

Standardization of automated handling systems : new trends and safety challenges

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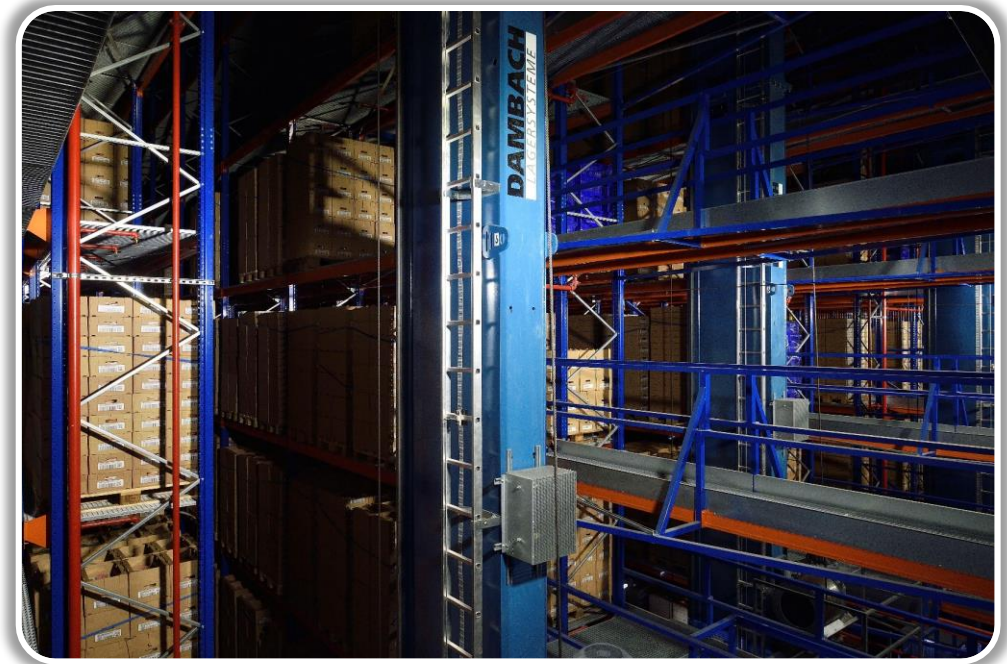
Automated handling systems

Driverless trucks



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Automated Storage and Retrieval System



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Automated handling systems : new trends

Evolution of technologies

- Lithium batteries
- Small components
- 3D cameras, lidar
- Software/AI
- "off-the-shelf" machines
- ...



New machines
New manufacturers

Evolution of market needs

- Increase of logistics needs
 - Flows
 - Storage capacity
- Recruitment issues
- Flexibility
- ...



New applications

Driverless trucks

Driverless trucks (AGV, AMR)

ISO/TC 110/SC 2/WG 15 – ISO 3691-4

Machine

- with **wheels**,
- intended for **load handling**,
- **without driver**,
- in an **industrial environment**.

1997 : EN standard

2020 : ISO standard

2023 : revised ISO standard

2026 : Ongoing revision



What's new?

Driverless trucks (AGV, AMR)

ISO/TC 110/SC 2/WG 15 – ISO 3691-4

- **New applications (bins, boxes, shelves handling)**
 - **New types of machines**
 - **New environments, new users (small and medium-sized companies , logistic centers)**
-
- ➔ New hazards? No
 - Collision, crushing, fall of a load, electrical hazards, etc.
 - ➔ New risks? Yes, e.g.
 - Severity, type of damage
 - Exposure : higher coactivity, temporary workers



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Impact on standardization

Driverless trucks (AGV, AMR)

ISO/TC 110/SC 2/WG 15- ISO 3691-4

- Update of the scope
 - New requirements for « small » machines
 - What is the state of the art?
 - Trucks vs robots
- **Find consensus on**
- Hazardous situations, risk identification, risk estimation
 - Risk reduction measures



Safety challenges

Driverless trucks (AGV, AMR)

ISO/TC 110/SC 2/WG 15– ISO 3691-4

- Conception

- reduce situations where detection of persons on the path need to be muted or reduced
- 'Reliable' detection of objects : not yet
- 'Reliable' localization : first steps

- Integration

- more important now with the "off-the-shelf" trend
- new requirements on how to integrate the machine in its environment

Degraded requirements, e.g. :

- a) Keep detection of persons on the path active all times
- b) If not possible, reduce the detection field and apply other measures
- c) If not possible, mute and apply other measures

Variety of machines, applications, and technical solutions

- Risk reduction measures can be on the truck or stationary, e.g. to prevent :
- the fall of the truck through an opening (dock, stairs)
 - the fall of a load during load transfer

AS/RS (Automated Storage and Retrieval System)

AS/RS (Stacker cranes, shuttle systems...)

CEN/TC 149/WG 6 - EN 528

Machine

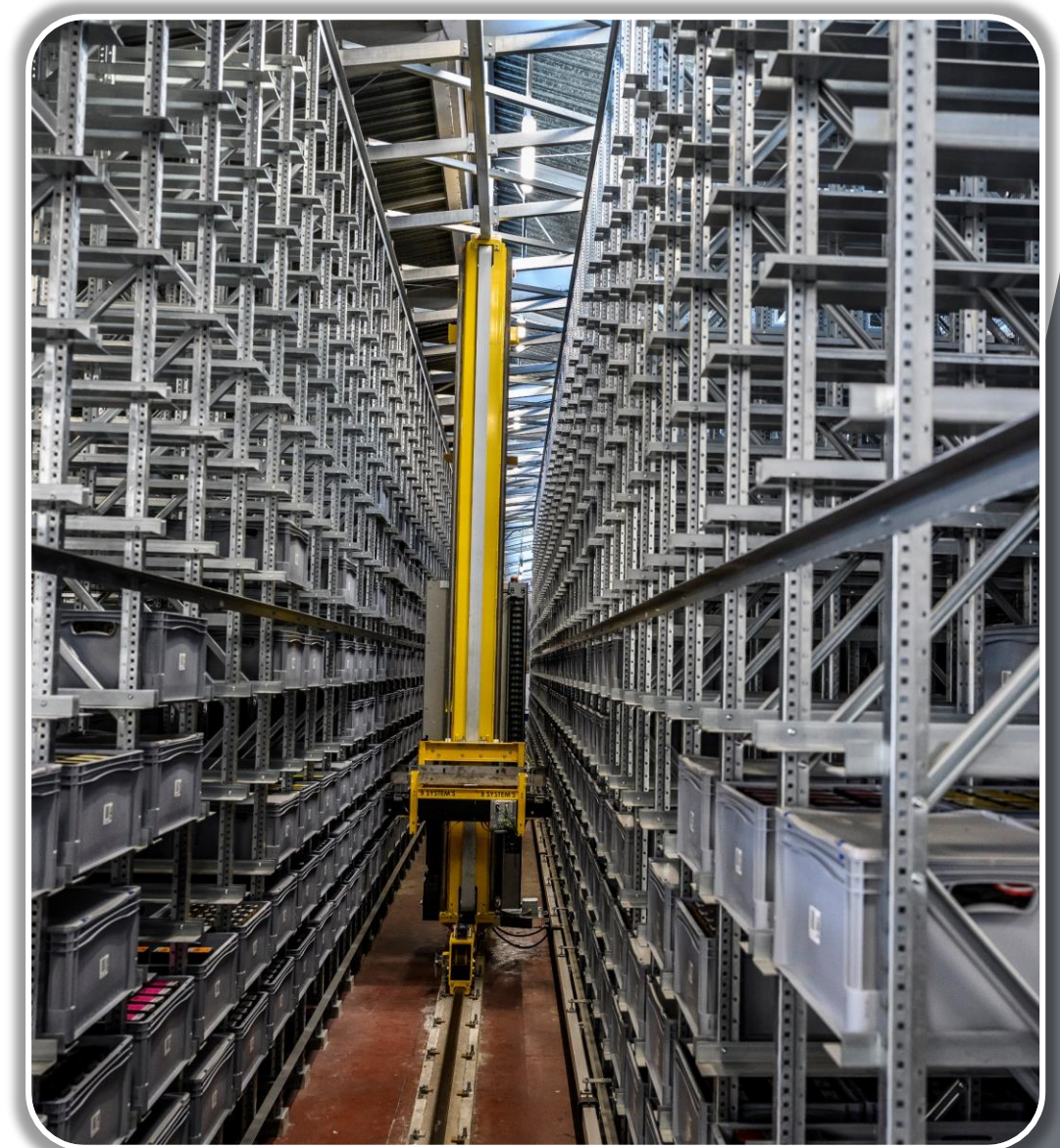
- **Rail dependant** (floor & ceiling),
- intended for **loads storage and retrieval**,
- **Safeguarded** area.

1996 : EN standard

2008 : revised standard

2022 : revised standard

2026 : project of revision

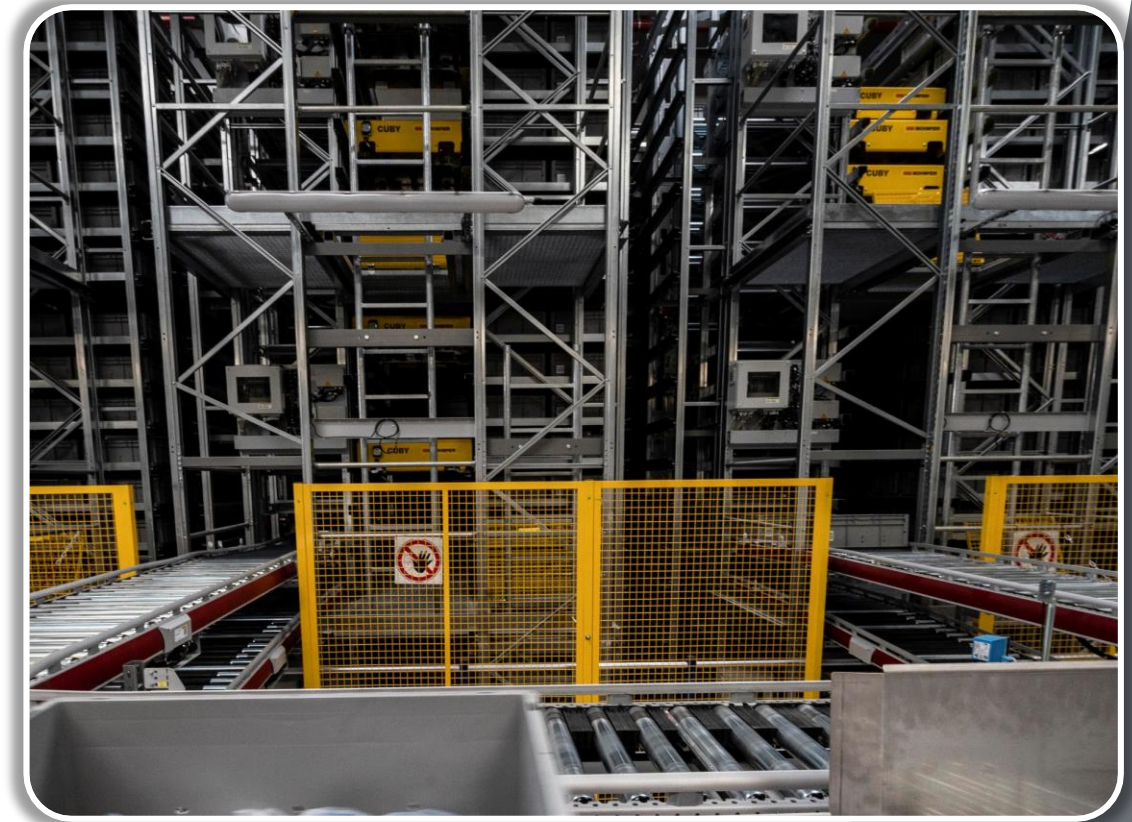


What's new?

AS/RS systems (Stacker cranes, shuttle systems...)

CEN/TC 149/WG 6 - EN 528

- **New type of machines**
 - Shuttle/robots systems
 - 2D or 3D movements
- **New users**
 - New hazards? No
 - New risks? Yes, e.g.
 - New hazardous situations (e.g. access for maintenance operations)



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Impact on standardization

AS/RS systems (Stacker cranes, shuttle systems...)

CEN/TC 149/WG 6 - EN 528

→ New types of machines

→ Project of new EN standard

→ Scope ?

CEN/TC 149

Date: 20YY-XX

prEN XXXXX:20YY

Secretariat: DIN

**Rail dependent storage and retrieval equipment — Safety requirements
for shuttle systems**

Regalbediengeräte — Sicherheitsanforderungen an Shuttle systemen

Transtockeurs — Prescriptions de sécurité xxx

Safety challenges

AS/RS systems (Stacker cranes, shuttle systems...)

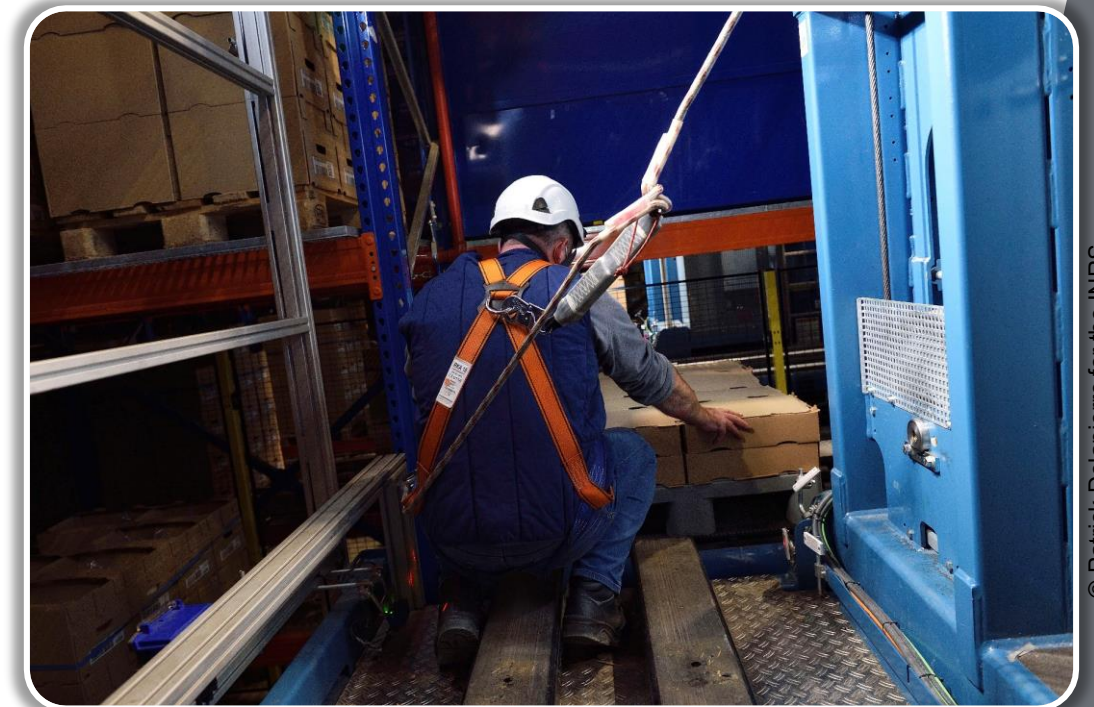
CEN/TC 149/WG 6 - EN 528

Address hazards during maintenance operations :

- **Impact or crushing of the body, or parts of the body, with moving elements**
- **Fall from height**

Define common requirements for a variety of machines :

- Division of the machine in several task zones (ISO 11161)
- Conception of access for all maintenance tasks
- Prevention of restart while a person is inside a task zone (ISO 12895)



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Conclusion

Challenges for standardization and safety requirements

Evolution of technologies and evolution of market needs



New machines, new applications to integrate



New risks to identify



New risk reduction measures to define



Complexity and variety



Fast-changing state of the art

Similar challenges for other types of machines : mobile robots outside industrial environments, humanoïd robots, drones...



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