E-BOOK

Manufacture success with AI

Spark innovation and drive profitability with an AI-based smart factory

NetApp

Contents

The future is here

Industry 4.0 is here, and like the steam engine centuries ago, it’s ready to revolutionize manufacturing.

From boosting productivity to improving product quality to producing more personally customized products, Industry 4.0 is changing the game for both manufacturers and consumers.

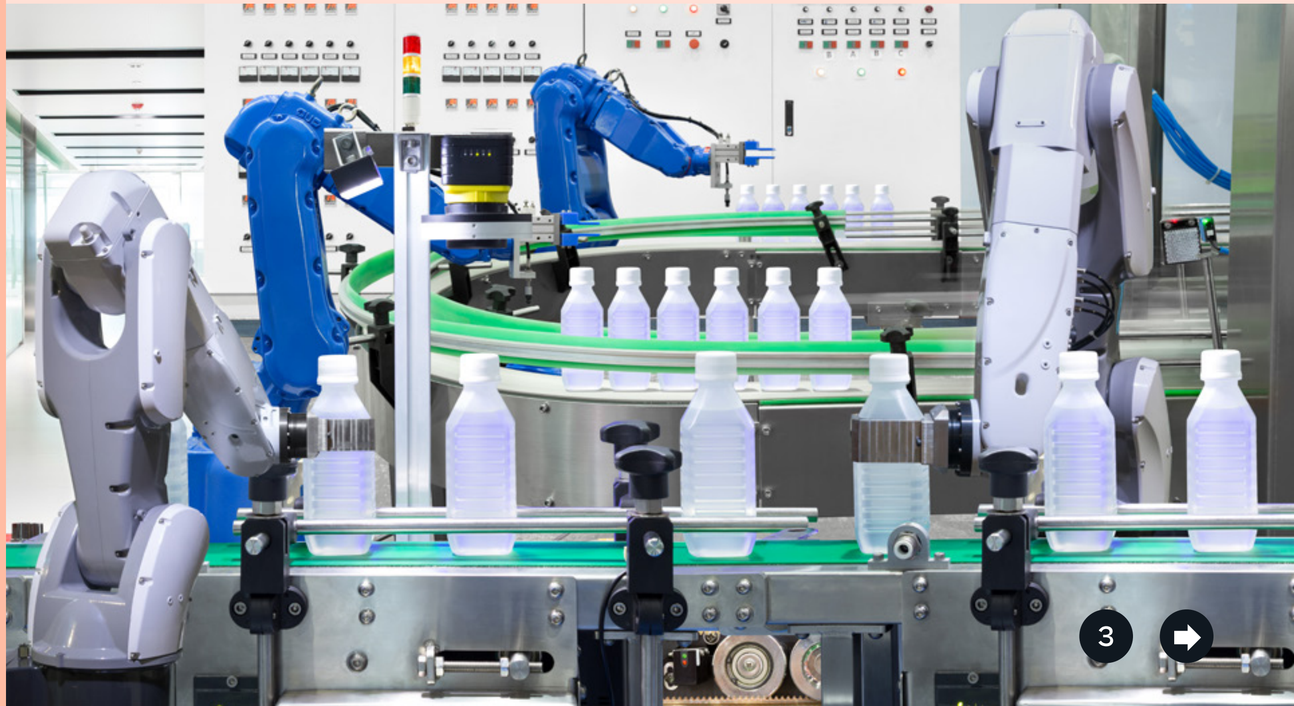
For today’s industrial revolution, manufacturers rely on artificial intelligence (AI) to build a smart factory that produces the operational and cost efficiencies promised by Industry 4.0. Research by Accenture suggests that AI will add nearly $37 trillion to the manufacturing sector by 2035.[1]

With AI, the possibilities are endless. But building an AI infrastructure comes with its own set of challenges. How do you integrate AI with your existing IT infrastructure? How do you scale your AI infrastructure across the business? How do you make sure your data quality is up to par? How do you manage your data effectively? How do you make your IT platform resilient? How do you get the flexibility to enable seamless integration of the ever-increasing technology changes?

The transformational effect of AI in manufacturing

71% of industrial equipment (IE) executives believe that AI will have a significant impact on their organization.[1]

78% of IE executives believe that AI will have a significant impact on the industrial equipment industry.[1]



Manufacture success with AI

The arrival of Industry 4.0 means that using AI as part of a smart manufacturing design is a prerequisite for staying competitive. Small add-ons aren't enough. Staying relevant—and profitable—today means either building a new manufacturing model from the ground up or retooling traditional factory floors.

Smart manufacturing incorporates Internet of Things (IoT) and business data with the analytical and predictive power of AI in real time. Trained algorithms can speed production, improve product lifecycle management, and offer actionable insights that help you maximize profit without sacrificing quality and customer satisfaction. AI systems can support people working on factory floors, too—creating a safer and more efficient work environment with real-time analytics and smart machinery.

Intelligent maintenance

AI-connected sensors help predict equipment failures before they happen so that you can schedule maintenance to prevent downtime.

Quality control

By combining AI with computer vision, you can detect product defects in real time. AI can also help predict the quality of your finished product based on the characteristics of your raw materials.

Process and efficiency management

AI automates tasks and improves safety and energy management. By streamlining manufacturing processes with AI, you can maximize production and optimize your labor investment.

Supply chain management

An AI-integrated supply chain provides real-time inventory management, insight into individual vendors, and raw material price forecasting—enabling continuous production and more agile decision making.

Intelligent maintenance

Downtime is kryptonite for manufacturers. Unplanned downtime costs manufacturers $50 billion each year.[2]

But there's a solution.

Intelligent maintenance uses AI to continuously monitor and predict when a machine failure might occur, giving engineers time to order a part and schedule downtime to install it. This proactive approach to maintenance makes assets more reliable while saving time and money.

When done the right way, predictive maintenance can eliminate **70%** to **75%** of failures while boosting production by **20%** to **25%.**[3]

Why intelligent maintenance?[4]

10x
return on investment (ROI)

25-30%
reduction in maintenance costs

35-45%
reduction in downtime

20-25%
increase in production

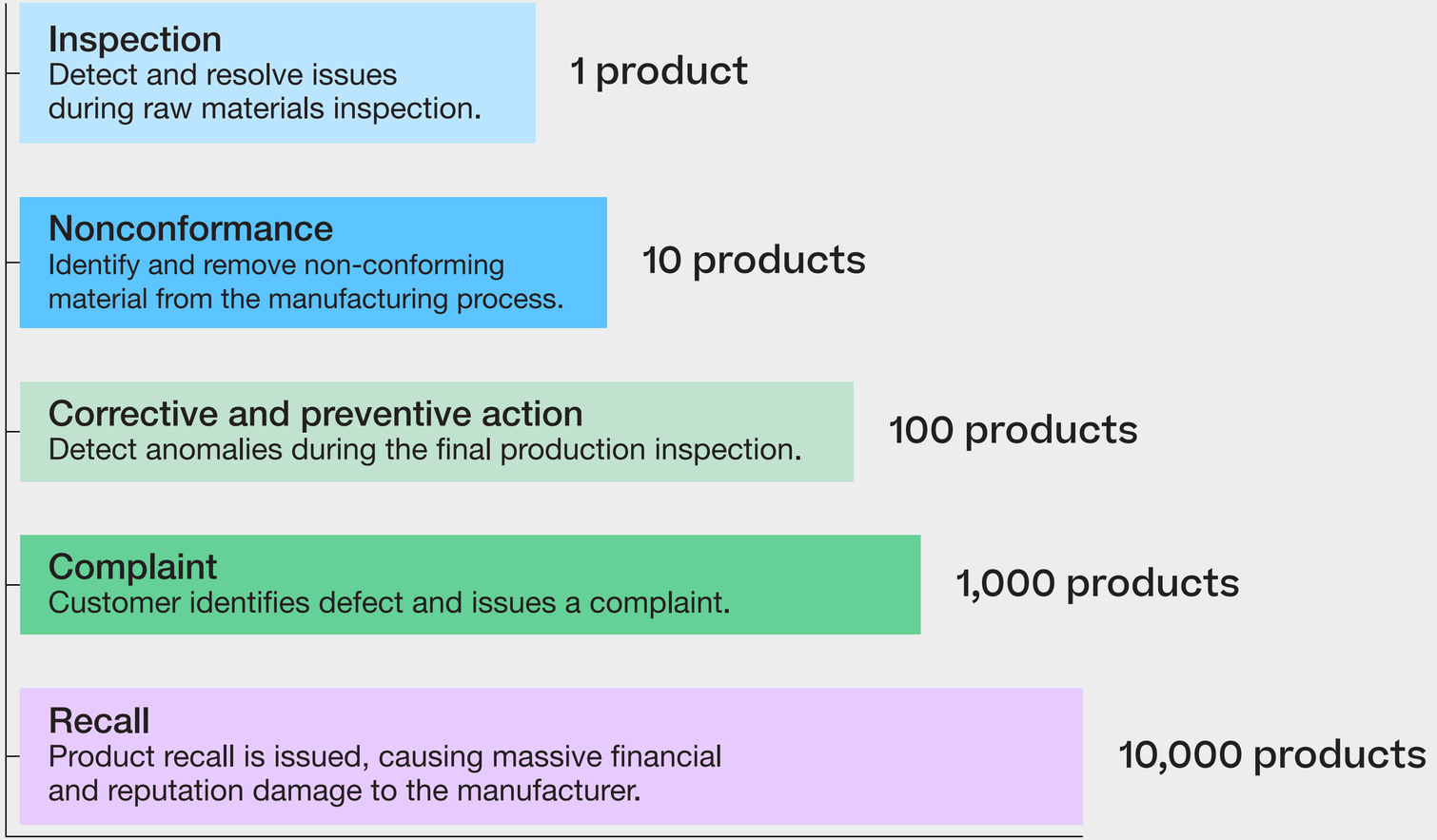
Quality control

Product quality can make or break your business. Quality control processes span the entire manufacturing lifecycle—from design to final product. Missteps at any point in the process can end up costing manufacturers millions (or even billions) of dollars.[5]

Computer vision and trained algorithms on the factory floor can be used to detect anomalies in production and performance that the human eye simply can't see. Catching component defects before they go into production:

- Prevents waste
- Creates better end products
- Helps avoid costly recalls
- Mitigates potential litigation
- Helps maintain a positive brand reputation

The cost of quality



1. Detecting issues early in the quality control process reduces the impact by a factor of 10.[6]

Process and efficiency management

The goal for any manufacturer is to create top-notch products quickly and cost effectively.

AI-based automation can help manufacturers increase production quality and yield, which ultimately results in revenue growth. By optimizing throughput and maximizing your labor investment, AI in factories adds value and spurs growth.

1 Task automation

Machines can work 24/7 at a consistent speed, with consistent quality, increasing overall production throughput. Although this automation might seem to be taking valuable jobs away from human workers, it actually frees skilled workers to take on more important tasks.

2 Energy management

To help reduce operational costs, AI can also be used to monitor and analyze energy consumption in the factory. Getting energy costs under control helps free up funds for improving production processes and output.

3 Safety

AI can also be used to improve safety on the factory floor. Cameras and sensors can alert you to potential hazards such as gas leaks so that you can address issues before they become dangerous. Wearable sensors can help make sure that workers are following safety protocols and send a warning before an accident happens.

Supply chain management

Moving fast to get your products to market is key to gaining and maintaining a competitive edge. But a glitch in the supply chain can bring production and distribution to a complete halt, resulting in inefficiencies, delays, and financial loss.

An AI-driven supply chain management solution with real-time visibility changes the game.

- Real-time inventory management prevents you from tying up millions of dollars in capital for excess safety stock, while keeping control over the components and materials you need to keep production flowing.
- Automation helps free up more than 6,500 hours per year for administrative tasks such as processing paperwork, adjusting purchase orders, and responding to supplier inquiries.[7]
- Greater insight and automated communication with individual vendors help you manage changes in schedules and demand. For example, you can automatically notify a supplier to push up or pause a delivery.

Automated planning helps you make more informed, agile business decisions. Instead of planning out for a month at a time, you can use AI to make more accurate, real-time predictions such as raw material price forecasting or demand for specific products.

Benefits of implementing digital technologies like AI into supply chain management include:[8]

- Up to **75%** reduction in lost sales
- **30%** lower supply-chain administrative costs
- **30%** reduction in logistics costs
- Up to **5%** increase in annual earnings growth before interest and taxes

Three keys to success

AI is key to building a smart factory. But many approaches to AI involve architectures that silo analytics, training, and inference workloads.

These silos create unnecessary complexity, increases costs, and make it hard to scale. Here are three keys to building an AI infrastructure that sparks innovation and drives revenue.

1 More accurate models

When it comes to AI, the more data, the more accurate the model. But more data means larger AI models—some with millions or billions of parameters.

Not only does all of this data need to be managed—it also needs to be protected within the strict limits of internal and external compliance regulations.

2 Seamless data movement

In a smart factory, thousands of edge locations gather terabytes of data every day. Effective AI requires a data pipeline that spans the entire ecosystem, from ingest and data preparation all the way to analysis and tiering. Data must be able to flow quickly and freely throughout the pipeline at every step. When access to this data is limited by a siloed infrastructure, deep learning only scratches the surface.

3 Speed

AI infrastructures must be able to react in a heartbeat. For applications such as quality control or worker safety, your computer vision applications need to be able to ingest, process, and respond instantly.

Artificial intelligence meets real business benefits

NetApp helps keep your data available in the right place at the right time to fuel transformation.

We remove data silos to provide real-time supply chain insight and efficiency, enable optimized equipment and product yield, make labor more productive, and reduce costs. Our proven AI solutions integrate with your legacy IT infrastructure and the world's biggest public clouds. As the data authority on hybrid cloud, NetApp delivers AI solutions that remove bottlenecks at the edge, core, and cloud. By removing these bottlenecks, NetApp enables more efficient data collection, accelerated AI workloads, and smoother cloud integration. You get the performance, mobility, protection, and scalability you need to meet changing market demands with AI solutions that enable you to:

- Optimize productivity with up to 300GBps read throughput per all-flash cluster with well under 1ms of latency.
- Extract the most value from your data with a data fabric and VantEdge edge inferencing solution that allow you to easily move data from edge to core to cloud.
- Keep your data safe with trusted data protection, compliance, and secure access for your distributed, diverse, and dynamic AI data.
- Grow without limits by seamlessly scaling from hundreds of terabytes to tens of petabytes.

Make AI easier with NetApp

5x

Run five times more data through your pipeline.

<60 seconds

Copy datasets in seconds rather than hours or days.

~20 minutes

Configure your AI infrastructure with Ansible integration.

Start your revolution today

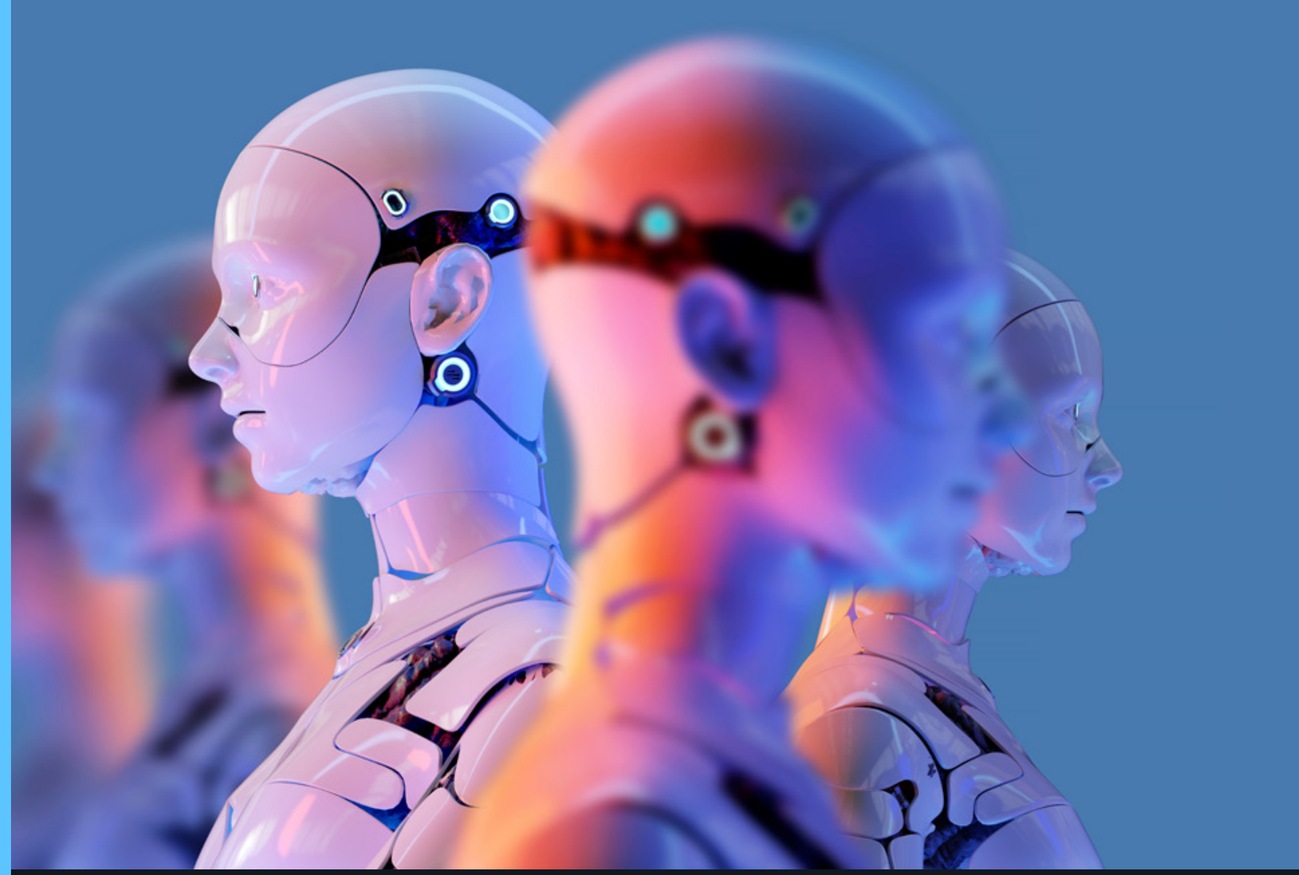
Are you ready to take the market by storm? Learn more about NetApp® solutions for AI:

- NetApp AI solutions for manufacturing
- NetApp AI solutions
- NetApp ONTAP® AI
- NetApp AI solutions for computer vision

Questions? Our AI solution specialists are standing by.

Manufacture success with NetApp AI

1. Accenture, Manufacturing the Future: Artificial Intelligence will fuel the next wave of growth, 2018.
2. Forbes, Manufacturing Without Unplanned Downtime Could Become a Reality Sooner Than You Think, February 26, 2021.
3. AssetSense, Predictive Maintenance.
4. Accelix, What is a predictive maintenance program?, April 2018.
5. Marsh, Quantifying the Full Costs of a Product Defect.
6. IQVIA Quality Compliance, Uncovering the Real Cost of Quality: 1-10-100-1,000-10,000, by Kevin Lee, June 2016.
7. Industry Today, How AI Is Improving Supply Chain Management Processes, March 26, 2021.
8. SupplyChainBrain, How Digital Solutions Are Creating More Resilient Supply Chains, by Ashish Rastogi, April 30, 2020



About NetApp
In a world full of generalists, NetApp is a specialist. We're focused on one thing, helping your business get the most out of your data. NetApp brings the enterprise-grade data services you rely on into the cloud, and the simple flexibility of cloud into the data center. Our industry-leading solutions work across diverse customer environments and the world's biggest public clouds.

As a cloud-led, data-centric software company, only NetApp can help build your unique data fabric, simplify and connect your cloud, and securely deliver the right data, services, and applications to the right people—anytime, anywhere.

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