Lenovo Hybrid AI Advantage™
with NVIDIA

The smarter path to achieving AI value in manufacturing

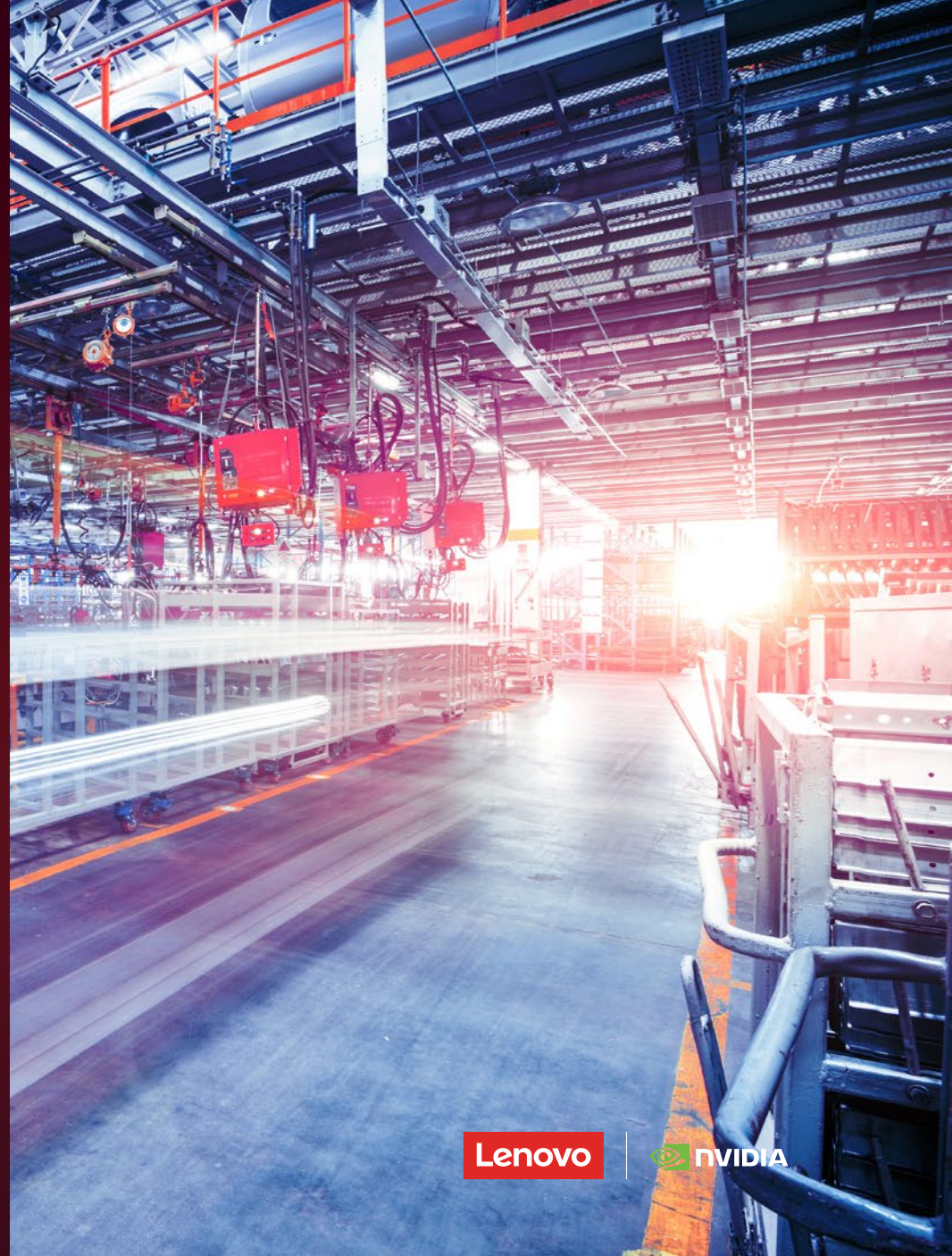
Launch, grow, and scale your AI initiatives with expert guidance and resources.

NVIDIA

Lenovo Hybrid AI Advantage™ with NVIDIA

Table of contents

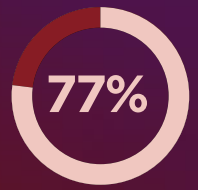
Accelerating innovation in manufacturing	3
Breaking down the barriers to AI ROI in manufacturing	4
Simplifying the journey	5
Enhancing quality control	6
Enabling predictive maintenance	7
Guiding robotics and automation	7
Optimizing production processes	8
Streamlining supply chain management	8
Supporting data-driven decision-making	8
Powering smart warehouses	9
Accelerating product development	9
Improving sustainability in manufacturing	10
Getting started safely and responsibly	10



Accelerating innovation in manufacturing

With the rapid emergence of machine learning and AI, manufacturers are looking at new ways to leverage the in-depth data analysis and decision-support capabilities of these technologies across a wide range of functions, including:

- **Operational optimization**
- **IT automation**
- **Supply chain evolution**
- **Sustainable manufacturing**



More than 77% of manufacturers have implemented some form of AI.[1]

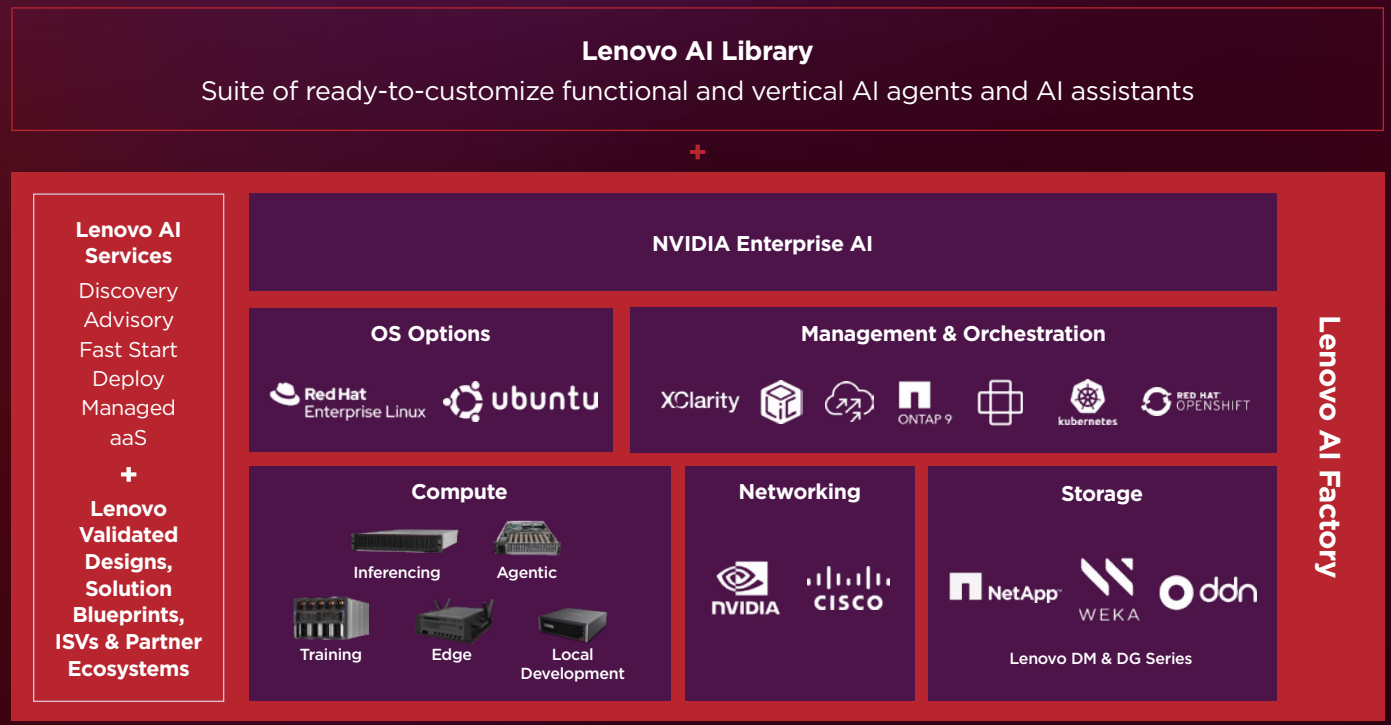
But manufacturers can face a variety of challenges when it comes to implementing AI solutions at scale:

- **Infrastructure** — Manufacturing organizations often have legacy systems, underpowered hardware, and disparate data silos. Enterprise AI implementations need AI-optimized devices and infrastructure where models can be trained, tested, and deployed quickly and efficiently.
- **Skill gaps** — As AI adoption continues to expand, the need for AI-skilled IT talent will only increase, making it difficult for manufacturing organizations to implement AI projects on their own.
- **Data readiness** — In addition to data coming from machine sensors on the line, AI applications must handle structured, unstructured, and semi-structured data coming from supplier systems, global economic data sources, and more.
- **Ongoing support** — Manufacturing environments can be tough on digital infrastructure with temperature and humidity extremes, high levels of vibration, fast-moving machines, and dust.

As AI becomes a business imperative, there's no room for trial-and-error approaches. Without a strategic roadmap and the right resources in place, manufacturing organizations run the risk of budget overruns, project delays, lost productivity, and the potential for reduced or negative ROI.

Breaking down the barriers to AI ROI in manufacturing

Lenovo Hybrid AI Advantage™ with NVIDIA integrates cutting-edge devices, infrastructure, software, and services to enable manufacturing companies scaling AI solutions across private and public AI models with great efficiency to unlock benefits throughout the organization.



This full-stack solution taps in to **NVIDIA AI Enterprise** software with **NVIDIA NIM™ AI models** combined with **Lenovo Validated Designs**, Lenovo AI Developer solution blueprints, and **Lenovo AI Services**. With this versatile, modular platform, manufacturers can build and scale AI implementations efficiently and reliably while preparing for a new era of agentic AI with minimal complexity.

Lenovo and NVIDIA bring years of partnership, collaboration, and engineering to meet customers where they are on their AI journey with speed, ease, and expertise.

Increase productivity — Enable teams to achieve more quickly with functional and vertical-specific AI agents, solutions, and personalized experiences, delivering value across locations.

Optimize agility — Build, validate, and scale AI operations with ease to reduce tech debt and drive operational efficiencies with modern AI infrastructure, devices, models, and services.

Innovate with trust — Achieve trusted, compliant, and responsible AI by managing and protecting data with Lenovo expertise and integrated, validated solutions across the enterprise and ecosystem.

Simplifying the journey

Lenovo Hybrid AI Advantage™ with NVIDIA solutions take advantage of **Lenovo Validated Designs** (LVDs) and Lenovo AI Developer solution blueprints, which provide comprehensive reference architectures that streamline AI development and the implementation of flexible and scalable hybrid AI infrastructures.

LVDs combine market-leading **Lenovo ThinkSystem** GPU-rich servers with **NVIDIA Hopper™ architecture or NVIDIA RTX PRO™ 6000 Blackwell Series GPUs**, and **NVIDIA Spectrum-X™** networking. This platform provides a robust, scalable, and pre-validated foundation to run the **NVIDIA Enterprise AI** software stack.

Pre-tested, turnkey solutions include the configuration of compute and storage servers organized as scale-out structures for specific AI workloads. This provides support for the rich data repositories generated by machine sensors and AI-powered computer vision. **Lenovo ThinkEdge** servers, accelerated by NVIDIA GPUs, can extend these AI-powered capabilities to the plant floor.

For local AI development and testing, **Lenovo ThinkStation** workstations extend these capabilities to creators and data teams, enabling on-device AI workflows and faster iteration connected to hybrid environments. Built on the NVIDIA GB10 Grace Blackwell Superchip, the ThinkStation PGX provides a scalable on-ramp for teams to prototype and test AI workloads and bring AI into the design phase to accelerate product development and QA, speeding time to value.

Deploy faster with ready-to-customize AI solutions

Lenovo Manufacturing Solutions offers comprehensive end-to-end AI solutions spanning supply chain, shop floor, and warehouse operations to empower manufacturers to achieve operational excellence, enhanced productivity, and sustainable growth. The **Lenovo AI Library** provides customizable, pre-validated AI use cases for quick ROI, offering flexibility in size, location, deployment method, and managed services to meet business needs.

In cases where pre-validated use cases are not yet available, Lenovo's agentic AI platform provides a broad array of pre-configured APIs, software development kits, and blueprint templates to streamline development. And, with **Lenovo AI Fast Start** service, you can prove business value with use cases tailored to your industry and workflow needs in under 90 days using your own data.

Enhancing quality control

AI-powered quality inspection can reduce defect detection time by up to 80% compared to traditional methods,[2] which makes it one of the most sought-after applications in manufacturing environments.

The Lenovo Validated Design for the Trifork Vision AI solution provides a comprehensive, proven roadmap that manufacturing organizations can leverage to deploy cameras and edge computing devices integrated with enterprise networking and systems to achieve:

- **Instant visual capture of manufacturing production output**
- **Near real-time assessment of product quality gaps**
- **Accurate tracking of quality performance trends over time**
- **Actionable insights for manufacturing QA teams to enhance decision-making**
- **Continuous evaluation of QA investments and their impact**
- **Seamless knowledge sharing across facilities to standardize best practices**

The combination of Lenovo technologies and Trifork Vision AI provides customers with the additional benefits of:

- **Scalability and flexibility** — Pre-validated Lenovo ThinkEdge servers ensure optimized AI workloads across various factory environments, allowing manufacturers to scale their AI capabilities efficiently.
- **Faster time-to-value** — Pre-tested and validated reference architecture streamlines deployment, reducing integration complexities and ensuring a quick return on investment (ROI).
- **Edge-to-cloud AI processing** — Supports real-time AI inferencing at the edge, reducing cloud-processing delays, optimizing latency, and enhancing data security with localized processing.
- **Compliance with industry standards** — AI-driven quality control ensures that manufacturers meet strict regulatory and compliance requirements with greater accuracy and reliability.

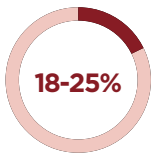
By adopting AI-powered vision-based solutions, manufacturers get high-impact inspections that give QA teams the data they need to streamline the quality assurance process, unlocking higher operational efficiency, cost savings, and improved customer satisfaction.

Enabling predictive maintenance

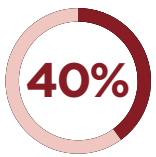
Utilizing sensor (IoT) data to monitor a wide range of operating conditions helps anticipate equipment failure before it happens. Manufacturers incorporating machine learning algorithms with their IoT systems have been able to improve the accuracy of failure predictions across critical equipment, resulting in:

73% reduction in infrastructure failures through continuous monitoring and early detection[3]

30-50% less downtime[3]



18-25% lower maintenance costs[3]



Extending asset lifespan by 40%[3]

Guiding robotics and automation

Lenovo Manufacturing Solutions offers smart robots with advanced capabilities for tasks such as packaging, storage and retrieval, tracking, inspection, increasing throughput, and increasing labor safety.

Our digital robotic inspection platform boasts a range of AI capabilities and employs digital technologies to observe, monitor, document, and analyze the condition and quality of equipment, processes, and environments, providing real-time alarms/warnings and generating insightful inspection reports.

It utilizes cutting-edge AI technology and complex detection logic to reconstruct scenarios based on a large vision model, ensuring the capture of inspection anomalies. The platform is customizable and adaptable for different business scenarios and can reach a high standard of image recognition for industrial inspection:

- **Meter reading** (deviation ≤ ±2%)
- **Equipment defect detection** (recall ≥ 90%, precision ≥ 90%)
- **Environmental condition monitoring** (accuracy ≥ 96%)
- **Personnel operation recognition** (accuracy ≥ 96%)
- **Equipment status monitoring** (accuracy ≥ 99%).

Optimizing production processes

AI solutions hold tremendous promise to help streamline production workflows, improve efficiency, reduce bottlenecks, and optimize resource allocation.

As a manufacturer itself, Lenovo has leveraged AI to keep production lines running smoothly and optimize production scheduling through its in-house **Advanced Planning and Scheduling** (APS) technology.

- Implementing this capability increased production line capacity by 24%, production volumes by 19%, on-time deliveries by 3.5X, and accelerated production schedule planning from two hours to two minutes.[4]
- A new planning system, leveraging digital twin technology and developed in-house by Lenovo, powers Lenovo's smart device manufacturing without pausing the line to retool for new projects.

Streamlining supply chain management

Collecting and analyzing data from internal and external sources in real time enhances planning, logistics, and supplier coordination. In addition, AI can help with more accurate demand forecasting to align production and inventory, minimize stockouts, and support efficient overall operation.

- Lenovo created its own AI-powered solution called **Supply Chain Intelligence** (SCI) which, using real-time analysis and simulations, has:
  - Reduced logistics costs by ~20%[5]
  - Reduced order-to-delivery lead time
- More than 70% of Lenovo supply chain employees use SCI to support their decision-making and keep track of day-to-day activities and, because cross-functional teams now share the same platform, decision-making cycle times have been reduced by an average of 60%.[5]
- Today, SCI performs over 1,500 data-related tasks revealing hidden insights that would be impossible for humans to uncover.

Supporting data-driven decision-making

AI-driven analytics provide actionable insights, helping manufacturers make informed decisions to improve operations and strategic planning. To accomplish this, the AI models need access to data from a wide range of sources — in a wide range of structured and unstructured formats — throughout the facility, which makes data orchestration critical for effective outcomes.

Lenovo and NVIDIA have collaborated with **Centific AI Data Foundry** to provide a pre-tested, scalable solution built with **Lenovo Validated Design**. This offering fuses Lenovo ThinkSystem servers and NVIDIA accelerated computing technology to conquer data complexity and accelerate insights.

- Leveraging **NVIDIA Metropolis**, **NeMo™ Retriever**, and **NVIDIA NIM™**, Centific's AI data foundry transforms data into actionable insights.
- Organizations can create a "data flywheel" where continuous data collection, analysis, and application lead to ongoing improvements in the outcomes. More data leads to more value, which leads to the ability to collect even more data.

Powering smart warehouses

The Lenovo Hybrid AI Advantage™ with NVIDIA can support a wide range of AI-powered solutions that enhance efficiency and productivity for handling raw materials and finished goods.

- **Asset tracking** — Incorporates real-time locating systems to automatically track and record the location and movement of an object with typical sub-meter positioning accuracy.
- **Pick Assist Autonomous Robot** (AMR) — Utilizes the most advanced "order-to-person" human-robot collaboration to help eliminate the need for manual route planning, warehouse redesign, or human intervention. This service offers maximum convenience to manufacturers as it's ready to use out of the box. It provides significant cost advantages, saving 50%-80% on labor costs with ROI between 10 months and two years.[6]
- **Automative Storage and Retrieval Systems** (AS/RS) — Offers high density, flexibility, and scalability in automated stereo warehouses and combines a variety of robotics with AI algorithms to unleash the potential of precise and agile pallet movement. By implementing this AS/RS system, businesses can result in a 200% increase in efficiency and ROI within three years.[6]
- **Warehouse Execution System** (WES) — Focuses on real-time coordination and optimization of material handling tasks and easily integrates automation resources from different brands into one unique platform.
- **Automatic Guided Forklift** (AGF) — Designed to revolutionize intralogistics operations, this innovative forklift leverages advanced technologies to empower the entire pallet handling process from onloading to high-level put-away. Implementing the AGF in an intralogistics workflow can lead to a 30% increase in overall transfer efficiency, with a typical ROI achieved within one to three years.[6]

Accelerating product design

Manufacturers are under pressure to deliver higher-quality products faster, while managing increasingly complex design requirements. That's why it's not surprising that 91% of manufacturers plan to increase investment in AI for product development.[7] Some manufacturers have seen product design time reduced by nearly 90% with AI.[8]

Lenovo ThinkStation workstations provide the accelerated computing foundation engineers need to bring AI directly into their design workflows.

With local, high-performance AI processing, designers and engineers can rapidly iterate on product concepts, run physics-based simulations, and generate synthetic data without waiting on shared infrastructure or cloud queues. This enables teams to explore more design alternatives in less time, catch performance issues earlier, and reduce the number of physical prototypes required.

AI-enhanced modeling tools running on devices like the Lenovo ThinkStation PGX workstation powered by the NVIDIA GB10 Grace Blackwell Superchip can automate labor-intensive tasks such as:

- Feature recognition
- Mesh cleanup
- Defect detection
- Parametric optimization

The result is a more agile, insight-driven design process that accelerates time to market. Manufacturers gain a fast, secure, and cost-effective way to modernize product development and unlock AI innovation at the desktop — without disrupting existing workflows.

Improving sustainability in manufacturing

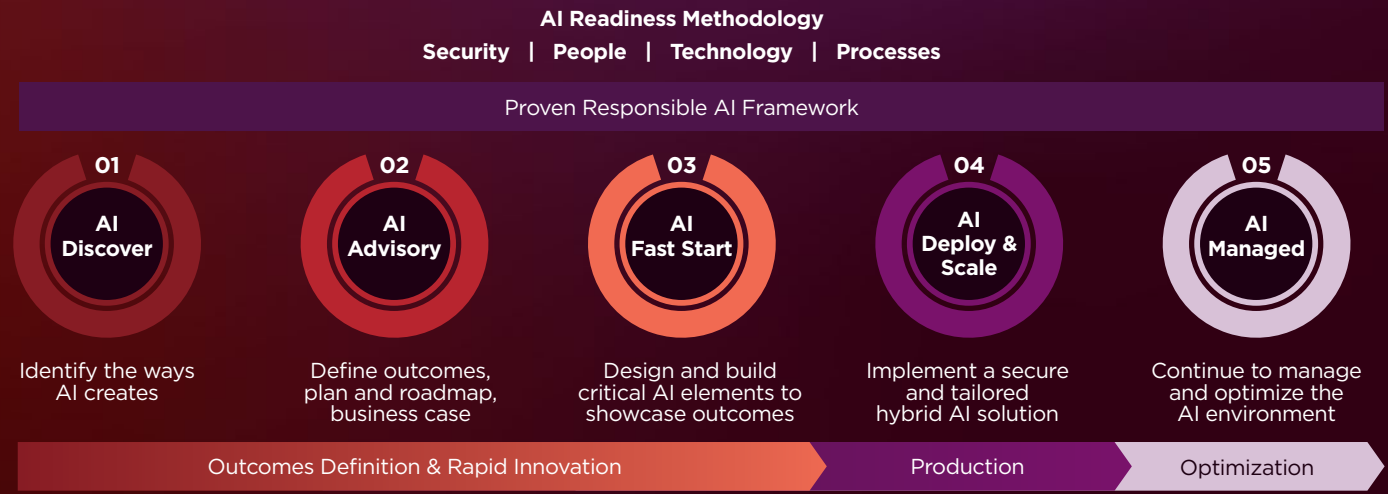
AI can play a central role in optimizing energy use in manufacturing facilities, reducing consumption, and lowering operational costs while promoting sustainability.

Lenovo's **ESG Navigator** replaces the traditional manual management of environmental, social, and governance (ESG) metrics with a flexible, transparent, and highly automated approach that captures data across the value chain — all from a single point of control. ESG Navigator provides 30+ AI models in energy efficiency and energy conservation scenarios, enhancing energy awareness to support progress toward sustainability goals.

Lenovo uses the Lenovo ESG Navigator to capture more than 250,000 data points across the manufacturing site and deliver dashboard reports for 228 KPIs. It also helps simulate a 3D model of the facility that shows all the different data points.

Getting started safely and responsibly

Whether you're not sure where to begin your AI journey, or you've defined use cases and are looking for support taking the next step, **Lenovo AI Services can help**.



Our assessments evaluate your organization's AI readiness from both a security and a responsibility perspective. We identify gaps that could slow your progress and provide clear recommendations to address them.

We'll also help build a roadmap together with defined next steps tailored to your unique needs and desired pace. Plus, we can help with implementation.

Increased agility on demand

Lenovo and NVIDIA solutions are also available through **Lenovo TruScale**, a convenient pay-as-you-go model that enables seamless scalability to meet rapidly increasing demands in processing power and capacity.

Lenovo Hybrid AI Advantage™ with NVIDIA

Gain your AI-powered competitive edge faster

AI is poised to reshape the manufacturing world going forward, and those organizations that adapt and adopt the technology quickly will see the greatest competitive advantage.

Lenovo Hybrid AI Advantage™ with NVIDIA solutions helps your organization unlock relevant intelligence from your data and AI models securely, efficiently, and responsibly.

Discover what your organization can accomplish with Lenovo Hybrid AI Advantage™ with NVIDIA solutions today.

Visit **Lenovo.com/hybridai** to learn more.

Sources

1 Rootstock, "State of AI in Manufacturing," 2025
2 Lincode, "How AI Visual Inspection Reduces Human Error and Increases Production Speed," May 2025
3 Netguru, "How AI Predictive Maintenance Cuts Infrastructure Failures by 73%," November 2025
4 Lenovo, "Lenovo's smarter manufacturing solutions drive the industry's AI-enabled transformation," October 2024
5 Lenovo, "Lenovo uses AI and machine learning to build an ultra-resilient supply chain," January 2024
6 Lenovo, "Manufacturing Solutions Brochure," December 2023
7 Aras, "91% of Manufacturers Plan to Increase Investment in AI for Product Development," March 2025
8 Manufacturing Leadership Council, "From Months to Minutes: How GenAI and AI Transform Product Design and Sourcing," August 2024