity represents the possibility that the machines dealt with here have both an EC and an EU conformity.

EC Declaration of Conformity and an EU Declaration of Conformity in combination.

PCM – Partly Completed Machinery

is a term for an assembly of parts which is almost machinery, but which cannot in itself perform a specific application.

¹ For the purpose of this document AGV is used synonymously for Automated Guided Vehicle (AGV) and/or Autonomous Mobile Robot (AMR-related)

Illustration production level

(Production-related context)

PL

Production level

Enterprise Resource Planning ERP

Warehouse Management Systems (WMS),
Manufacturing Execution Systems (MES), ...

Control level

Level of system control of AGVs. The control level can be centralised, but also decentralised.

Examples in the document: FMS Fleet Manager Representation Control Level.

Production level

Level for various systems in a company, for the management and control of production processes. Examples in the document:

- ERP Resilience Resource Planning
- WMS Warehouse Management Systems
- MES Manufacturing Execution System systems

Illustration control level

CL

Control level

Fleet Manager FMS



2 Assembly of Machines

”...

A production-related connection is given by the fact that:

- The individual machines or partly completed machines are arranged in such a way that they are to be regarded as a self-contained unit (here, in particular the focus is placed on the coherent set-up) and
- The individual machines or incomplete machines work together as a whole, this means, for example, that the cooperation must be oriented towards a common goal, for example the production of a specific product) and
- The individual machines or partly completed machines are operated as a whole, i.e., via a common or superordinate, functional control or have common command facilities.

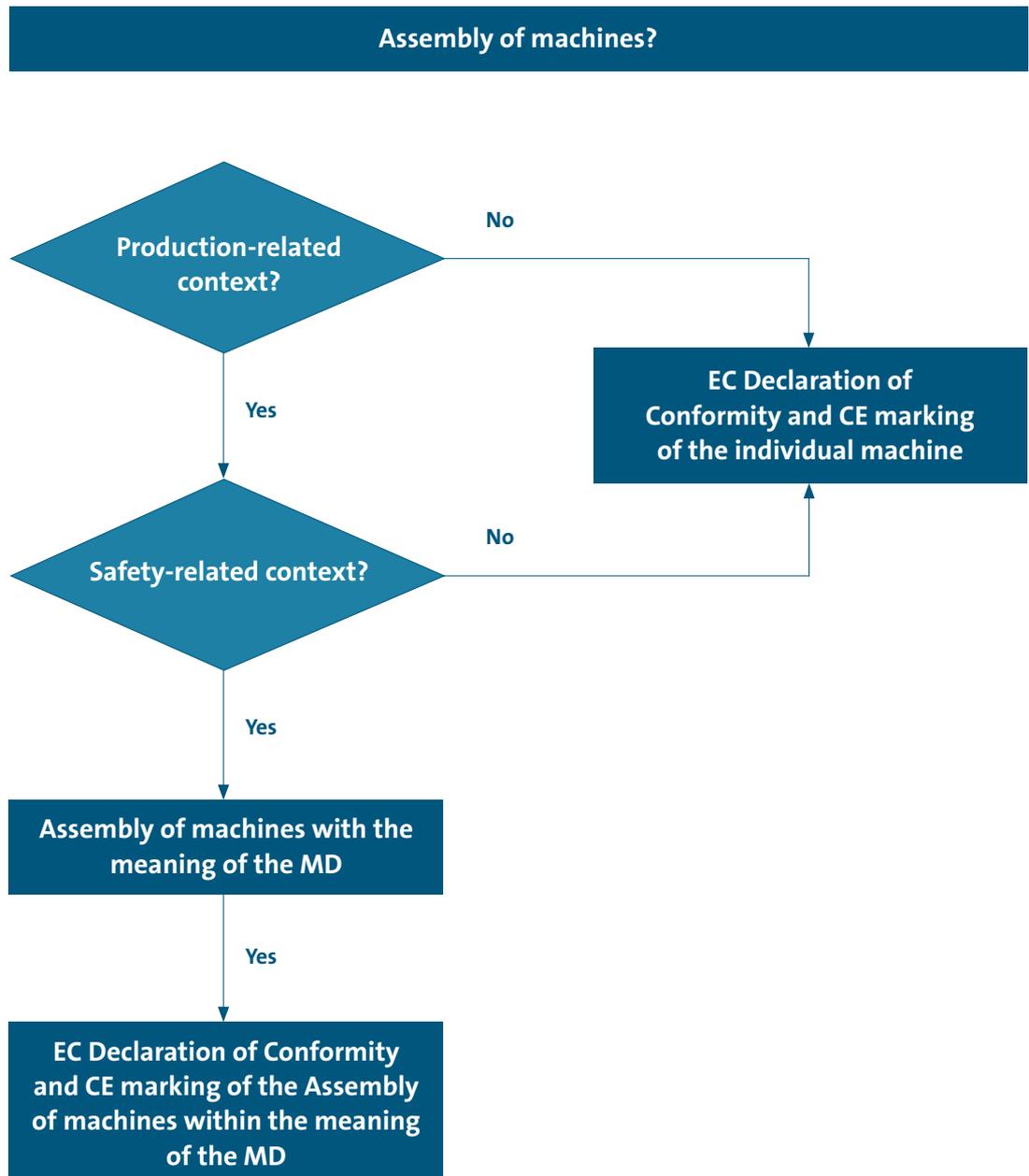
In terms of safety, the individual machines or partly completed machinery function as a whole and thus form a unit in this respect (safety-related context). This is the case when machines and/or partly completed machines are connected to each other in such a way, that an event that occurs in one component of the system leads to a hazard in another component and safety measures must be taken for this "totality" in order to bring all these components into a safe condition in the event of a hazard.

[Source: BMAS - Interpretation of the terms used in the Machinery Ordinance and EC Machinery Directive 2006/42/EC.

“Assembly of Machinery“. Of 5 May 2011 (GMBI. No. 12, p 233)]

See also Annex I, section 1.2.4.4 of the MD, Assembly of Machinery.

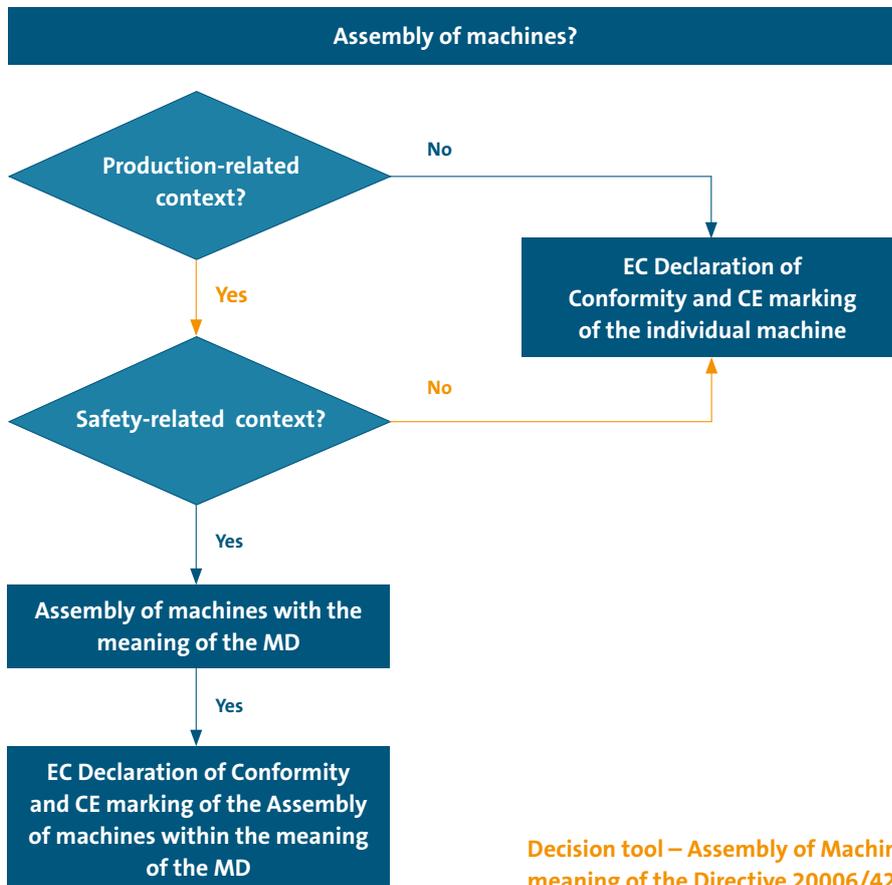
...”



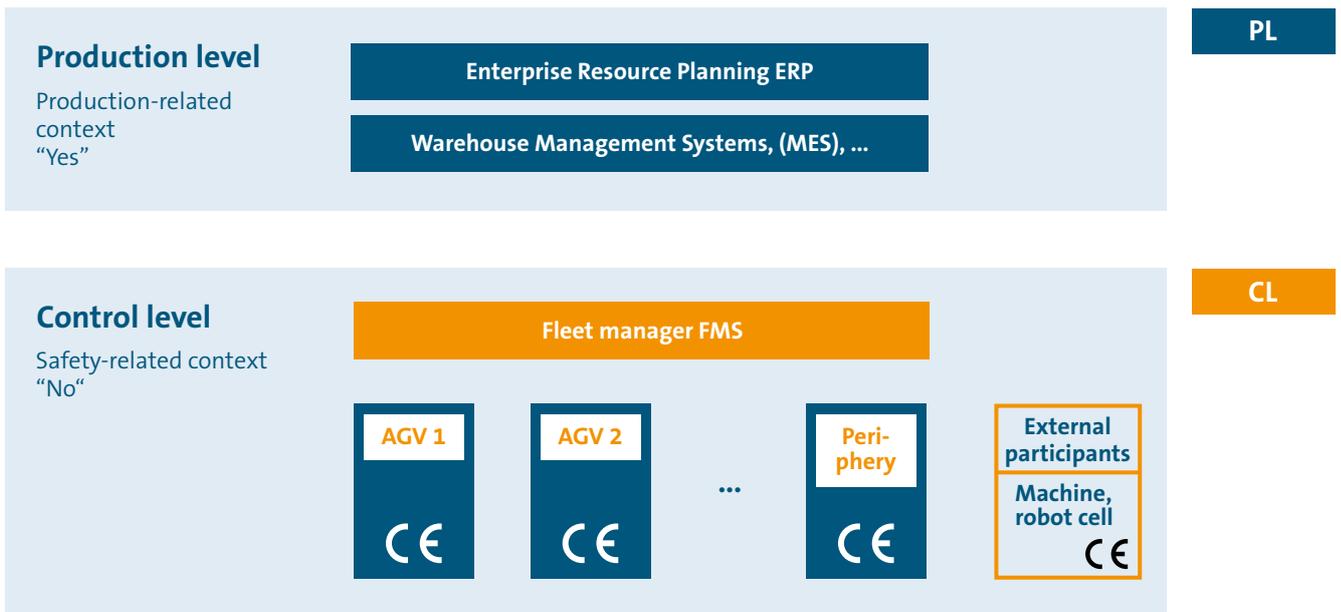
Decision tool – Assembly of Machines within the meaning of the Directive 2006/42/EC

Source: BMAS - Interpretationspapier zum Thema „Gesamtheit von Maschinen“

3 Case 1: Production-related but not safety-related context

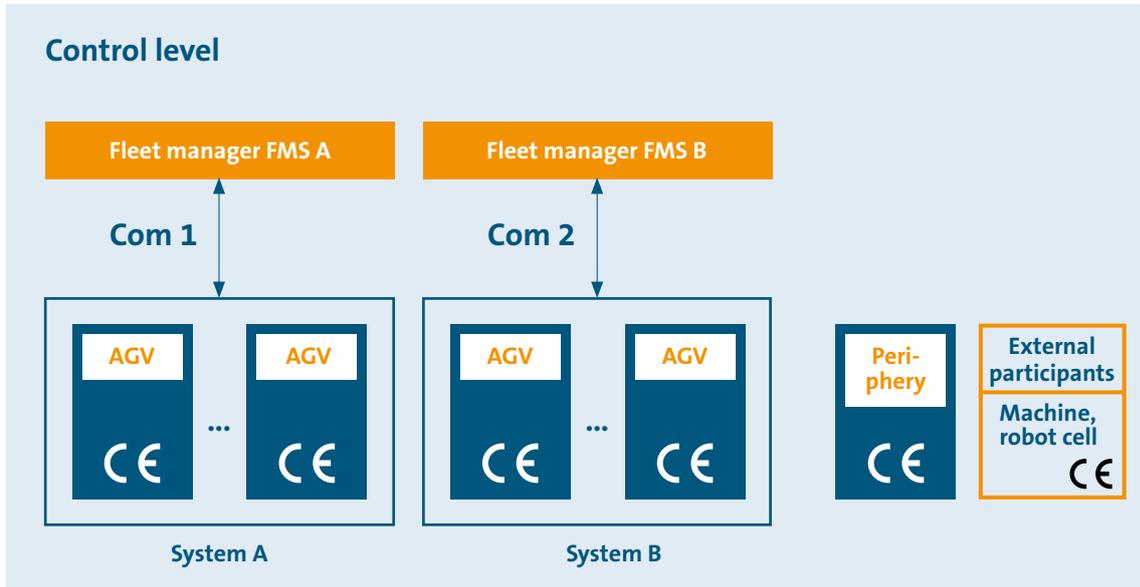


Decision tool – Assembly of Machines within the meaning of the Directive 2006/42/EC



Making of "individual machines – AGV" within the meaning of Directive 2006/42/EC

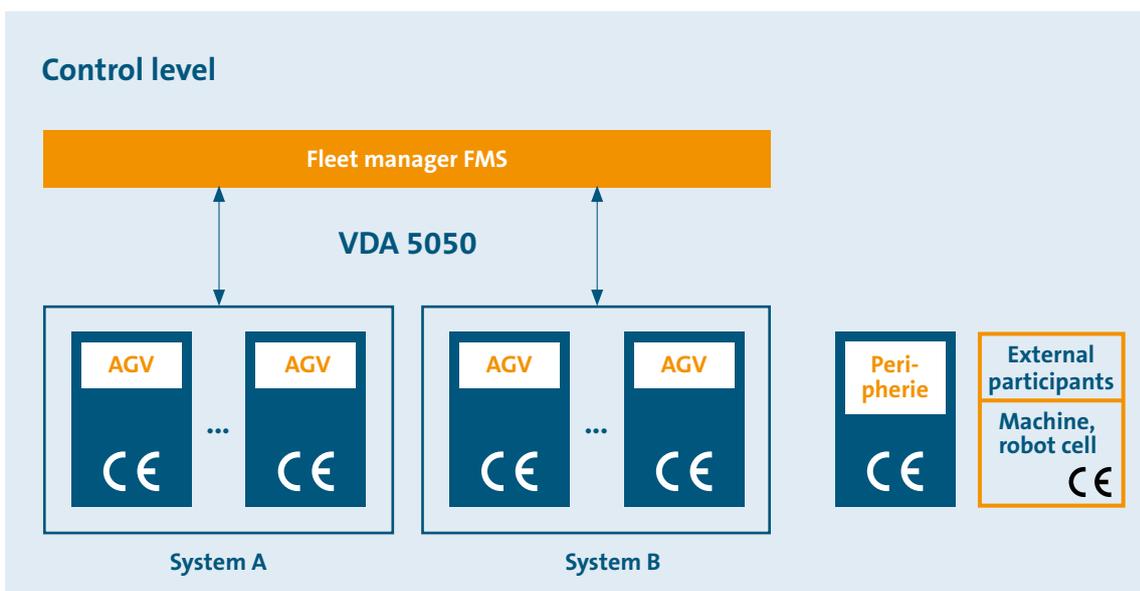
3.1 Case 1, Ex. A:
Production-related but not safety-related context CONTROL LEVEL –
two systems, two independent fleet managers



CL

Making of “individual machines – AGV” within the meaning of Directive 2006/42/EC

3.2 Case 1, Ex. B:
Production-related, but not safety-related context CONTROL LEVEL –
two systems, one fleet manager



CL

Making of “individual machines – AGV” within the meaning of Directive 2006/42/EC

3.3 Explanation of Case 1; Case 1 Ex. A; Case 1 Ex. B

Different AGVs are coordinated in terms of control by a common fleet manager and a production-related context is assumed in this example through WMS, ERP.

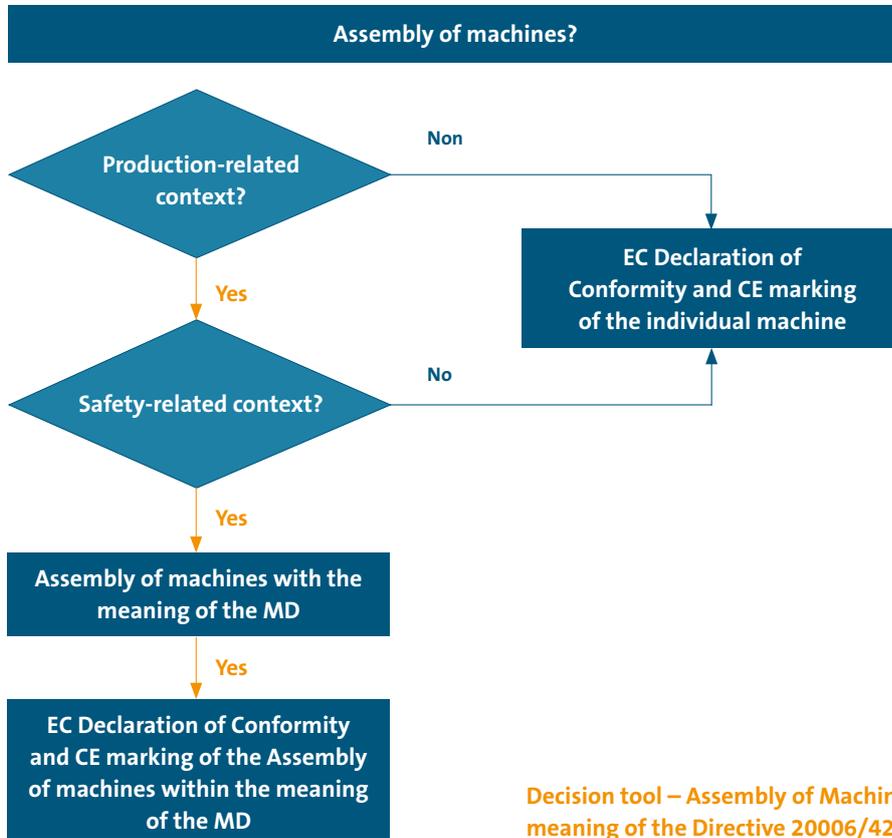
There is no safety-related context between the AGVs, as the individual AGVs are not linked to each other in terms of safety. The AGVs are "machines" in the sense of the MD and have their own autonomous safety strategy.

Within this technical production context, there may also be other machines/systems which act as individual machines in the sense of the MD.

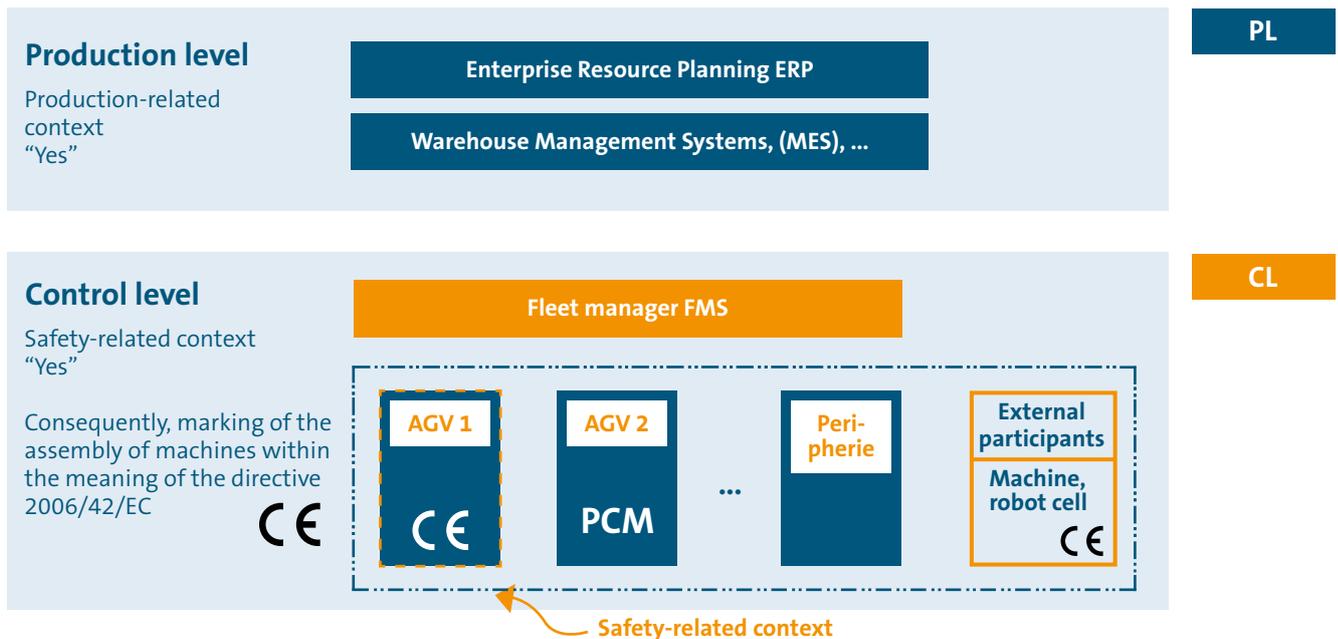
In this case, the picture (BMAS) results in an EC/EU Declaration of Conformity and a CE marking of the respective individual machine (e.g. FTF, robot cell, etc.).

An assessment of the risks or hazards at interfaces, e.g. AGV transfer point, must be considered individually and are not necessarily part of the individual EC/EU declarations of conformity.

4 Case 2: AGVs with a production and safety-related context in connection with safe machines and overlapping work areas



Decision tool – Assembly of Machines within the meaning of the Directive 2006/42/EC



A CE marking for the assembly of machines, because the individual machines are connected in terms of production and safety. The CE marking of an individual machine remains on the individual machine.

Different AGVs are coordinated in terms of control by a common fleet manager and a production-related context is assumed in this example through WMS, ERP.

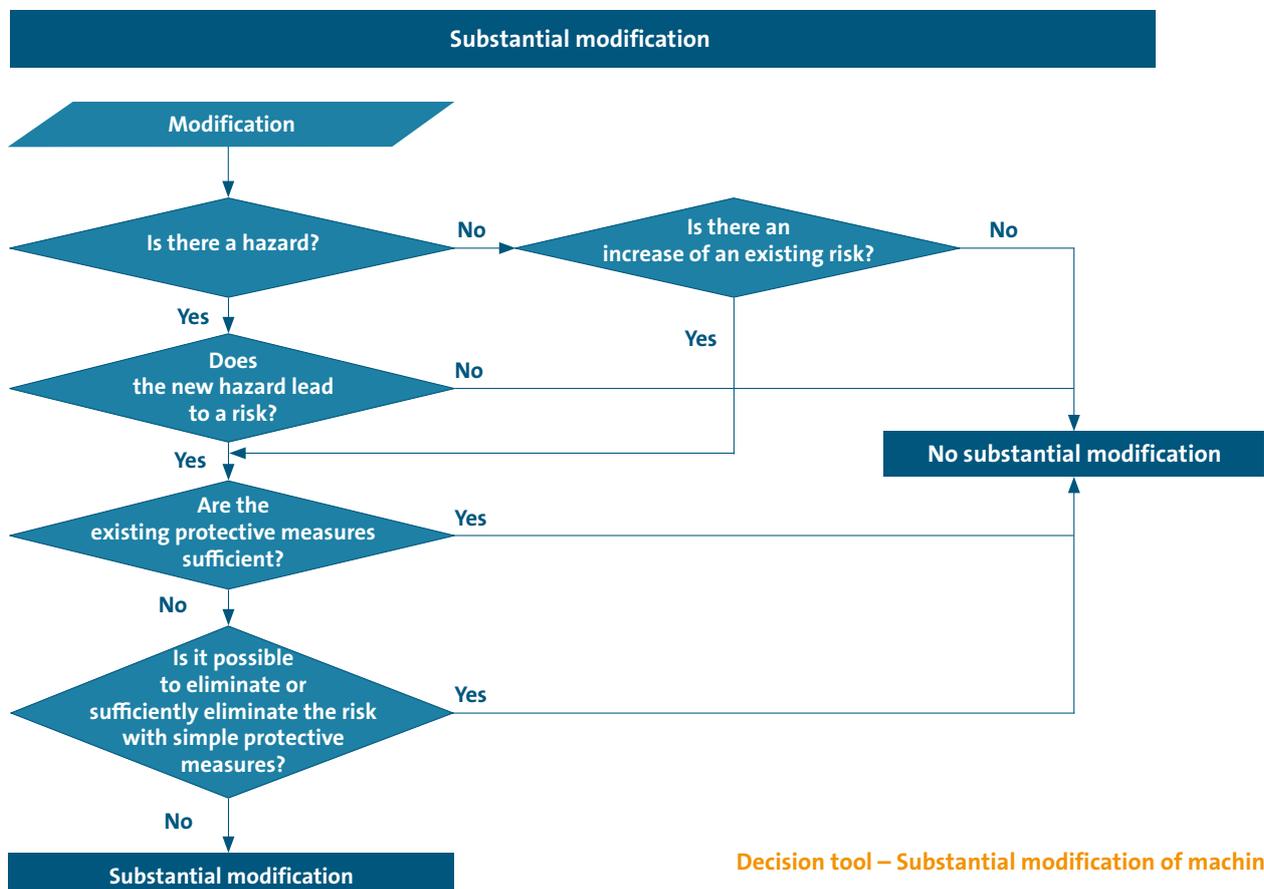
There is a safety-related context between the AGV and the other machines, the individual machines are safety-linked to each other, i.e. when a safety function is triggered or responded to, the AGVs in the effective range of the safety function, adjacent peripherals and external participants go into a defined safe state.

In this case, the CE marking for the assembly of machines results from the illustration (BMAS), since there is a production- and safety-related context between the individual machines. The CE Marking of an individual machine remains on the individual machine(s).

5 Modification of a machine (BMAS interpretation paper)

Any modification to a machine, regardless of whether it is used or new, which may impair the protection of the legal interests of the Product Safety Act². If the use of the equipment is impaired, e.g. due to an increase in performance, a change in function, a change in the intended use (e.g. due to a change in the auxiliary, operating and input materials, conversion or changes in the safety technology), the following must first be investigated with regard to their safety-relevant impact. This means that it must be determined in each individual case whether the modification of the (used) machine has resulted in new hazards or whether an already existing risk has increased. Three different cases can be distinguished here:

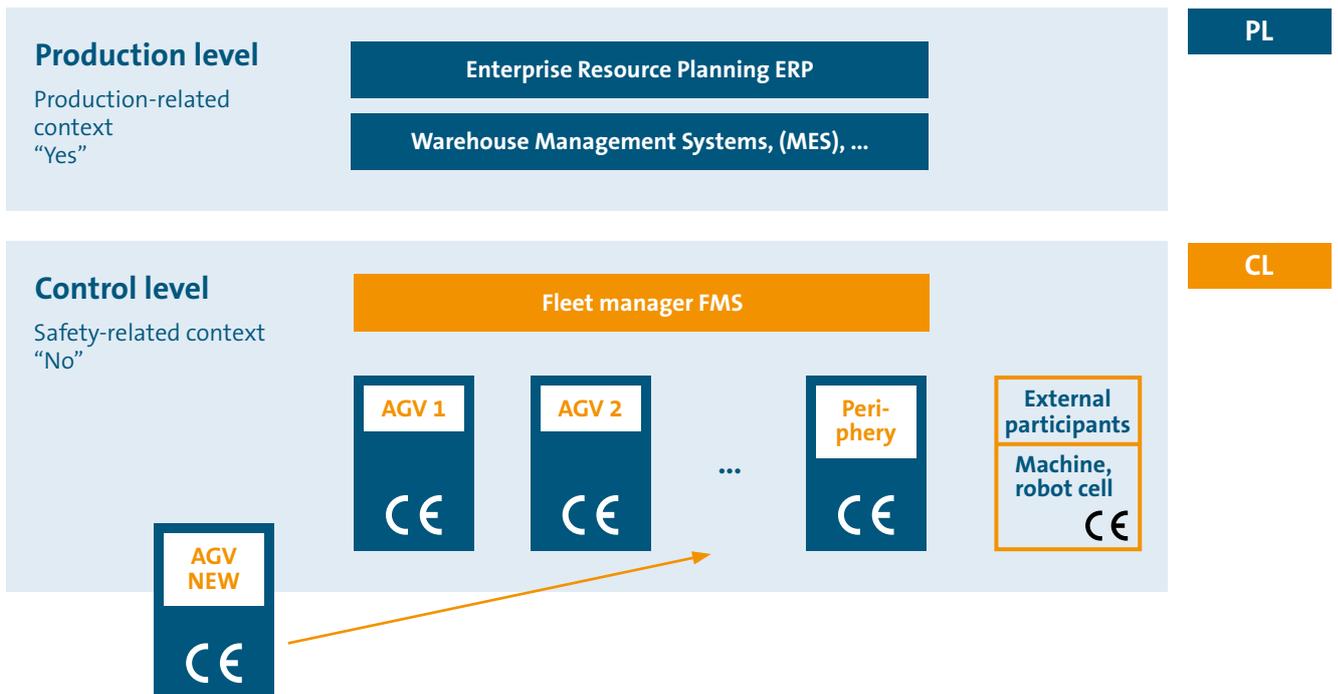
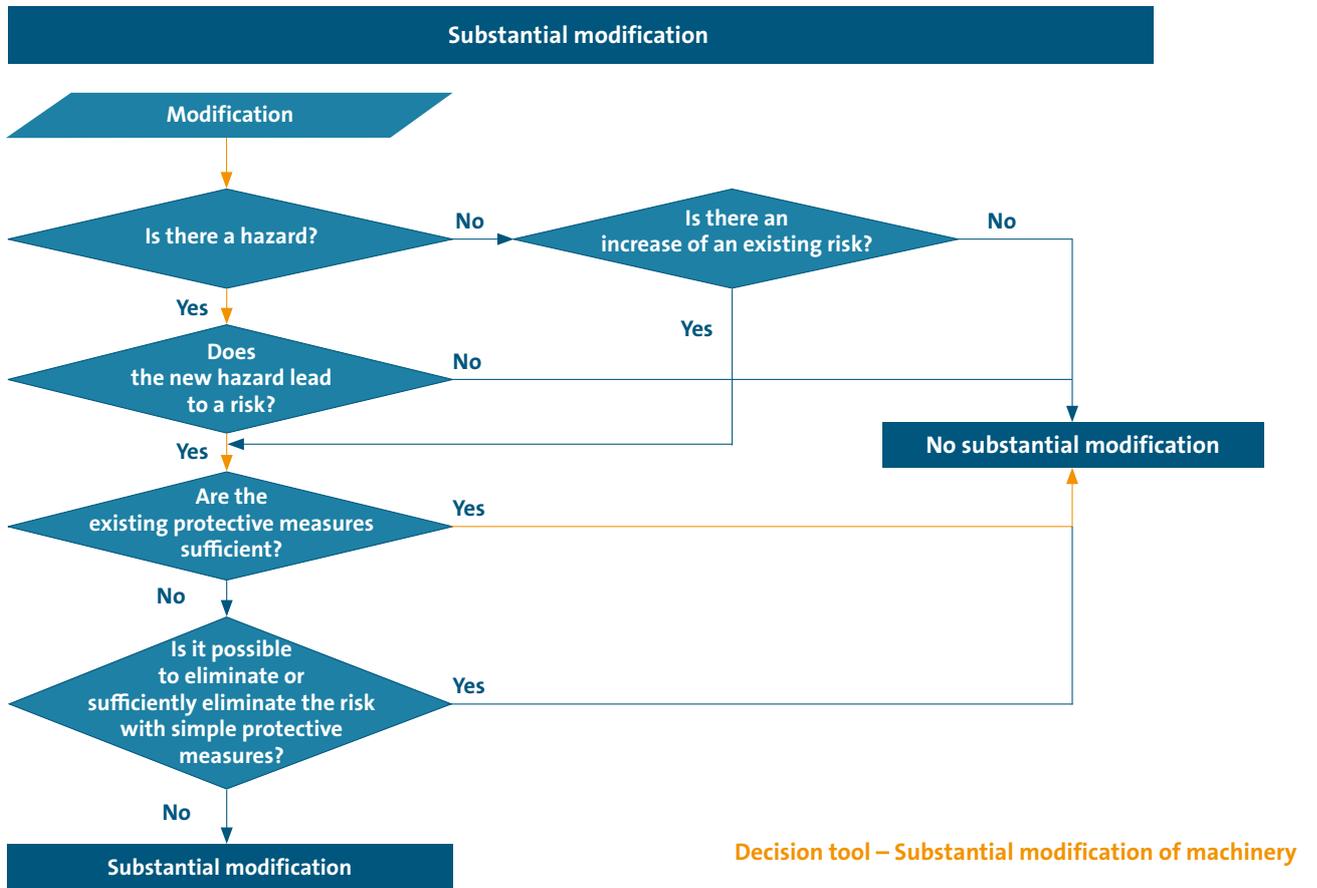
1. There is no new hazard or increase in an existing risk, so that the machine can still be considered safe.
2. Although there is a new hazard or an increase in an existing risk, the existing protective measures of the machine before the change are still sufficient for this, so that the machine can still be considered safe.
3. There is a new hazard or an increase in an existing risk and the existing protective measures are not sufficient or suitable for this.



Decision tool – Substantial modification of machinery

² German Produktsicherheitsgesetz

5.1 As in case 1, subsequent addition of individual machine without safety-related context



Making of "individual machines – AGV" within the meaning of Directive 2006/42/EG

5.1

As in case 1, subsequent addition of individual machine without safety-related context

Different AGVs are coordinated in terms of control by a common fleet manager and a production-related context is assumed in this case through WMS and ERP.

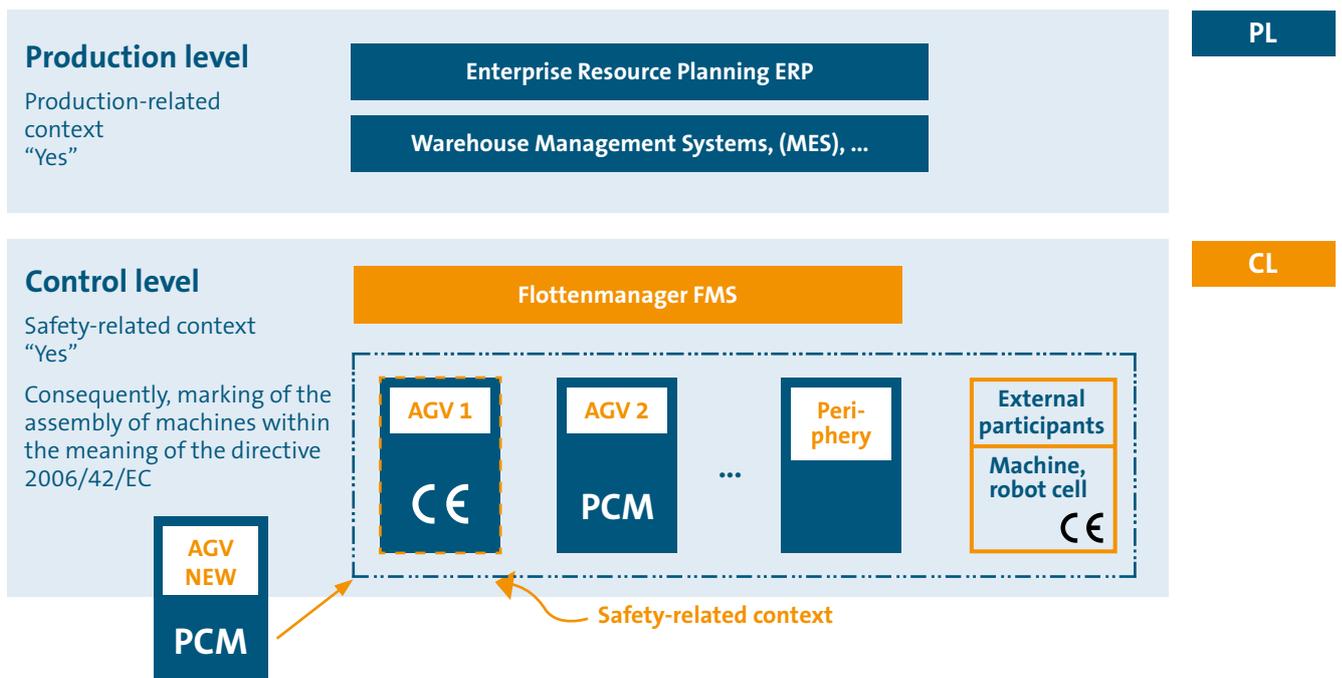
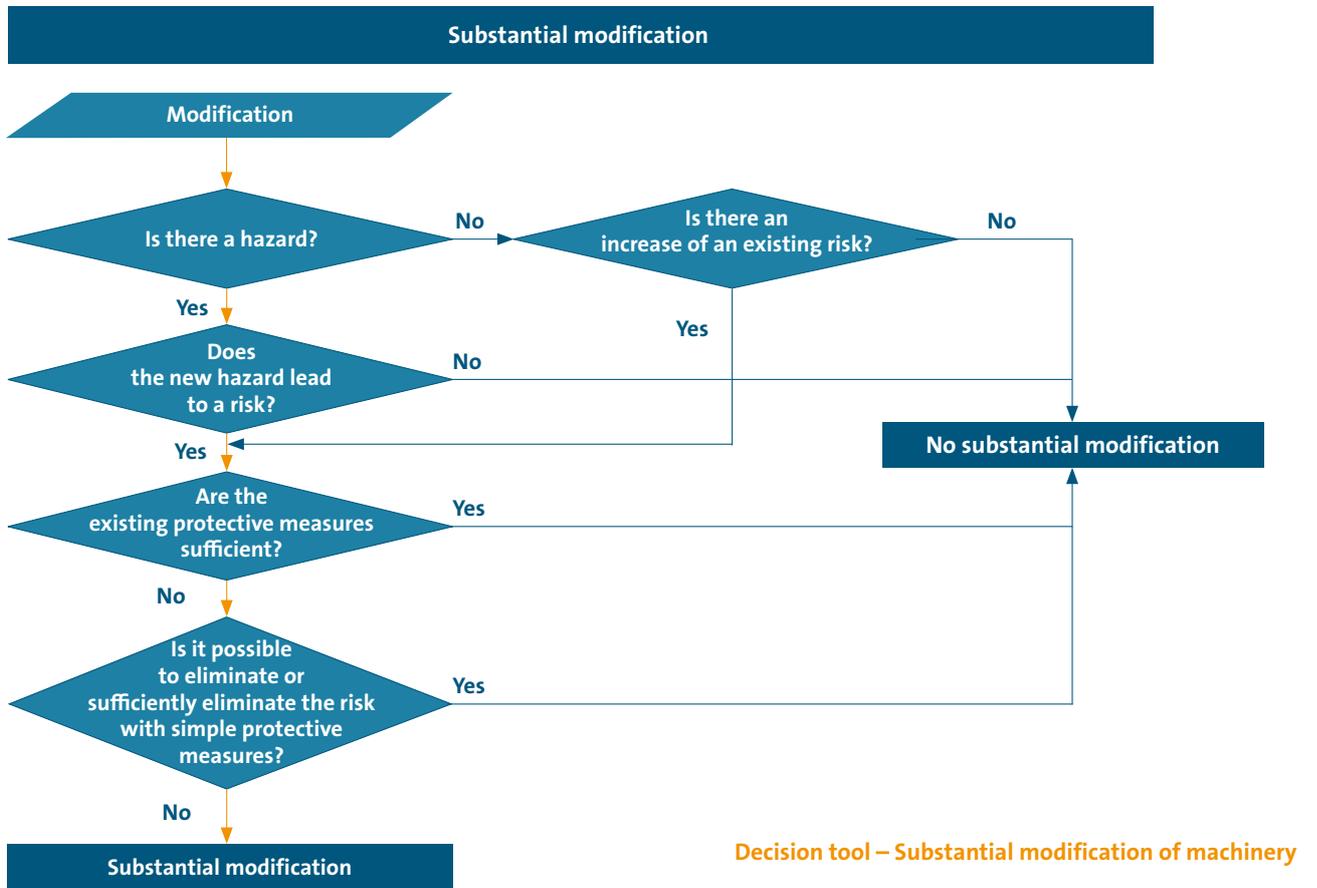
There is still no safety-related connection between the AGVs, but as a machine in the sense of the MRL, the AGVs have an independent autonomous safety strategy. In this case, there is no significant change to the machine, as the existing protective measures are sufficient despite new hazards that lead to a new risk.

The existing AGVs and the added AGVs are “individual machines” in the sense of the MD with EC/EU declaration of conformity and CE marking.

Within this case of an assumed technical production connection, there may also be other machines/plants which in themselves act as machines in the sense of the MD.

In the case described, the existing CE markings of the respective machines (e.g. AGV, robot cell, etc.) remain valid. The added AGV must have its own EC/CE declaration of conformity and CE marking. These declaration(s) of conformity become part of the already existing technical documentation.

5.2 As case 2: Subsequent addition of single machine or PCM with safety-related context



New conformity assessment procedure with new CE marking of the "Assembly of Machines" in the sense of Directive 2006/42/EC, including the new manufacturer's marking.

5.2

As case 2: Subsequent addition of single machine or PCM with safety-related context

Different AGVs are coordinated by a common fleet manager in terms of control technology, and a production connection is assumed in this case by means of a WMS and an ERP. The existing system already has a safety-related context.

Another AGV, in this example an incomplete machine in the sense of Directive 2006/42 EC, is assigned to the existing totality of machines by the fleet manager in terms of production technology, control technology and safety technology.

In this assumed case, it is a significant change to the machine, as new risks arise due to new hazards. The existing protective measures are not sufficient and simple protective measures do not minimise the new or increased risks.

The existing set of machines and the newly added AGVs are therefore considered as new "Entire machinery" in the sense of the MD.

The previous declaration of conformity states that the machine complied with the regulations at the time it was placed on the market or put into service. Beyond that, it no longer has any effect, it then only has a "historical" statement. The existing "Entire machinery" including all AGVs present in the system must undergo a new conformity assessment procedure according to the MD. This may lead to changes to existing AGVs, as they may have to be adapted to the current state of the art. The result of the assessment procedure is a new EC/EU Declaration of Conformity and a new CE marking for the new complete machine in accordance with Directive 2006/42/EC after the substantial modification.

References

European Commission

Guide to the Machinery Directive 2006/42/EC [Version 2.2.]

VDMA Quick Guide "CE marking of machines with Explanation of the Conformity Assessment Procedure" [Version September 2015]

VDMA position paper

Definition of machinery and assembly of machinery in the sense of EC Directive 2006/42/EC [17 November 2009].

Interpretation paper

on the subject "Assembly of machines" – Bek. D. BMAS v. 5.5.2011, IIIb5-39607-3-.

VDMA – Knowledge Machinery Directive

Classification of products as machinery or partly completed machinery [28 July 2011].

VDI

Automated Guided Vehicles - Guide to Safety

Ed.2020

DGUV Test - significant changes to products

[06/2016]

Interpretation of the term "Assembly of machines" used in the Machinery Ordinance or EC Machinery Directive 2006/42/EC

[Of 5 May 2011 (GMBI. No. 12, p 233)]

Imprint

VDMA

Materials Handling and Intralogistics

Lyoner Str. 18
60528 Frankfurt am Main
Germany

Contact

Phone +49 69 6603-1734
E-Mail andreas.scherb@vdma.org

Layout

VDMA DesignStudio

Copyright

© August 2022

VDMA

Materials Handling and Intralogistics

Lyoner Str. 18
Germany
60528 Frankfurt am Main
Germany

Andreas Scherb
E-Mail andreas.scherb@vdma.org
Internet vdma.org/intralogistics

www.vdma.org