

Smart, scalable, and human- centric

Reimagining warehouse
performance with AI-powered
automation from Lenovo

Smarter
technology
for all

Lenovo



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Warehouses are the beating heart of the global supply chain. As customer expectations intensify and become harder to predict, warehouse operations need to be smarter, faster, and more adaptable than ever. AI and automation are rapidly changing what's possible—for speed, scale, and accuracy.

At Lenovo, we have developed a suite of solutions—and a connected approach to partnership—which can help manufacturers and logistics businesses to create the right mix of AI, automation, and support to adapt.

In this eBook you can explore how intelligent automation, data-driven insight, and end-to-end integration help your warehouse realize greater efficiency, scalability, and resilience.

From streamlining operations and reducing costs to empowering your workforce and unlocking new growth, discover how the right technology foundation can turn your warehouse operations into a true competitive advantage.



The warehouse is on the front-line of global uncertainty



Ecommerce growth, growing customer expectations and competitive labor markets have put the pressure on warehouse teams and leadership. Operations and logistics processes have to work faster and more accurately, at scale, within a context of real scrutiny on operational spend.

Despite this, many warehouses still rely on systems built for slower, simpler, and smaller operations. That gap between what warehouses can do and what they need to do is widening, with clear implications for warehouse performance, operational speed, and bottom-line efficiency.

We can identify some of the common challenges facing warehouse teams and leaders across APAC:

1. Managing total cost of ownership

The case for warehouse transformation ultimately comes down to value. Modernization promises efficiency and scale, but without better long-term total cost of ownership (TCO), initial gains could erode.

You need solutions that allow you to start small, prove value and then scale. Phased rollouts and flexible commercial models allow organizations to align initial investment with expected future demand, to stress-test ROI early.

Buying a solution is only part of the cost—and the impact. Integration, training, software updates, maintenance, energy use and end-of-life management all contribute to the real value of your stack.

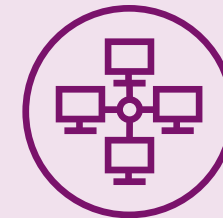
Your automation imperatives



Clear visibility of full lifecycle costs, from deployment to disposal



A flexible and scalable pay-as-you-go Everything as a Service model, letting businesses use Lenovo IT resources on demand without large upfront costs



Interoperable systems that work seamlessly across platforms

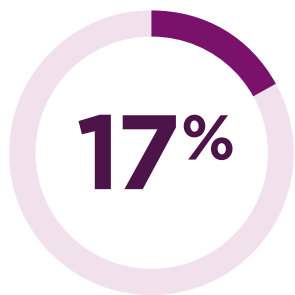


Reliable technology with maximum uptime and predictable performance

2. Achieving real-time visibility

Customers want speed, but many warehouses face data fragmentation and disconnected systems which make it impossible to anticipate and meet new operational needs.

Without real-time insight, small inefficiencies can multiply rapidly, with delayed pick ups, misplaced orders and other service issues risking customer satisfaction. Many organizations still rely on batch reporting and outdated dashboards that won't surface these issues until it's too late. To keep up, you need to confidently take decisions in seconds. When systems lag, or when latency and integration issues slow data down, you get bottlenecks that drag on productivity.



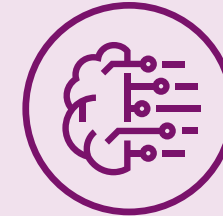
CAGR for warehouse automation in APAC to 2030.¹

¹ <https://www.globenewswire.com/news-release/2025/06/03/3092649/28124/en/Asia-Pacific-Warehouse-Automation-Industry-and-Investment-Analysis-Report-2025-2030-AGVs-to-Experience-Substantial-Growth-Indian-Market-to-Expand-Rapidly.html>

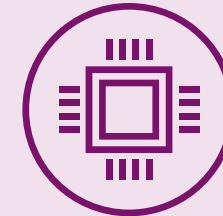
Your automation imperatives



Real-time visibility across warehouse performance metrics



Low-latency compute that can enable instant decision-making



Secure, scalable data processing that reduces bottlenecks

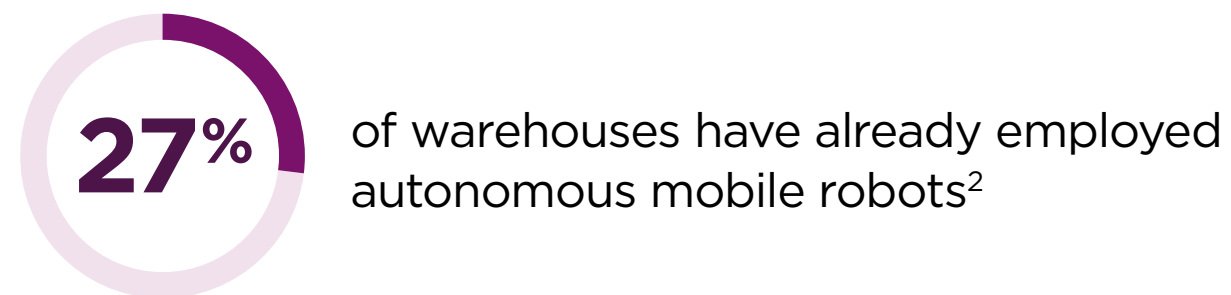


Dashboards that provide immediate insight into all levels of the business

3. Building and retaining a skilled, empowered workforce

Across APAC, a restricted market and rising costs of labor make finding, hiring and retaining talent a growing concern for the warehouse. The on-demand economy expects ever-faster turnaround times, putting workers under increasing pressure.

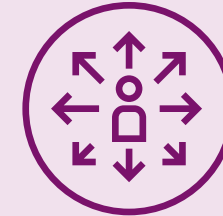
An overextended workforce translates directly into higher operating costs, where overtime, emergency recruitment and high staff turnover quickly erode margins. Constantly changing teams also complicate technology adoption, training and support. Across the whole warehouse operation, automation can help to reduce repetitive work and burnout, support staff development, and manage workloads more effectively.



² <https://www.globenewswire.com/news-release/2025/06/03/3092649/28124/en/Asia-Pacific-Warehouse-Automation-Industry-and-Investment-Analysis-Report-2025-2030-AGVs-to-Experience-Substantial-Growth-Indian-Market-to-Expand-Rapidly.html>

³ <https://www.forrester.com/press-newsroom/forrester-global-online-retail-sales-to-grow-8-9-annually-reaching-6-8-trillion-in-2028/>

Your automation imperatives



Technology that augments human performance



Simple and repeatable adoption and onboarding processes



Improved human and AI/machine collaboration

Change is coming

E-commerce in APAC is projected to reach US\$3.2 trillion by 2028,³ and customers expect fast, personalized delivery every time. Labor is scarce, margins are thin, and every minute of downtime comes at a cost.

Warehouses need to evolve to be smarter, more connected and more resilient. That's where next-generation technology is essential, to optimize costs, boost visibility and give your teams the tools to perform at their best.

Your opportunity: a truly future-proof warehouse operation

AI, automation and advanced analytics are changing how products are designed, built and delivered. Innovations that began on the factory floor are now reshaping the wider logistics chain, creating speed, cost and performance advantages in the vital link between production and customers.

At the same time, growing sustainability requirements demand smarter energy management and resource optimization across warehouse operations.

Smart, AI-enabled and automated systems can spot bottlenecks, fine-tune workflows and predict maintenance needs. Robotics and edge computing can handle repetitive, high-volume tasks so teams can redirect their attention to higher-value work. With continuous optimization, you can enable faster decisions, more sustainable operations and more reliable performance.



Get more from the space you have

New facilities are expensive. With automation, robotics and connected tools, you can optimize the real estate you already own, for better performance and a healthier bottom line.



Get the keys to sustainable operations

Smart warehouse tools track and manage energy use in real time, predict maintenance needs to extend asset life, and cut unnecessary energy consumption.



Give your people the right tech

Your warehouse teams know your operations inside out. A smart warehouse will amplify and extend their capability, helping people stay safer and more productive.

You don't have to take on the task alone

Lenovo brings together the solutions, services, infrastructure, and devices you need to build and scale the intelligent warehouse—in a way that lets you transform at your pace.

You can move quickly from an initial pilot to scale across multiple sites and use cases, with a comprehensive portfolio designed to provide the exact fit for your needs.

Our flexible commercial models help you align investment to outcomes, and our expertise across AI and automation makes us a single, trusted partner capable of realizing measurable ROI as you scale.

With Lenovo, you can modernize with confidence—one step, site, and success at a time.





CASE STUDY

Optimizing warehouse operations with AI automation

ST Logistics

Singapore's leading third-party logistics provider transformed a challenging labor market into an opportunity for future development by automating its warehouse logistics operations, supporting faster, more environmentally sustainable services.

ST Logistics



Delivering an end-to-end solution

Partnering with Lenovo as part of its broader digital transformation strategy, ST Logistics leveraged its in-house expertise and Lenovo's advanced AI-powered solutions to co-develop a smart warehouse system that optimizes operations.

The Lenovo Manufacturing Solutions feature three core components: a Warehouse Execution System (WES) and Autonomous Mobile Robots (AMRs). Alongside the IT infrastructure, Lenovo provide dedicated AI consultancy and support services to ensure a solid foundation for success.



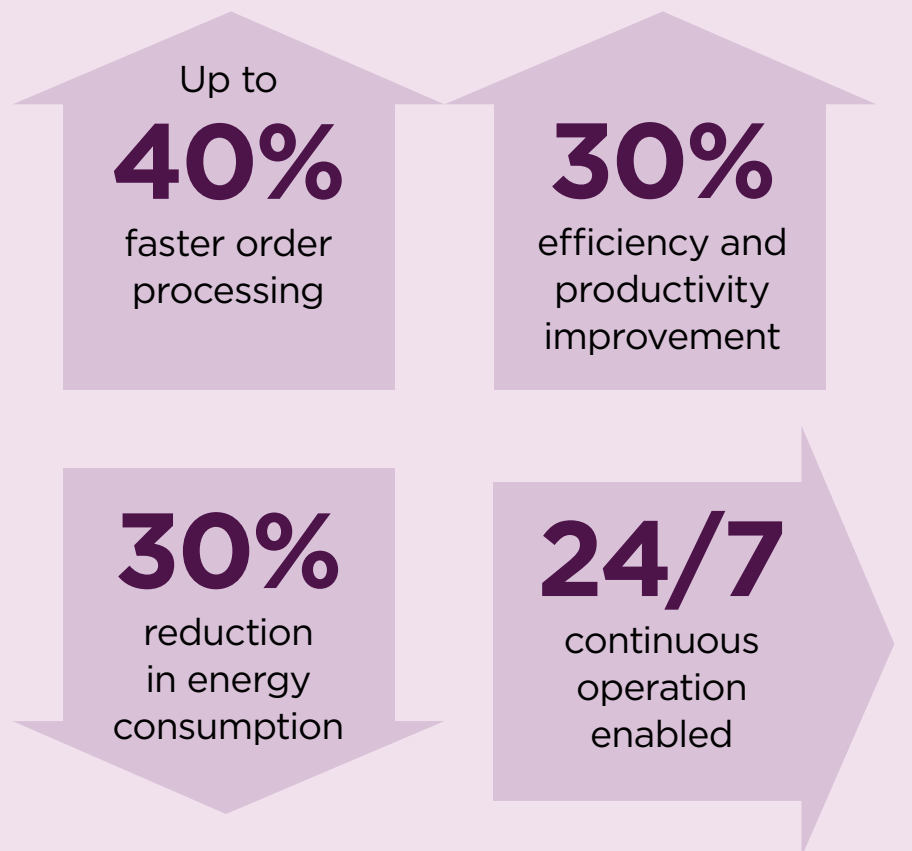
Taking logistics to the next level

By connecting its existing Warehouse Management System (WMS) and Warehouse Control System (WCS) with the new WES, Lenovo empowered ST Logistics to automate its entire order processing system—from receiving to shipping—across its warehouses.

Today, the automation solution powers a fleet of autonomous robots that pick and transport good from different workstations across ST Logistics' warehouses. At the same time, the WES leverages AI algorithms to automatically calculate how to prioritize storage of goods so items that are ready for immediate shipping are always easily accessible.



Results



“ By collaborating with Lenovo, we gained access to cutting-edge AI-powered solutions that complement ST Logistics’ vision for smarter, greener logistics. Lenovo’s expertise, combined with our strategic direction, enabled the successful automation of our warehouse logistics.”

Hamarian Mohamad, General Manager, Homeland Security, ST Logistics

Optimize every part of your warehouse operation with Lenovo

Lenovo's AI-powered automation solutions revolutionize the way warehouses operate at every level. With smarter processes and technology, you can remove dangerous and time-consuming manual tasks from your team's day-to-day work, accelerate processing, and seamlessly orchestrate your warehouse operations for speed and productivity.

We combine the solutions, services, advanced robotics, infrastructure, and devices to help you build an AI-ready warehouse that can handle the massive challenges facing modern supply chains.

Technology isn't just something we build. Everything we deliver is tried and tested in our own supply chain and manufacturing practices. We rely on proven, AI-powered warehouse solutions that have been verified in real operational environments, and which can be tailored to meet your specific requirements for reliability, flexibility, and measurable results.

Building on our leadership as the world's number one PC maker, we continue to advance innovations in edge, cloud, network, and intelligence solutions, to support the evolving needs of every customer in every industry.



One partner, a warehouse of possibilities



With Lenovo, you get a partner for it all. We bring a comprehensive end-to-end portfolio of solutions, services, infrastructure and devices, alongside proven technology expertise that can help you identify exactly what you need and deliver it with precision.

You can rely on our manufacturing expertise, recognized experience, broad partner ecosystem, and worldwide delivery network. All our solutions are built to be accessible, affordable, and reliable, and we are committed to ensuring you get maximum utility, value and advantage from your smart warehouse investment.




Three priorities as you start your smart warehousing

With Lenovo, you have the
blueprint for scalable, efficient,
and resilient supply chains
built for long-term success.






1. Increase operational efficiency and reduce costs

Measurable efficiency is the drumbeat for everything we do. Our integrated AI, automation, and analytics operate together to deliver continuous optimization and streamline energy use, workflows, and operational costs.

 Reduce operating costs	 Use end-to-end solutions to scale growth	 Power through performance
<p>By automating critical warehouse tasks, our AI-driven systems continuously refine processes and make smarter use of resources.</p> <ul style="list-style-type: none">• Automate route planning, picking, and handling with various automated robotics• Optimize layouts and transport flows with AI to lower energy consumption• Build autonomous, adaptive order-to-person workflows	<p>Build a portfolio of modular, automated solutions such as AMR and Automated Storage and Retrieval System (AS/RS) that increase throughput, accuracy, and storage efficiency.</p> <ul style="list-style-type: none">• Reduce upfront cost and financial risk with Lenovo TruScale Everything as a Service—which provides pay-as-you-go flexibility so you can scale only when needed• Tailored solution design—we source and integrate the most suitable technologies to maximize ROI based on your operational needs• Consultative, long-term partnership—our expert guidance ensures your AI and automation transformation aligns strategically with your business goals and delivers continuous growth beyond implementation	<p>AI thrives on data and processing power—and we provide both. Lenovo’s AI PCs, workstations, edge and server solutions give you a robust, scalable foundation for real-time analytics and automation.</p> <ul style="list-style-type: none">• Handle complex data processing and ERP/CRM integration with Lenovo ThinkStation and ThinkSystem portfolio• Create a more agile, responsive warehouse by seamlessly incorporating datasets into workflows through high performance AI infrastructure with Lenovo ThinkSystem



2. Unlock existing infrastructure

When you automate, you don't need to start from scratch. We can help you unlock the value hidden in what you have already, by scaling automation intelligently.

 Scale seamlessly	 Improve interoperability	 Enable real-time intelligence
<p>Our solutions enable you to automate systems incrementally, helping you to manage and sustain change and effectively optimize current and future infrastructure investments.</p> <p>Once you have the foundations in place, you can extend automation beyond the physical warehouse into digital twin to enable visualization, scheduling, and planning.</p> <ul style="list-style-type: none">• Use AI-powered coordination to maximize space and get real-time precision• Rapidly deploy and redeploy Pick Assist Autonomous Mobile Robots (AMRs) across sites while avoiding downtime• Scale to 24/7 warehouse operations, supported by Lenovo's strong infrastructure foundation and AI expertise	<p>Get your systems working in concert. Lenovo brings automation resources into one Warehouse Execution System (WES). This enables you to unify and coordinate technologies from multiple vendors through a single, connected operation, for fewer disruptions and greater visibility.</p> <ul style="list-style-type: none">• Get continuous intelligence with autonomous monitoring and intelligent exception handling• Limit manual interference and data silos with seamless integration across equipment and software• Get a reliable control point to capture and transmit operational data with Lenovo ThinkCentre	<p>Our predictive analytics and real-time monitoring solutions enable you to detect and resolve issues before they cause downtime or impact your bottom-line.</p> <ul style="list-style-type: none">• Process massive datasets from sensor readings, sales orders and more, with high-performance computing on Lenovo ThinkStation devices, and ThinkSystem servers• See live data on warehouse performance and inventory management to inform operational decisions

3. Get the best experience for every employee

Automation is fundamentally about empowering people. By applying AI in ways that enhance and extend human capability, you can build safer, smarter, and more fulfilling workplaces.

 Increase productivity	 Predictable and reliable operations	 Improve experience and safety
<p>When it's done right, automation enables higher throughput, faster response times, and consistent quality. Our AI-driven, collaborative systems free workers from repeat work and let them to focus on creating value and responding to what your customers really want.</p> <ul style="list-style-type: none">• Automate unloading, put-away, pallet retrieval, picking, packing and loading to accelerate throughput• Support 24/7 continuous operations to meet customer demand without more headcount• Tool up your managers with Lenovo ThinkPad devices that let them troubleshoot and oversee operations on-the-go	<p>Predictability breeds confidence. That's why Lenovo solutions work to reduce variability and manual errors, using automation and data-driven insights to maintain consistency and reliability.</p> <ul style="list-style-type: none">• Get accuracy and consistency with the design of automated material handling• Enhance inventory management for predictable output• Meet SLAs with continuous monitoring and AI-driven exception handling	<p>By automating hazardous processes you can improve working conditions, enhance safety, and enable your employee to develop new digital skills.</p> <ul style="list-style-type: none">• Redeploy staff to higher-value roles with advanced personnel management tools• Empower teams with accessible training, compliance, and certification via Lenovo ThinkPad and ThinkCentre devices

With Lenovo, you have a global leader in your corner

180

Markets

30+

Global
manufacturing sites

>\$160M

invested in digital
transformation

18

R&D locations
worldwide

1B+

Global customers

2000+

Suppliers

69.5K

People

120M+

Shipments

10M+

Order lines per year



World Economic Forum
Global Industry 4.0
Lighthouse Recognition



Global supply chain ranked
8th globally by Gartner



AAA-rated for ESG by MSCI

Ready for an AI revolution?

Investment in smarter, automated and AI-powered warehouse tools does take work. It's a rethink of how your operations create and deliver value to your top and bottom-line at a foundational level, providing the opportunity to reduce costs, accelerate processes and get your customers what they want, when they want, even more reliably.

With Lenovo, doing that work feels so much easier. You can start where you are, scale towards where you want to get to at your pace, and continually revisit your goals and requirements. We never put a lid on your ambition—because we have the global reach and wraparound support to go as far as you choose, as fast as you need.

Wherever you are in your transformation journey, it's time to take the next step.

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**Smarter
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