



Warehouse Automation

AI, Robotics and the Future of Fulfilment

October 2026

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 LEX™

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Warehouse automation market

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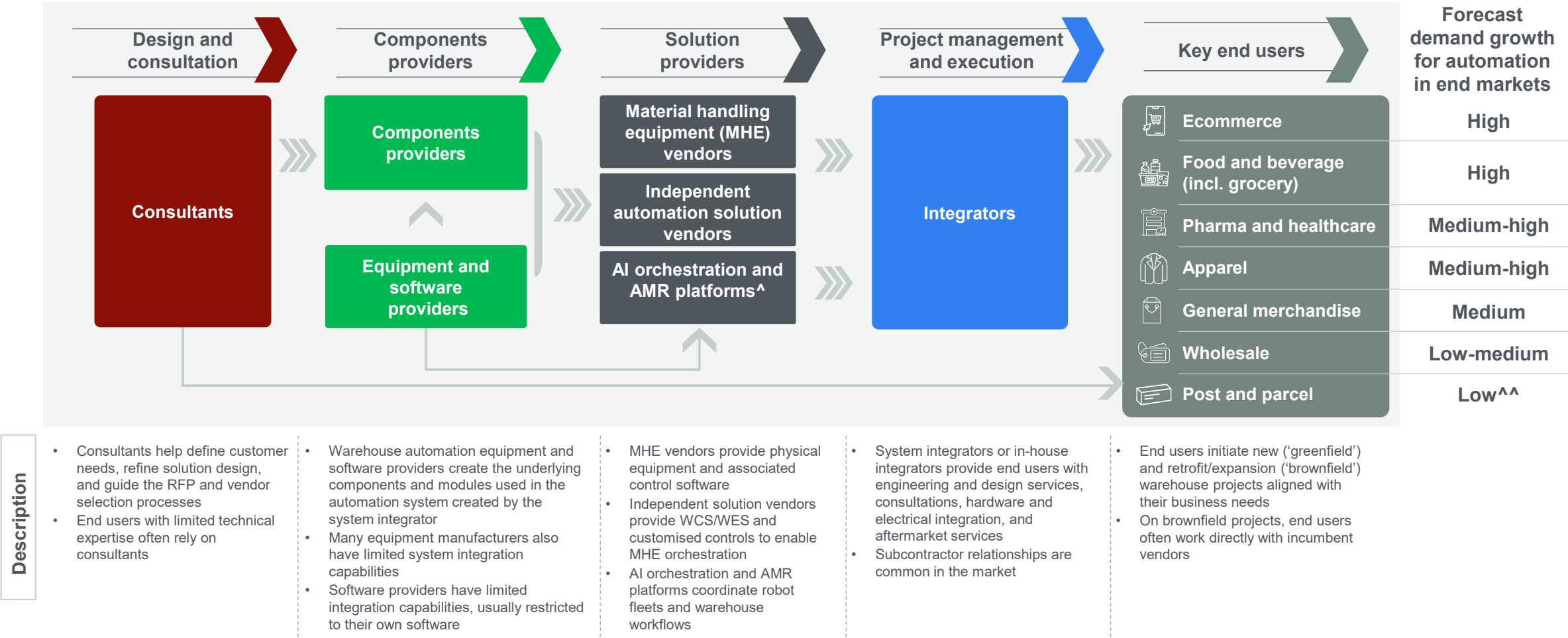
M&A activity and trends

- **Warehouse automation** is entering a period of **accelerating growth**: The global market is set to expand from c.€21bn in 2025 to c.€42bn by 2030F, with growth increasing from c.10% p.a. (2016-25) to **c.14% p.a. (2026-30F)**, as labour constraints, fulfilment complexity and AI-enabled automation broaden the addressable market beyond large-scale greenfield projects seen in the period following COVID
- Demand is underpinned by **persistent labour shortages and rising wage costs**, continued ecommerce and omnichannel complexity, and a growing preference for retrofit and densification of existing sites over new-build expansion, supported by shorter payback periods and modular, lower-capex deployment models (e.g., robotics-as-a-service)
- **AI is extending across the automation stack** as an orchestration layer, connecting equipment, robotics and data to enable adaptive, real-time decision-making on slotting, routing and task allocation
 - **High-density matrix storage** offers a flexible alternative to stacker cranes and shuttle systems, with adoption estimated to grow 20%-25% over the next five years
 - **Humanoid robots and mobile manipulators** are moving beyond pilots into live commercial deployments, with logistics and warehousing well suited to these technologies given their structured, repeatable environments
 - **AGVs/AMRs** and mixed-fleet interoperability remain essential as warehouses combine equipment and software from multiple vendors under a single orchestration layer
- Customers increasingly require **end-to-end solutions** that simplify their supply chains, giving system integrators and platform-agnostic software providers an integral role in the customer's value chain; winning companies combine leading market positions, scalable business models and a demonstrated ability to deliver against complex, multivendor projects
- Overall M&A activity has cooled from its 2022 peak and is stabilising, with **deal count improving into H1 2026** and average deal size stepping up (from c.€75m-€150m in 2022-24 to c.€450m in 2025) as strategic buyers become more selective and pursue platform-scale transactions; financial and strategic buyers remain broadly balanced (~50/50); and public markets reward the shift towards software and robotics, with pure-play **warehouse automation trading at a c.2.5x premium** to material-handling equipment (14.9x vs 5.9x NTM EBITDA)

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Stakeholders span the full warehouse automation value chain, with integrators coordinating solutions from equipment and software providers to meet end user requirements



^Includes AI-driven orchestration software and autonomous mobile robots; ^^Low growth from already high base
Note: MHE=material-handling equipment; AI=artificial intelligence; AMR=autonomous mobile robot; WCS=warehouse control system; WES=warehouse execution system; RFP=request for proposal;
Sources: L.E.K. analysis; Harris Williams analysis

Warehouse automation encompasses technologies across the full material flow, from conveyors and storage systems to autonomous robots and orchestration software

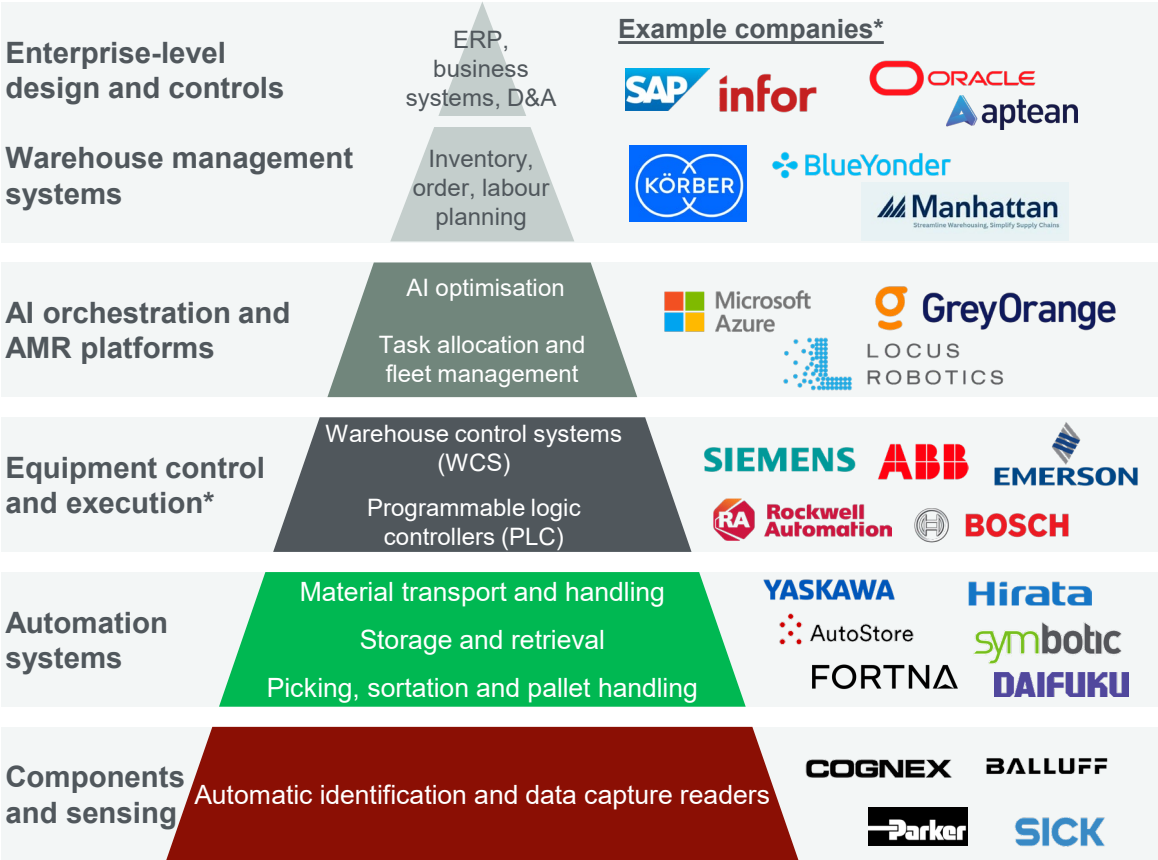
Overview of warehouse automation technologies

	Conveyors			Sortation	(De)palletising	Overheads	Picking	AGV/AMR	Humanoids
Product group									
Description	Conveyor Conveyors for transporting boxes, pallets, trays, trolleys, etc., from A to B	Loading/unloading Automated solution that loads or unloads items from trucks, trolleys, containers, etc.	Special operations All tasks that cannot be distributed into the ordinary product buckets, e.g., tilting of crates	Sorter System which performs sortation of conveyed goods according to their destination or need	(De)palletiser Automated solution which stacks or destacks items on pallets	Overhead systems Conveyors/shuttles for transporting hanging goods such as totes and apparel	Picking robots Robots using scanners and sensors to accurately pick products and remove them from/onto load carriers	AGV/AMR Autonomous guided vehicles/autonomous mobile robots for transporting boxes, pallets, trays, trolleys, etc., from A to B	Humanoids Human-form robots (with mobility, perception and dexterity) to perform tasks such as handling, picking and sorting within human-designed warehouses
	Storage systems						Software and data		Other
Product group									
Description	Lift Vertical lift for overcoming height differences for boxes, pallets, trays, trolleys, etc.	Transfer cars Transfer cars for distributing boxes, pallets, etc., at workstations, storage locations or outbounds	(De)stacker Automated solution that piles up pallets, boxes, trays, etc.	Stacker cranes Stacker cranes which store and retrieve boxes and pallets from multiple levels of a storage system	Shuttles Shuttles which store and retrieve boxes, pallets, etc., from one level of a storage system; can be overhead	AS/RS Computer- and robot-aided systems that can retrieve boxes or store them in specific locations	Software and controls Software that manages material flow and real-time activities of each module's control within the system	AI orchestration and AMR platforms AI software that orchestrates and optimises equipment, robots and workflows in real time	Other hardware Examples such as AIDC readers used for the identification and intake/commissioning processing

Note: AGV=automated guided vehicle; AMR=autonomous mobile robot; AS/RS=automated storage and retrieval systems; AI=artificial intelligence; AIDC=automatic identification and data capture
Source: L.E.K. research and analysis

AI is extending beyond point solutions to become an intelligence layer across the warehouse automation stack, connecting orchestration, data and increasingly flexible robotics

Illustrative warehouse industry automation technology stack



Assessment of current AI trends in automation




Intelligent automation

- AI is shifting warehouse automation from rule-based execution to adaptive, real-time optimisation, improving slotting, routing, task allocation and throughput
- Value creation is shifting towards system-level optimisation, strengthening providers' ability to improve efficiency, uptime and ROI




Software and data

- Software and data are becoming key differentiators, enabling fleet orchestration, predictive maintenance, performance analytics and continuous optimisation
- Data-enabled services create recurring, higher-margin revenue opportunities while strengthening customer retention and lifetime value




Robotics and vision

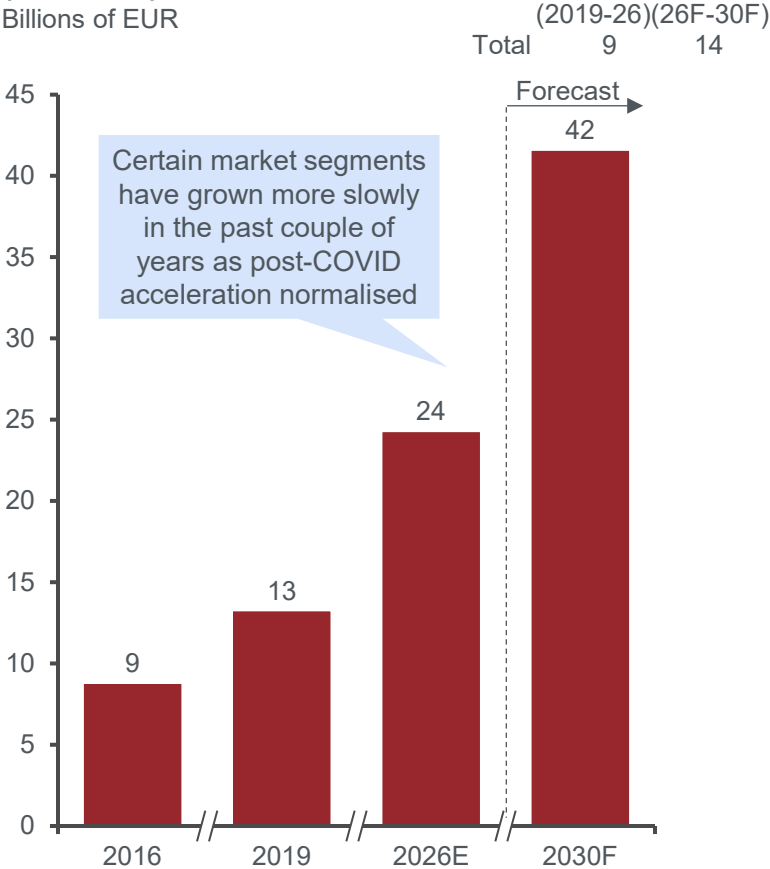
- AI-enabled robotics and computer vision are unlocking more complex warehouse tasks, including piece picking, mixed-SKU handling and dynamic fulfilment
- The convergence of robotics, perception and software expands automation into more flexible workflows, increasing providers' relevance in end-to-end warehouse projects

Expected impact	Negative	Neutral	Moderately positive	Strongly positive
				

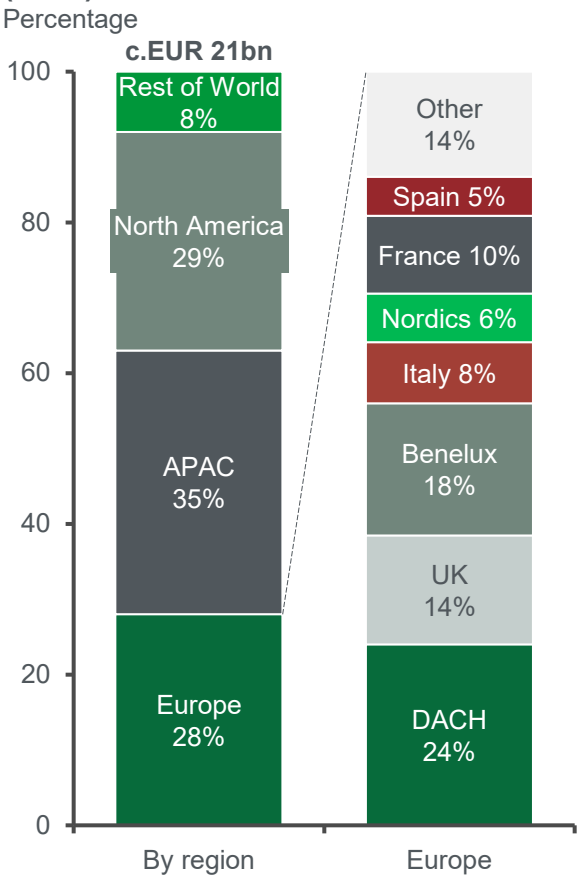
Note: *Diversified players including Siemens and ABB span multiple layers of the automation stack; AI=artificial intelligence; ERP=enterprise resource planning; D&A=data and analytics; AMR=autonomous mobile robot; WCS=warehouse control system; PLC=programmable logic controller; ROI=return on investment; SKU=stock-keeping unit
 Source: L.E.K. research and analysis

Global warehouse automation is expected to accelerate from c.9% historical growth to c.14% through 2030F, driven by labour constraints, fulfilment complexity and AI-enabled automation

Global warehouse automation market (2016-30F)



Warehouse automation market size by region (2025)



- Warehouse automation has grown strongly over the **past decade**, supported by rising ecommerce penetration, increasing omnichannel complexity and greater requirements for speed and accuracy in fulfilment
- Growth is expected to remain robust at **c.14% p.a. through 2030F**, with persistent labour availability and cost pressures continuing to strengthen the business case for automation across warehouse operations—this represents increasing automation intensity vs recent history
- AI is expanding the capabilities and value proposition of warehouse automation, enabling more intelligent orchestration, dynamic decision-making, and optimisation of robotic and automated workflows
- Increasing demand for flexible, scalable solutions is broadening automation adoption as operators seek to manage greater SKU proliferation, volatile order profiles and shorter delivery windows without proportionally increasing labour
- Warehouse automation demand is geographically diversified, providing automation vendors with a broad growth opportunity

Note: AI=artificial intelligence; CAGR=compound annual growth rate; SKU=stock-keeping unit; APAC=Asia-Pacific; DACH=Germany, Austria and Switzerland
Sources: TBRC; Interact Analysis; Logistics IQ; Statista; L.E.K. research and analysis

Warehouse automation adoption is accelerating as demand for warehouse capacity increases and new technologies expand the range of automatable workflows

Executive summary	Warehouse automation market	Case study 1: Matrix storage	Case study 2: Humanoids	M&A activity and trends
<div>Warehouse demand is increasing and automation adoption is becoming easier to justify ...</div> <div><ul style="list-style-type: none">Ecommerce and omnichannel complexity are increasing fulfilment pressure, with online sales continuing to outgrow total retail and driving smaller orders, faster fulfilment and more returnsRegional supply chain shifts are changing warehouse demand as cross-border ecommerce, trade complexity and inventory localisation reshape where capacity is requiredRetrofit and densification are becoming more attractive than new-build expansion as operators seek faster capacity gains from existing sites to avoid major operational disruptionsWorkforce constraints and ergonomics continue to support automation, particularly in repetitive, high-walk, heavy-lift and hard-to-staff workflowsAutomation is becoming easier to justify as modular systems, RaaS models and lower-disruption deployments reduce upfront investment and shorten payback</div>	<div>... as technology development expands the range of automatable AI-orchestrated workflows ...</div> <div><div><div>High-density storage/matrix storage is moving AS/RS beyond static storage, combining dense cube-based storage with dynamic slotting, retrieval sequencing and goods-to-person fulfilment</div></div><div><div>Humanoids and mobile manipulators are emerging as a flexible robotics layer, combining mobility, perception and manipulation to operate in human-designed warehouse environments</div></div><div><div>AI is becoming the new warehouse control layer, coordinating robot fleets, task allocation, routing and congestion resolution across increasingly complex automation systems</div></div><div><div>Robotics is expanding from movement into manipulation, with improved EOAT, force sensing and physical AI enabling picking, stowing, depalletizing and packing</div></div><div><div>Mixed-fleet interoperability is becoming critical as warehouses combine WMS, WES, WCS, AMRs, AS/RS, sorters, conveyors and robotic arms from multiple vendors</div></div></div>	<div>... enabling operators to improve capacity, reliability and ROI</div> <div><ul style="list-style-type: none">Operators can increase throughput within existing footprints, reducing bottlenecks, manual touches and travel timeAutomation enables more flexible capacity, allowing operators to scale by workflow, zone or module rather than committing to full-site transformationAI and digital twins can unlock hidden capacity, improving utilization of labour, space, forklifts and material flows before adding real estateReliability, uptime and serviceability become key buying criteria as automation becomes mission-critical to fulfilment operationsThe value proposition expands beyond labour savings, with benefits across cost-to-serve, safety, energy efficiency, accuracy and customer service</div>		

Note: AI=artificial intelligence; ROI=return on investment; RAAS=robotics-as-a-service; EOAT=end of arm tooling; AS/RS=automated storage and retrieval system; WMS=warehouse management system; WES=warehouse execution system; WCS=warehouse control system; AMR=autonomous mobile robot
Source: L.E.K. research and analysis

Low automation penetration, strong retrofit demand and resilient structural tailwinds support the long-term growth outlook for warehouse automation solutions

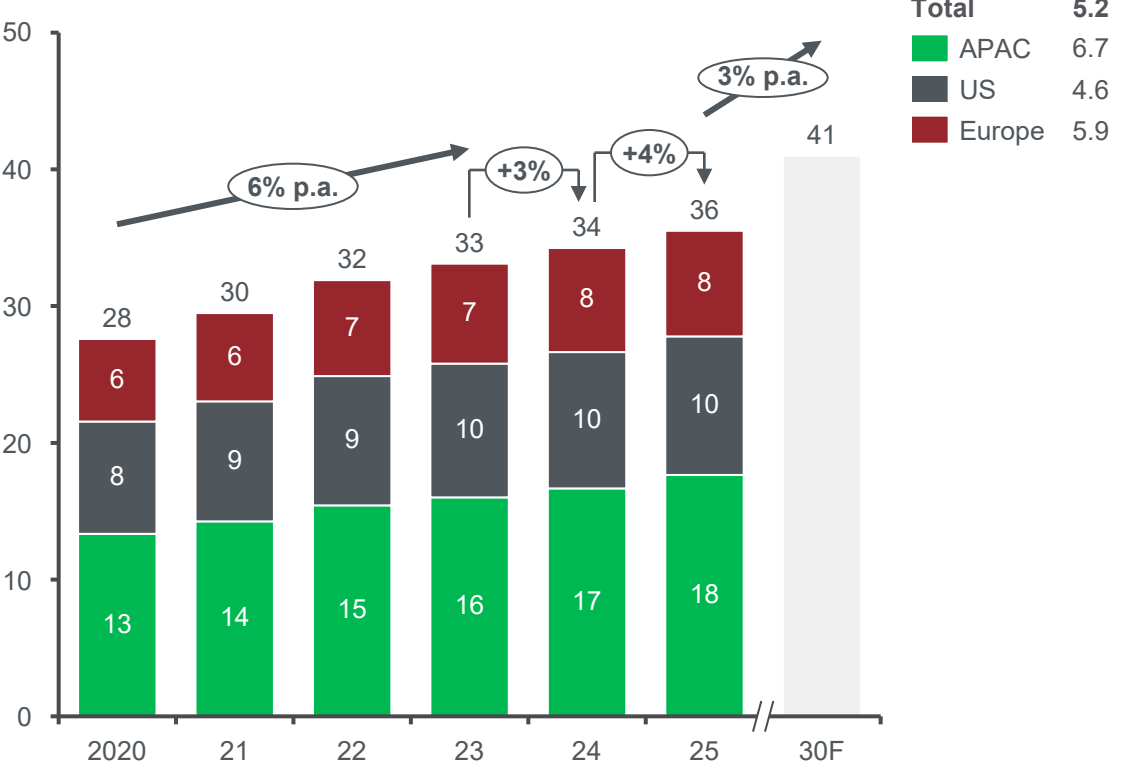
<div></div> <div>Significant opportunity for penetration growth (new build and retrofit)</div>	<div>Low levels of penetration with significant headroom and strong ROI</div> <div><ul style="list-style-type: none">Warehouse automation penetration remains relatively low in smaller and midsize facilities, creating substantial runway for future adoptionIncreasing technology maturity and improving ROI are accelerating automation uptake across retrofit projects</div>
	<div>Strong growth potential in smaller retrofit projects</div> <div><ul style="list-style-type: none">There is a growing focus on sub-€20m retrofit projects as customers seek flexible, lower-capex automation solutions for existing facilitiesAutomation demand is supported by shorter payback periods and modular deployment</div>
	<div>Broader automation growth driving awareness of benefits</div> <div><ul style="list-style-type: none">Adoption of broader warehouse automation solutions continues to grow, with significant further headroom (adoption is being led by Europe and selected APAC countries)Further growth in adoption is expected over the next 5 years (considering retrofits and new builds)</div>
	<div>Supported by secular labour market trends and safety requirements</div> <div><ul style="list-style-type: none">Persistent structural challenges from labour shortages, space constraints and increasing wage costsRegulatory requirements, including safety and employee welfare considerations, incentivise operators to reduce reliance on manual processes</div>
<div></div> <div>Near-term greenfield rebound and long-term retrofit resilience</div>	<div><ul style="list-style-type: none">Warehouse automation demand has softened from post-COVID highs, with discretionary capex delayed by macro uncertainty, higher financing costs and slower new-build activityGreenfield is expected to rebound rapidly in the short term as delayed projects return, while the long-term market remains attractive given low penetration, ageing infrastructure and ongoing retrofit productivity needs</div>
<div></div> <div>Growing installed base with attractive recurring spend requirements</div>	<div><ul style="list-style-type: none">The installed base for these solutions is growing, expanding the market for recurring repair and maintenance spend, in addition to potential upgrade and replacement activity</div>

Note: ROI=return on investment; APAC=Asia-Pacific
Source: L.E.K. research

Following elevated warehouse additions during 2020-25, warehouse stock growth is expected to moderate through 2030F as mature markets absorb capacity and development normalises

Europe, US and APAC warehouse stock (2020-30F)

Billions of sq ft



- **Europe, US and APAC warehouse stock grew at c.5% p.a. in 2020-25 and is expected to moderate to c.3%-4% p.a. towards 2030** as the post-COVID logistics build-out normalises and developers absorb excess capacity, while structural demand from ecommerce, supply chain resilience and automation continues to support new development
- **APAC recorded its strongest historical growth in warehouse stock at c.6%-7% p.a.**, driven by significant capacity additions in China and broader modernisation of logistics infrastructure, though growth is expected to moderate as China transitions from large-scale supply additions towards lower levels of new development through 2030
- **In the US, warehouse stock grew at c.4% p.a. in 2020-25**, supported by the post-COVID supply expansion, though higher vacancy and more selective developer activity are expected to constrain near-term additions before construction gradually recovers from 2027 as excess capacity is absorbed
- **Europe's warehouse stock grew at c.5%-6% p.a. in 2020-25, supported by ecommerce penetration and demand for modern logistics space**, with future stock growth expected to remain steady rather than accelerate as improving occupier demand is balanced by financing costs, land availability and development constraints

Note: CAGR=compound annual growth rate; APAC=Asia-Pacific
Source: Interact Analysis; L.E.K. research

Global warehouse automation penetration remains uneven, reflecting differences in labour availability, cost pressures, ecommerce demand and logistics infrastructure

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M&A activity and trends

Below-average automation penetration

MEA countries*

- MEA penetration is low but growing fast in Gulf hubs; UAE and Saudi Arabia lead adoption as ports expand and ecommerce scales, though low labour costs elsewhere in the region weaken the automation payback case
- Latin America is at an earlier stage of adoption, led by Brazil's retail and ecommerce growth; cost pressure is driving gradual AMR and WMS uptake, but the region remains a small share of the global market, held back partly by Brazil's strong labour protections

"... Protectionist labour laws in some markets make it difficult to downsize manual operations leading to the automation market being stuck ..."

- Senior VP Commercial and Sales, Dematic

South America countries**

Average automation penetration



- Current automation penetration in the US and Canada is currently in line with the global average
- There remains significant headroom for growth in automation penetration in these markets, given the potential cost and throughput benefits of increased warehouse automation, including localised labour shortages

"... Labour shortages rather than reducing project cost are the key driver for automation projects. People do not want to work in minus 20 degree temperatures, necessitating strong automation adoption to offset these labour shortages ..."

- Senior VP Commercial and Sales, Dematic

Above-average automation penetration



Selected APAC countries***

- Strong consumer demand for ecommerce and a low proportion of 3PL warehouses compared to other countries have led to higher automation penetration in the EU and APAC region
- However, manual warehouses remain common, and there is therefore significant headroom for increased automation penetration

"... Warehouse automation is most developed in China and Germany. Together they account for 50% of the global market ..."

- Former COO, Europa Systems

"... Benelux is the heart of logistics in northern Europe because of the Port of Rotterdam. But some are still manual warehouses due to strong labour supply ..."

- Senior VP Commercial and Sales, Dematic

Note: MEA=Middle East and Africa; UAE=United Arab Emirates; AMR=autonomous mobile robot; WMS=warehouse management system; 3PL=third-party logistics; *Includes countries such as Qatar, Saudi Arabia, the United Arab Emirates and Israel; **Includes countries such as Brazil, Argentina and Chile; ***Includes countries such as China, Japan and Australia
Source: Interact Analysis; Logistics IQ; L.E.K. research, analysis and interview

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Matrix storage systems – an alternative to commonly used stacker cranes and shuttles for storage and retrieval – are expected to see increasing adoption and higher growth rates

Executive summary

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Case study 1 – Warehouse matrix storage systems

Description

- Matrix systems (or cubic AS/RS) are a type of modular automated storage and retrieval system that can be configured to a wide range of size and capacity specifications
- They are suited to goods-to-person automated storage and retrieval, with high SKU and lower load applications
- These systems can be integrated with existing warehouse automation technology, making them applicable to both full facility and upgrade projects

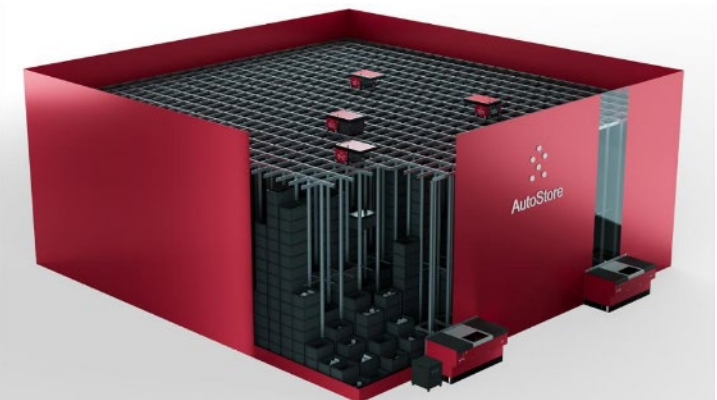
Benefits and limitation for smaller projects

- The matrix AS/RS concept is highly flexible and can be configured to desired capacity and available warehouse space, making these systems applicable to most warehouse sizes
- These systems are primarily used in ecommerce and retail applications, as the size of the cube, ability to handle high SKU count and multichannel distribution make the solution well suited to these industries
- However, the size of the cube also limits the application of these systems, as many products will not fit in the fixed storage bin dimensions

Market outlook and potential

- These systems are gaining in market share, with an estimated growth rate of 20%-25% over the next five years, driven by further uptake in the ecommerce and retail markets
- Growth in matrix systems is expected to slow significantly over the long term as these systems reach maximum penetration within applicable markets
- Alternative storage and retrieval systems, such as stacker cranes, AGVs and shuttle systems, are more flexible than matrix systems and may disrupt growth in the segment

Example of automated warehouse matrix storage



Leading matrix storage system providers

EXOTEC

AutoStore

ATTABOTICS

HAI
ROBOTICS

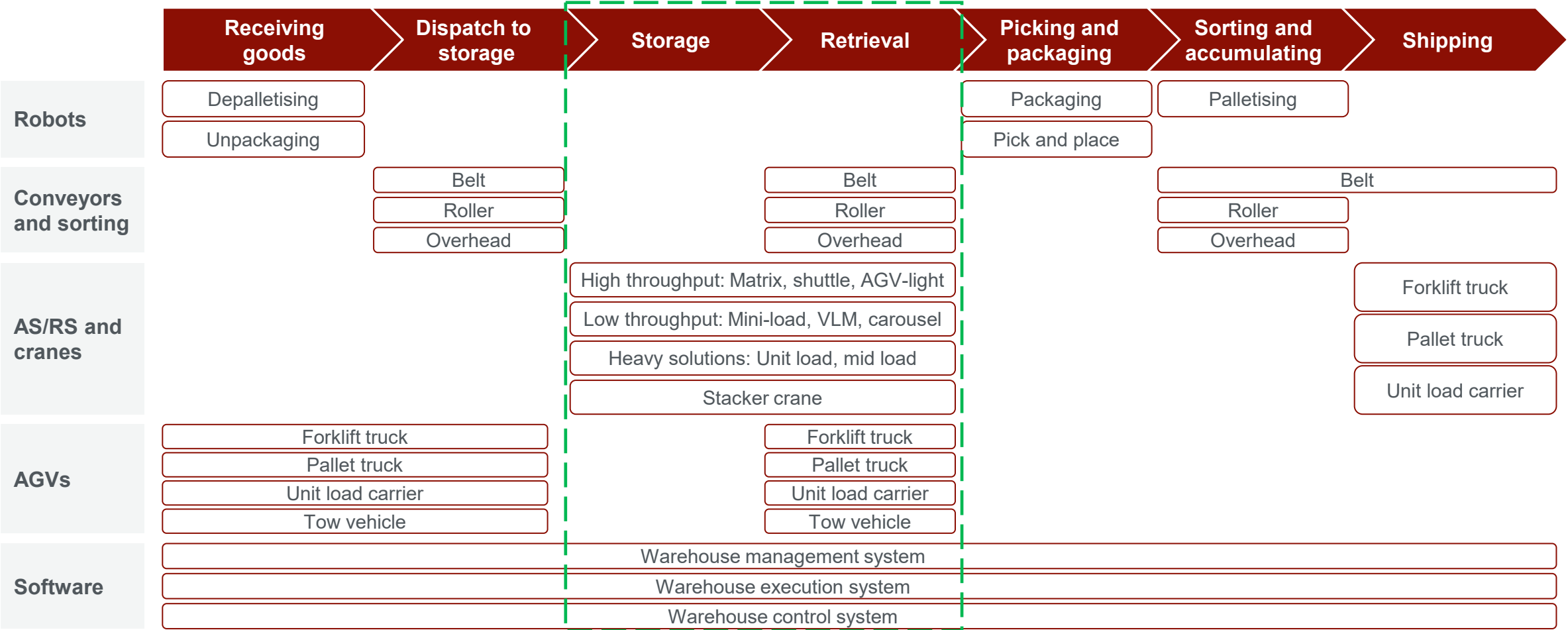
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Note: AS/RS=automated storage and retrieval system; SKU=stock-keeping unit; AGV=automated guided vehicle
Source: L.E.K. research and analysis

Matrix storage creates value across storage, retrieval, sequencing and fulfilment workflows, and interfaces with multiple other warehouse automation technologies

Case study 1 – Solution portfolio within the warehouse automation value chain

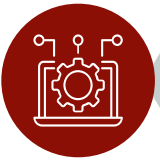


Note: AS/RS=automated storage and retrieval system; AGV=automated guided vehicle; VLM=vertical lift module
Source: L.E.K. research and analysis



Value in high-density automation is concentrated in the software and integration layers which help support retrofits of existing warehouse space into more flexible, higher-density storage

Case study 1 – How companies can invest behind the theme of high-density automation

	Software and orchestration	<ul style="list-style-type: none">• Target WCS/WES and AI orchestration platform vendors who optimise slotting, retrieval sequencing, task allocation and material flow across high-density systems• Prioritise vendor-agnostic software and data platforms that integrate with WMS and multiple automation technologies, creating differentiated and recurring revenue
	Robotics and adjacent automation	<ul style="list-style-type: none">• Invest in AMRs/AGVs, robotic picking and material-handling technologies that extend high-density storage into end-to-end goods-to-person workflows• Favour modular and flexible robotics platforms that can be deployed into existing facilities and scaled by workflow, zone or module
	Integration and workflow customisation	<ul style="list-style-type: none">• Back systems integrators with the controls and engineering capabilities to connect high-density storage with conveyors, robotics and WMS/WES/WCS onsite• Platform-agnostic integration capability is increasingly critical in brownfield environments, where existing infrastructure must be worked around rather than designed from scratch, and it drives customer stickiness and share of broader project spend
	Aftermarket and recurring services	<ul style="list-style-type: none">• Build recurring revenue through remote monitoring, predictive maintenance and software upgrades tailored to high-density automation's dense, sensor-rich installed base• As matrix and shuttle-based systems scale towards broader market penetration, the growing installed base expands repair and maintenance, upgrade, and replacement spend, supporting higher customer lifetime value

Note: WCS=warehouse control system; WES=warehouse execution system; AI=artificial intelligence; WMS=warehouse management system; AMR=autonomous mobile robot; AGV=automated guided vehicle
Source: L.E.K. research and analysis

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Humanoid adoption is moving beyond pilots in warehouse environments, with proven material-handling use cases creating a foundation for broader workflow expansion

Overview of use cases for humanoid robots:

NONEXHAUSTIVE

End markets	 Manufacturing			 Logistics/ warehousing			 Retail and service
Use cases	Line-side delivery			Case and tote handling			Shelf restocking
	Machine tending			Palletising/depalletising			Customer assistance
	Assembly support			Truck loading/unloading			Store cleaning/ maintenance
	Quality inspection			Picking and packing			Checkout automation
	Kitting and sub-assembly			Inventory movement			Hospitality concierge
	Maintenance and repairs			Sorting/induction			In-store marketing/ display setup
	Tool and part retrieval			Recycling and returns handling			Security and loss prevention
	Flexible small-batch tasks			Conveyor-to-shelf transfer			Backroom logistics
							

- **Warehouse-focused humanoids emerged in 2023**, when Agility launched Digit for logistics applications and Amazon began testing the platform for tote recycling; **GXO followed with the first formal commercial deployment in 2024**
- **Initial roles centre on repetitive material-handling tasks**, including case/tote movement, transfers between AMRs or robots and conveyors, and package handling/sorting, providing an early entry point into warehouse workflows
- **Humanoids can operate within existing, human-designed warehouses**, using existing aisles, workstations and automation infrastructure, potentially reducing the need for significant facility redesign
- **Use cases are expanding as dexterity and AI capabilities improve**, towards product/shelf picking, replenishment, quality assurance and bar code scanning, allowing robots to address multiple workflows with the same platform
- **Adoption remains in the early stages but is moving beyond pilots**; by late 2025, Agility's Digit had moved **>100K totes in a live commercial warehouse deployment**, demonstrating increasing reliability at scale

Note: AMR=autonomous mobile robot; AI=artificial intelligence
Sources: Boston Dynamics; Built Robotics; company websites; L.E.K. research and analysis

The structure of a typical humanoid robot can be divided into three major layers: AI system, motion control system and robot body

Case study 2 – Humanoid robots

NONEXHAUSTIVE

Building blocks of a humanoid robot

The structure of a typical humanoid robot can be divided into three major layers:

AI system:

- Definition:** Also known as the humanoid robot's 'brain', it processes information, interprets its environment, runs AI models and coordinates interactions with people
- Major components:** AI chips and AI computing

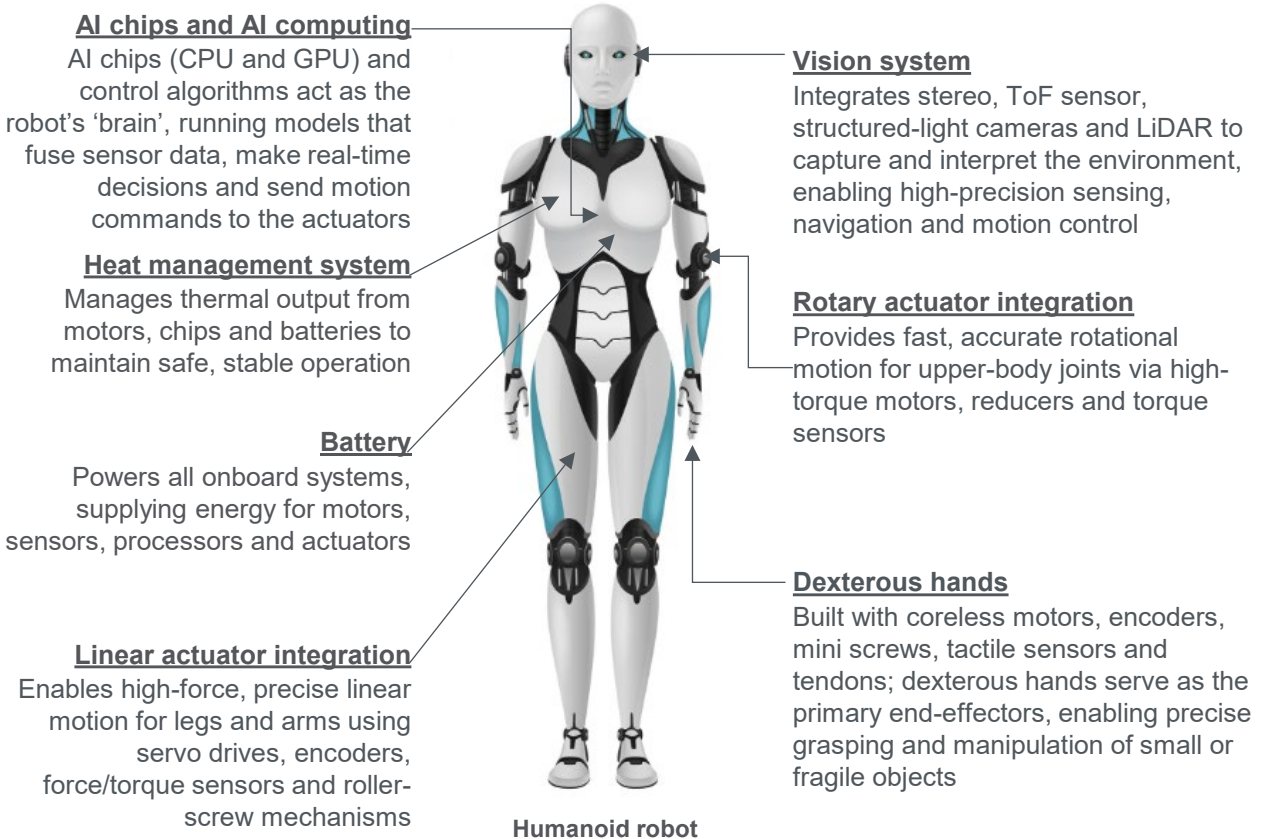
Motion control system:

- Definition:** It turns the robot's strategic instructions into precise joint movements, managing locomotion, stability and navigation, all running on a shared compute stack with the AI system
- Major components:** Linear actuator integration, rotary actuator integration, dexterous hands (controller and motion control algorithm)

Body:

- Definition:** It contains the core physical systems that enable perception and movement, such as cameras and sensors, actuators, hands, power supply, and the robot's structural frame
- Major components:** Vision system, linear actuator integration, rotary actuator integration, dexterous hands, battery and heat management system

Key components of a humanoid robot



Note: AI=artificial intelligence; CPU=central processing unit; GPU=graphics processing unit; ToF=time of flight
Source: Machine Design; Humanoid Magazine; Futurobots; L.E.K. research and analysis

Humanoid robotics is supported by a multilayer value chain, with specialised players driving hardware, software, integration and deployment activities

Case study 2 – Humanoid robots

ILLUSTRATIVE

Value chain	Core components manufacturing	Systems manufacturing	Robot AI and warehouse orchestration	Integration and workflow customization	Deployment, operations and maintenance
Description	<div></div> <p>Manufacture foundational hardware enabling motion, balance and perception; includes actuators, sensors, cameras and batteries, many sourced from adjacent industries</p>	<div></div> <p>Design, assemble and calibrate complete humanoid platforms, integrating mechanical structures, electronics and controls; robots are engineered for warehouse tasks such as case/tote handling, picking, pallet movement and material transport</p>	<div></div> <p>Develop perception, motion-planning and control software enabling humanoids to navigate facilities, manipulate goods and execute tasks autonomously; orchestration software connects robots with WMS/WES and dynamically assigns workflows across robot fleets</p>	<div></div> <p>Integration of humanoids into customer workflows including hardware interfacing, fleet management, facility mapping, etc.; today, this layer is primarily driven by industrial automation incumbents and systems integrators</p>	<div></div> <p>Deploy and commission humanoid fleets onsite, train operators and support ongoing operations; includes remote monitoring, preventive maintenance, software upgrades, performance optimization and fleet scaling as additional warehouse use cases are introduced</p>
Value chain participants	<div></div>	<div></div>	<div></div>	<div></div>	<div><p>Potential end users (early adopters of humanoids)</p></div>

Note: AI=artificial intelligence; WMS=warehouse management system; WES=warehouse execution system
Sources: The Idea Farm; Humanoid Robotics Technology; Hyundai Robotics; TraxTech; company websites; L.E.K. research and analysis

Humanoid robot deployment readiness depends on task complexity and environmental stability, with logistics and warehousing offering the highest fit due to end-market stability

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Warehouse automation market

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M&A activity and trends

Case study 2 – Humanoid robots

Key humanoid robot deployment readiness metric:

1 Task complexity

Task complexity reflects **the level of physical precision, environmental understanding and real-time decision-making** a humanoid must perform to complete a task end-to-end; it represents how much the robot must:

- Manipulate:** perform precise, multijoint movements; grasp and handle varied objects; use tools confidently
- Perceive:** interpret the environment through vision and sensors; recognise objects; read labels or cues; detect variation
- Decide and adapt:** follow multistep workflows, apply conditional logic, react to unexpected changes and coordinate safely around people

2 Environmental stability

Environmental stability describes **how predictable, structured and consistent** the physical workspace is for a humanoid; it considers:

- Layout predictability:** whether aisles, pathways and equipment stay fixed or change frequently
- Surface conditions:** floor uniformity, obstacles, debris, slopes or weather exposure
- Workflow consistency:** how reliably tasks, traffic patterns and human activity follow repeatable routines

End markets	Task complexity	Environmental stability
 Logistics and warehousing	<ul style="list-style-type: none">Ideal for standardised, repetitive tasks that require low situational judgement but moderate fine-motor demands in item handling	<ul style="list-style-type: none">Highly structured environments with fixed aisles and predictable traffic flows enable repeatable workflows for humanoids
 Manufacturing	<ul style="list-style-type: none">Motions are well defined and repeatable, with potential hazards but limited workflow branching	<ul style="list-style-type: none">Assembly lines are tightly controlled, with consistent layouts, tooling and safety protocols
 Retail and service	<ul style="list-style-type: none">Tasks demand high dexterity, situational awareness and interpersonal judgement	<ul style="list-style-type: none">Store layouts shift frequently; aisles can be crowded, cluttered and impacted by customer behaviour, creating unpredictability in navigation
 Healthcare and caregiving	<ul style="list-style-type: none">High cognitive and social demands—customer interaction, language understanding, emotion recognition and problem resolution	<ul style="list-style-type: none">Physical layouts are relatively structured, but operations are highly dynamic, with frequent interruptions and variable patient flows
 Construction and infrastructure	<ul style="list-style-type: none">Wide variety of tasks requiring tool use, on-the-spot adaptation and coordination with multiple trades increases dexterity and judgement requirements	<ul style="list-style-type: none">Constantly changing sites with uneven terrain, debris, weather effects and moving equipment produce highly unstructured environments
 Defence and public safety	<ul style="list-style-type: none">Extremely demanding—mission planning, threat assessment, communication with civilians and life-critical decision-making, with near-zero tolerance for error	<ul style="list-style-type: none">Disaster zones, emergency scenes and contested environments are highly volatile, unstructured and unpredictable

Source: Research Gate; ScienceDirect; Medium; L.E.K. research and analysis

Overall humanoid deployment readiness



Humanoid robots remain early-stage, and clear platform winners have yet to emerge; focusing on component suppliers and orchestration software layers offers more hedged exposure to this market

Executive summary

Warehouse automation market

Case study 1: Matrix storage

Case study 2: Humanoids

M&A activity and trends

Case study 2 – Humanoid robots

How companies can invest behind humanoids

	Humanoid platforms and OEMs	<ul style="list-style-type: none">• Highest risk, highest potential return approach through backing humanoid OEMs with demonstrated commercial deployments• Current OEMs (e.g., Agility Robotics, Figure, Apptронik, Fourier) remain pre-scale and capital-intensive, so platform selection and timing are particularly important here compared with other layers in the value chain
	Component and hardware suppliers	<ul style="list-style-type: none">• Targeting suppliers of actuators, sensors, batteries and vision systems offers more hedged exposure across platforms• Many of these suppliers (e.g., Bosch, Nidec, Nabtesco) already serve adjacent robotics and industrial end markets, reducing dependence on any single humanoid OEM's success
	AI and fleet orchestration software	<ul style="list-style-type: none">• Investing in perception, motion-planning and fleet-orchestration software captures value as operators run increasingly mixed robot fleets• Large technology platforms (e.g., Google DeepMind, AWS, NVIDIA, Microsoft) are already active in this layer, raising the bar for specialist software vendors and favouring those that can partner with (rather than compete against) these players
	Systems integration and deployment services	<ul style="list-style-type: none">• Backing systems integrators and industrial automation incumbents comes with much lower platform selection risk• Established integrators (e.g., FANUC, Siemens, ABB, Tompkins Solutions) are best placed to embed humanoids into existing customer relationships, while early adopters such as Amazon, DHL and GXO provide reference deployments

Note: OEM=original equipment manufacturer; AI=artificial intelligence
Source: L.E.K. research and analysis

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- **M&A activity and trends**

Warehouse automation deal counts are past their 2022 peak but stabilising, with H1 2026 running ahead of the 2025 pace

Executive summary

Warehouse automation market

Case study 1: Matrix storage

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M&A activity and trends



M&A Trends



Deal count off its peak: After peaking in 2022, deal activity gradually eased through 2025 before showing early signs of stabilising in 2026



Flight for high-quality assets: The slowdown was driven by strategic buyers becoming significantly more selective, focusing on highly targeted acquisitions that offer clear strategic alignment and value



Segment rotation towards robotics: Picking, handling and humanoid robotics remained the most active segment as advances in AI and machine vision unlock automation of complex, hard-to-standardise manual tasks amid persistent labour shortages, while the now more mature AGV and AMR segment cooled after a wave of consolidation



Balanced buyer base: Financial and strategic buyers have each accounted for roughly half of all deals across the period, with financial buyers involved in c.57% of transactions, underscoring a consistently balanced buyer universe

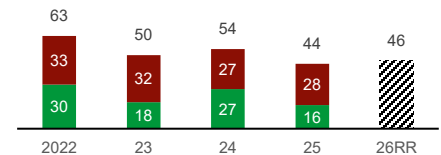


Step-up in deal size: Average deal size jumped to c.€450m in 2025 from c.€75m to c.€150m over 2022 to 2024, pointing to a shift towards larger, platform-scale transactions rather than higher volume



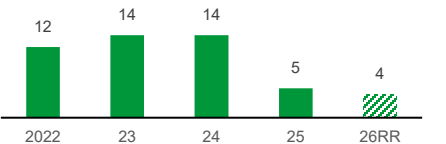
Strong M&A outlook: With volumes stabilising into 2026 and a balanced buyer base, we expect continued platform-led M&A over the next 12 to 24 months

■ Deals with PEG involvement
■ Strategic deals



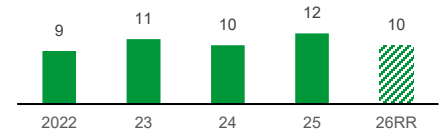
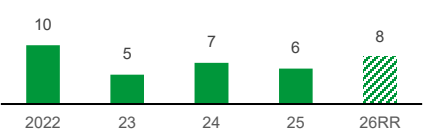
AGVs and AMRs

■ Number of Deals



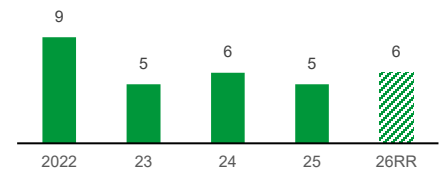
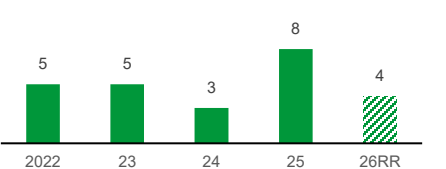
Picking, handling and humanoid robotics

WMS and supply chain software



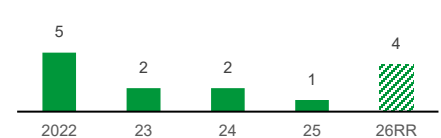
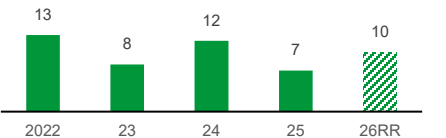
Storage and micro fulfilment

System integrators



Conveyor and sortation

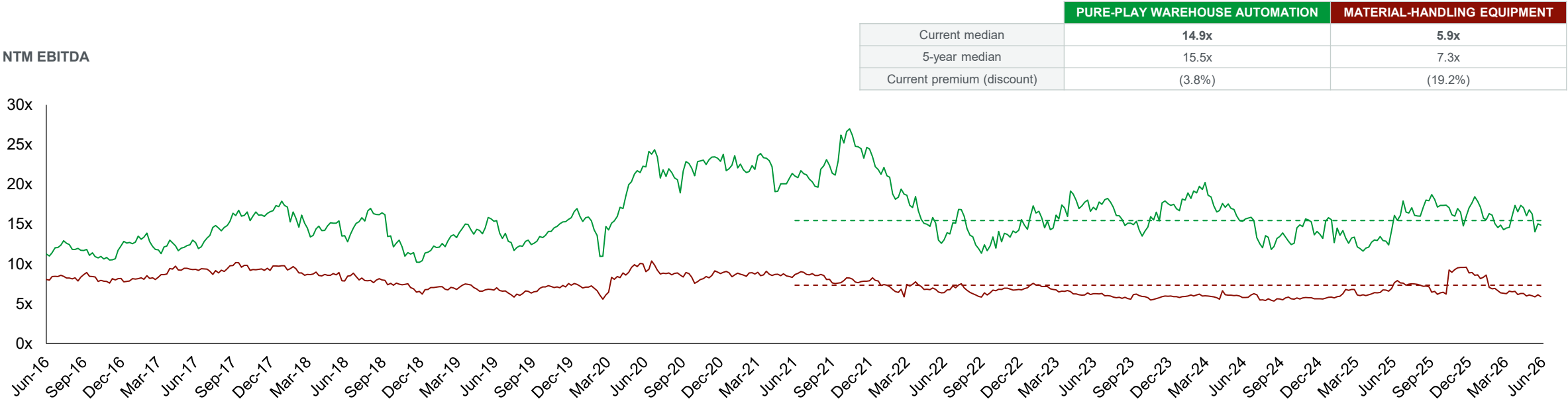
Asset tracking, vision and other



Note: Full-year deal RR based on announced deals until June 30, 2026; AI=artificial intelligence; AGV=automated guided vehicle; AMR=autonomous mobile robot; PEG=private equity group; WMS=warehouse management system; RR=run rate
Source: HW Intelligence; Mergermarket

Pure-play warehouse automation commands a c.2.5x valuation premium over material-handling equipment as the segments continue to diverge

Warehouse automation companies — public comparable market performance by key segments



Pure-play warehouse automation

— Current median

..... 5-year median


AutoStore









Material-handling equipment

— Current median

..... 5-year median











Note: NTM=next twelve months; EBITDA=earnings before interest, tax, depreciation and amortisation; IFRS=International Financial Reporting Standard; IFRS-reporting entities have been adjusted to pre-IFRS 16 figures
Sources: S&P Capital IQ, as of June 30, 2026

Key terms and acronyms used throughout this report are defined below for reference

Term	Definition
3PL	Third-Party Logistics (Provider)
AGV	Automated Guided Vehicle
AI	Artificial Intelligence
AIDC	Automatic Identification and Data Capture
AMR	Autonomous Mobile Robot
AS/RS	Automated Storage and Retrieval System
CAGR	Compound Annual Growth Rate
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EOAT	End of Arm Tooling
HKEX	Hong Kong Stock Exchange
IPO	Initial Public Offering
MFC	Micro Fulfilment Centre

Term	Definition
NTM	Next Twelve Months
PEG	Private Equity Group
PLC	Programmable Logic Controller
RaaS	Robotics-as-a-Service
ROI	Return on Investment
RR	Run Rate (e.g., 2026rr = annualised run rate based on deals announced to date)
SKU	Stock-Keeping Unit
SPAC	Special Purpose Acquisition Company
VLM	Vertical Lift Module
WCS	Warehouse Control System
WES	Warehouse Execution System
WMS	Warehouse Management System

Harris Williams and L.E.K. are leveraging unique insights from market-defining client engagements and executive conversations to distil critical trends in industrial automation

Industrial automation



Process industry automation



2022



Autumn 2026

Discrete (factory) automation



2022



Spring 2026

Warehouse automation



2022



Autumn 2026

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