Microsoft

A Leader's Guide to Industrial AI in Action

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Introduction

AI represents one of the most revolutionary opportunities for business transformation in history, and it comes at a time of profound transition for manufacturers. The industry faces stark challenges, from labor shortages to shifting supply chains to rapidly increasing demand. More and more, connected solutions enabled by AI look like the way forward.

These AI technologies have emerged suddenly, and they're evolving rapidly. In this fast-paced environment, it can be difficult to identify the right path forward. It's especially challenging in manufacturing, where production plants and global supply chains rely on tight coordination between complex physical and digital tools.

No two manufacturers will engage with AI transformation in exactly the same way. Some need to prioritize greater product innovation, while others will benefit more from optimizing factory processes or providing superior service in the field.

With the technical flexibility of AI and its ability to ingest and digest large amounts of data, it's increasingly clear that these tools will play a significant role in transforming manufacturing. Business leaders are taking notice.

64% of industrial manufacturers have already begun experimenting with and deploying AI use cases.[1]

[1]MIT Technology Review, Taking AI to the next level in manufacturing, 2024.
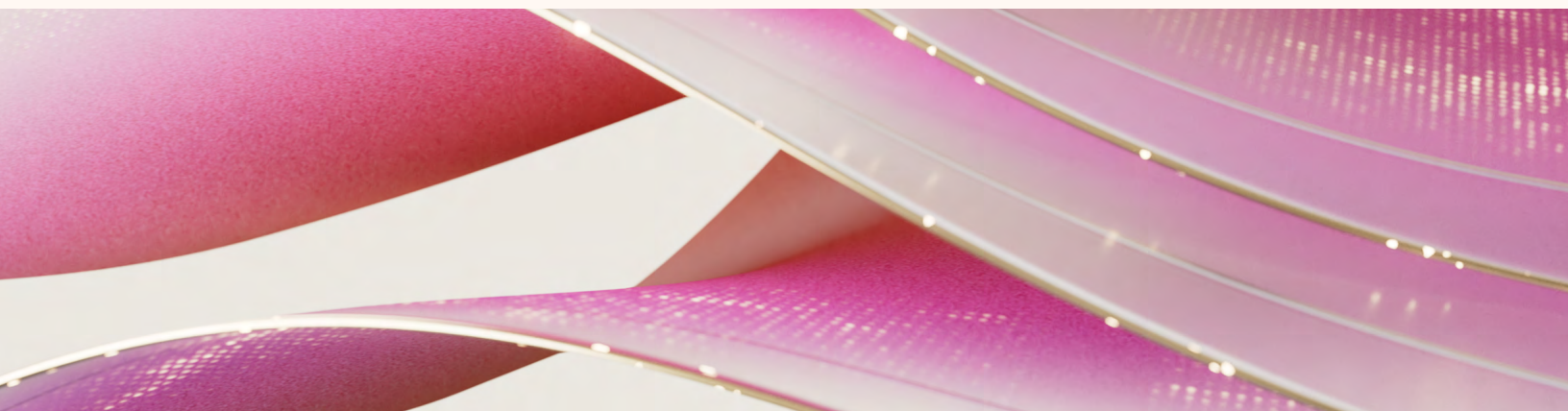
Whatever pathway your organization chooses, it starts with a willingness to discover new ways of working. In the midst of major change, three realities are encouraging business leaders to reimagine how they approach this industry:

(1) Manufacturing is at a crossroads

AI is creating new pathways for innovation and efficiency. At the same time, manufacturers face cost pressures, supply chain volatility, sustainability mandates, and workforce shifts.

Before companies apply AI solutions to these challenges, they need to overcome significant hurdles:

- Fragmented and poor-quality data diminishes the ability of AI to do what it does best.

- Legacy systems and processes are in desperate need of updates, upgrades, and integration with enterprise systems and AI.

- Manufacturers are having trouble attracting new talent during a skilled labor shortage and retaining knowledge as the workforce shifts.

- Leaders face monumental decisions about where to invest in AI initiatives. They need strategic support to determine what's right for their businesses.

70%
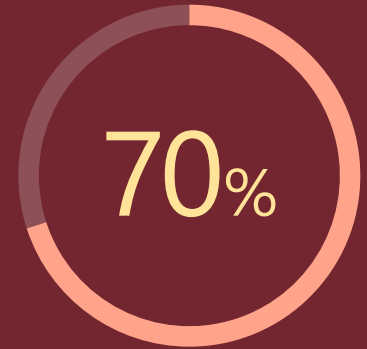
of manufacturing companies report being stuck in AI "pilot purgatory."[2]

[2]McKinsey & Company, Digital Manufacturing - escaping pilot purgatory, 2023.

② AI is already making an impact across manufacturing

There are countless ways to apply AI to your industrial organization. That means there's no one-size-fits-all approach.

Some common themes are starting to emerge:

- Connecting data that previously existed in siloed or inaccessible systems unlocks value by enabling new AI solutions.

- Contextual information and support for decision-making empower workers to do more with the resources they have, wherever they operate.

- Intelligent assistance and generative AI accelerate design and development, providing an edge in the product development lifecycle.

- Real-time visibility and automation enhance factory operations and minimize errors by keeping everyone connected and communicating.

③ Innovation takes time—and now is the time to start

AI initiatives don't happen overnight. They begin with a careful assessment of your company's needs. From there, it takes deliberate strategy, organizational buy-in, and employee skilling to apply this technology effectively and reap its ROI.

Real transformation depends on purposeful AI that's connected to data and deployed at scale. Those who act today have the opportunity to build long-term competitive advantage.

A framework for transforming manufacturing with AI

Design, build, operate

The future of manufacturing belongs to businesses with the vision to see the path ahead and the drive to take it. Your goal might be inspiring innovation, optimizing processes, or elevating service. Whatever your priorities, success begins with strategy, and implementing that strategy relies on the right technology.

This e-book shares three opportunities for manufacturing leaders who see the potential of AI transformation:

(1) **Design:** Accelerate innovation with generative design processes
Amplify engineering, design, and product commercialization with virtual assets, AI-enabled processes, and real-time feedback.

(2) **Build:** Create a robust data foundation for production and operations
Modernize your technology estate by integrating industrial data, infrastructure, and assets to inform and influence production.

(3) **Operate:** Empower frontline workers with purpose-built AI tools
Enable knowledge and frontline worker productivity through immersive visualization, AI collaboration, and training experiences.
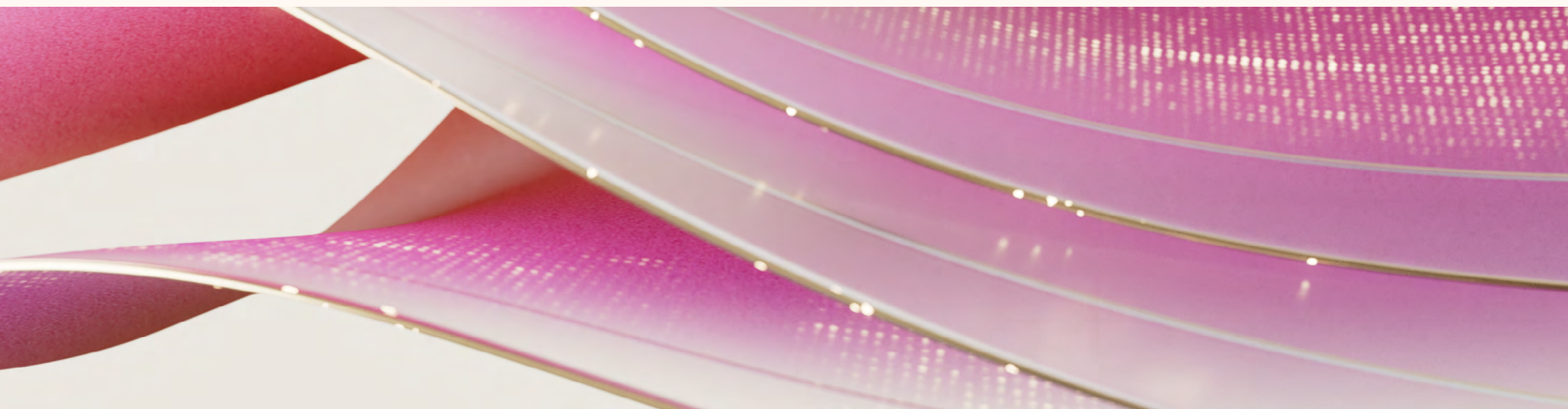
Accelerate innovation with generative design processes

Amplify engineering, design, and product commercialization with virtual assets, AI-enabled processes, and real-time feedback.

In the race to market, rapid product development is the key to staying competitive. AI can shorten development cycles, improve quality, and help your teams get more innovative products to market faster.

Use case: Accelerate product development and engineering with generative AI

Unassisted by AI, engineering teams spend long stretches of time refining and optimizing product designs to meet performance, cost, and production requirements. These tasks demand hours of manually reviewing components and creating digital CAD models that meet customer expectations. All of these processes are time-consuming and leave design teams prone to overlooking existing inventory.

With AI, your engineers can automate design processes and quickly generate innovative solutions that meet predefined specifications. Prototyping and simulation software supported by generative AI reduces design and materials use costs. Together, these capabilities minimize the time your teams spend on manual iterations and let them focus on higher-value tasks like ensuring manufacturability or fulfilling regulatory standards.

The outcome is improved efficiency through real-time iteration on product designs and CAD models, scenario simulations, and the ability to create lightweight, cost-efficient parts.

Product development at the speed of AI

- **Shorten the development lifecycle:** AI agents can analyze design specifications and descriptions to generate precise 3D models that meet your requirements. Optimizing the use of existing components speeds up the design process and reduces development costs.

- **Unlock customization:** Folding feedback into the design process itself helps your organization meet customer demands and increase satisfaction through better customization.

- **Simulate and model products:** AI can preprocess data and analyze design requirements to recommend optimal simulation methods with high-quality data. These capabilities shorten research cycles by generating more innovative designs more rapidly while respecting your constraints.

- **Enable continuous improvement:** Machine learning models can provide insights into future customer needs. By training models on your enterprise knowledge and records, you can drive better decision-making and gain a competitive edge.

HARTING

Case study

HARTING reduces design time from weeks to minutes with Siemens and Azure AI Foundry

HARTING needed a simpler way for customers to find and design the right product in a catalog of more than 27,000 options, but traditional processes were time-consuming and required high levels of technical expertise. The leader in industrial connectors implemented an AI-driven assistant fueled by Microsoft Azure OpenAI in Foundry Models and Microsoft Cloud for Manufacturing.

HARTING's AI-guided Han® Configurator lets customers describe their needs in natural language. AI translates those inputs into technical specifications, guiding them to the right product in just one minute. Customers can also visualize their configurations in 3D, building confidence in their decisions.

The AI solution reduced configuration time from 15 or 20 minutes to just one, significantly improving efficiency and rapid creation of custom prototypes.

Read the story

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HARTING would never have trained our own large language model. We were glad to see the Microsoft model fits our purpose without additional training. It has real-world knowledge and even some industry knowledge we didn't expect. That's one reason we love this project—it allows us to maintain our connector expertise, which is our competitive edge, without sharing proprietary knowledge.

Julia Froehlich

Director of Innovation Hub, HARTING Technology Group

Use case: Streamline software-defined products with AI-assisted coding

Software development teams dedicate a significant portion of their time to writing and debugging code to maintain application quality and ensure functionality. AI applications are already adding value to the product design process.

Integrating AI-assisted coding with programmable logic controller (PLC) programming and connected products accelerates the development process. AI provides real-time code suggestions, automates repetitive tasks, and identifies errors early. By freeing your developers to focus on creative problem solving and optimizing system performance, AI assistance reduces development time while ensuring higher code quality and faster deployment.

Better products through better code

- **Improve coding quality:** Code-generation agents can help engineers create high-quality, tested, and validated code for PLCs. Equipped with AI-generated code, you can accelerate the development process while minimizing errors, maintaining consistency, and adhering to best practices across projects.

- **Accelerate code creation:** Agents automate repetitive tasks and provide intelligent code suggestions that significantly reduce the time and effort required for PLC programming to speed up engineering timelines.

- **Automate requirements:** AI-powered management tools can organize, summarize, and write requirements on behalf of your human developers to streamline existing workflows and scale analysis.

50%

improvement in coding efficiency and testing.[3]

85%

of developers report that they feel more confident in the quality of their code.[4]

[3]McKinsey & Company, AI for IT modernization: Faster, cheaper, better, 2024.
[4]GitHub, Research: Quantifying GitHub Copilot's impact on code quality, 2023.

Schneider Electric

Case study

Schneider Electric fast-tracks innovation with Azure OpenAI

Schneider Electric is the innovative force behind many of the technologies used every day in energy management and industrial automation. The company provides solutions that enhance productivity and deliver better energy efficiency around the world—in homes, buildings, datacenters, electrical grids, and nearly every aspect of industry.

Schneider has been experimenting with AI and using this technology for more than three decades. Now that the necessary infrastructure and supporting technologies have matured, the company is basing its customer-facing AI solutions on a highly performant technology from a vendor it has trusted for years: Azure OpenAI, a solution within Microsoft Cloud for Manufacturing.

Schneider's EcoStruxure platform connects IoT devices on the shop floor to information systems to drive strategic decision-making. It lets customers control their facilities' energy performance dynamically and decide how to use power effectively.

Read the story

Get started: Streamline software-defined products by supporting your engineers using AI-assisted coding.

- Build custom generative AI solutions for specific manufacturing workflows with Azure OpenAI.

- Quickly build, deploy, and scale web apps and APIs with Azure App Service.

Generative AI solutions
like Azure OpenAI are
delivering what I dreamed of
when I started my career:
seamless cooperative
interaction between human
and machine to make the best
possible decisions.

Francois Bonnard

AI Partnerships Director, Schneider Electric
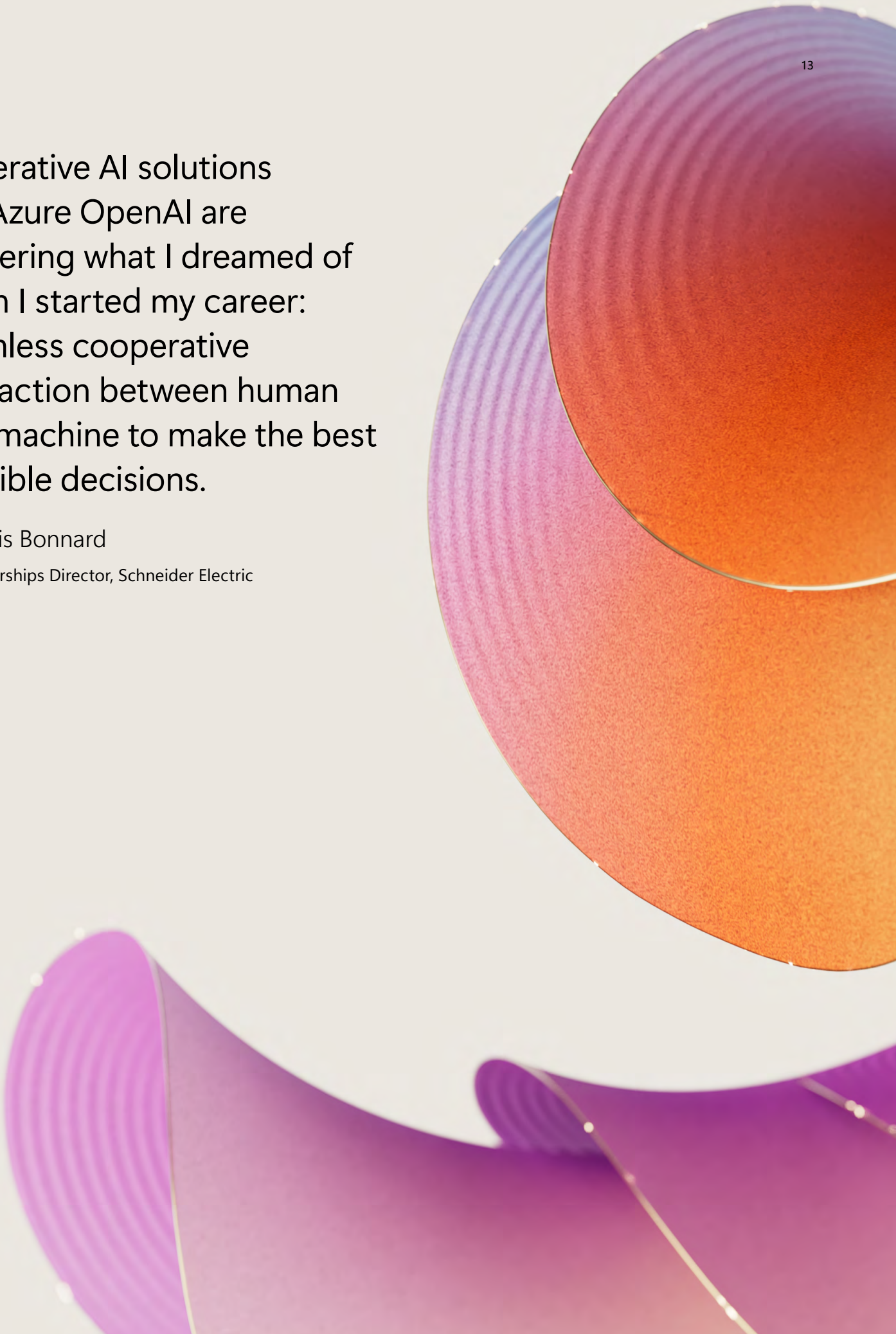
Create a robust data foundation for production and operations

Modernize your technology estate by integrating industrial data, infrastructure, and assets to inform and influence production.

A unified data foundation unlocks real-time insights and helps manufacturers scale AI responsibly across operational technology (OT) and information technology (IT) systems. By connecting your data and integrating your tools, you unlock more value from existing systems while enabling new digital investments.

Use case: Transform factory operations with real-time data access and AI agents

Manufacturers dedicate substantial time to optimizing their processes. It's an essential and ongoing effort to ensure efficiency and streamline operations.

Unfortunately, many companies' data ecosystems are holding them back from fully implementing connected factory operations. They face fractured, sprawling data estates and siloed IT and OT environments. At the same time, costly integration and maintenance disincentivize data sharing between vendors. Finally, inadequate data governance and security risks limit manufacturers' ability to scale. The result is that poor-quality data inhibits information-reliant solutions.

By unifying your data ecosystem, you democratize access to insights across your organization and enable real-time decision-making. AI-enabled facilities can use real-time environment data to predict equipment failures, reducing unnecessary downtime and preventing defects that slow production. This leads to shorter manufacturing cycles while ensuring higher-quality outputs and faster, more efficient delivery. Ultimately, the better you equip your organization through connected data and systems, the more agile and responsive your operations will be, helping you drive innovation and outpace your competitors.
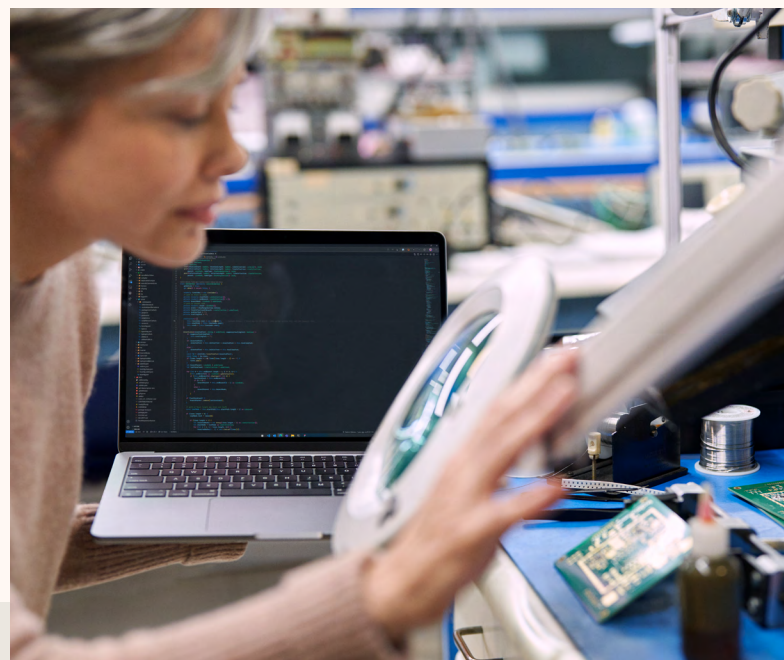
Unified data: A foundation for innovation and efficiency

- **Enable essential use cases:** By connecting factory and facility data across your enterprise resource planning (ERP), manufacturing execution system (MES), internet of things (IoT), and computerized maintenance management system (CMMS) tools, you enable root cause analysis, waste reduction, and production insights while unlocking intelligent analysis.

- **Access key metrics:** Identify cost and carbon reduction opportunities by gaining visibility into metrics like scrap rates, yields, and energy usage over time.

- **Contextualize data:** Rapidly gather insights and direct work on production lines that would otherwise operate in silos.

- **Improve yield:** Better information empowers production, engineering, procurement, and finance professionals to make more effective product and process decisions.
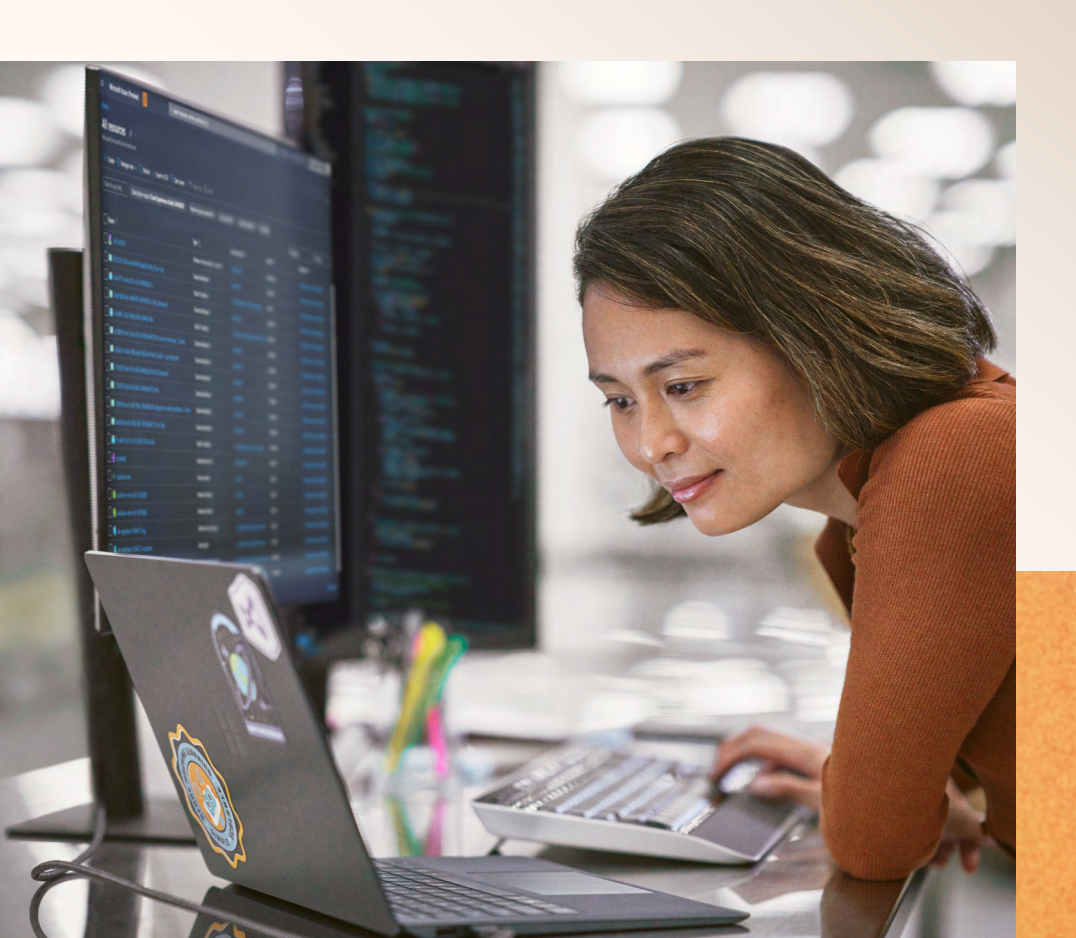
Case study

Schaeffler unlocks factory insights

Schaeffler needed to modernize data management and unlock intelligence across diverse IT and OT systems using generative AI. This enables advanced factory reporting and troubleshooting to boost uptime, quality, productivity, and yields.

The global manufacturing leader implemented Manufacturing Data Solutions in Microsoft Fabric and the factory operations agent in Azure AI Foundry, part of Microsoft Cloud for Manufacturing.

AI-driven insights are maximizing machinery uptime, employee productivity, quality, and yields by empowering employees with instant, actionable near real-time intelligence from across different IT and OT systems, including ERP, SCM, and MES.

Read the story

Get started: Transform factory operations through the power of connected data.

- Unify data across your manufacturing organization with Microsoft Fabric.

- Empower frontline workers to get more done faster with Microsoft 365 Copilot.

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With the agent in Azure AI [Foundry], our workers can now immediately search for the reason of the downtime and the best way to solve it. This makes us quicker, and it's easier for the workers to remember the solutions for next time.

Tobias Ebersbach

VP, Operations Digitalization & IT Division B&IS, Schaeffler

Use case: Improve safety and frontline productivity with AI guidance

Manufacturers are having difficulty retaining, onboarding, training, and upskilling frontline workers. Meanwhile, employees still use paper-based processes for most workflows. The result is increased costs that arise from unplanned or extensive asset downtimes, lower first-time fix rates, and employee burnout.

Occupational safety is also front and center in the minds of manufacturing leaders.

AI-driven insights and specialized agents empower your frontline workers with real-time data. They improve decision-making and response times by providing information that's relevant to the task at hand.

The first step toward enabling those capabilities is a unified data estate that reaches across different enterprise systems and information sources. With more accessible data and connected systems, technological advancements drive cost savings, improved operational efficiency, better on-site safety, and a competitive edge in the market.

Business outcomes

- **Enhance safety for factory workers:** Agents can provide answers to safety-related questions to align your workforce with established occupational health and safety (OHS) guidelines.

- **Streamline safety inspections:** By converting handwritten notes into digital summaries and generating incident reports, intelligent tools accelerate the inspection process and channel inputs into readable data.

- **Enhance employee support:** AI-powered tools can process vast amounts of operational data and quickly provide technicians with the specific information they need. This enhances experienced employees' workflows and helps newer workers build their skills.

- **Achieve faster issue resolution:** Access to insights based on critical information from different sources and facilities informs decision-making and enhances operational agility across the value chain.

$3T The annual cost to businesses from work-related injuries and illnesses.[5]

[5]Coherent Market Insights, Occupational Health Market Analysis, 2025.

NetworkRail

Case study

Network Rail embraces a more efficient and safer data-driven future with Microsoft Azure

Network Rail needed to modernize its data analytics solution for asset management and maintenance. The British railway operator's Intelligent Infrastructure program chose Microsoft Azure to help build several new solutions that bring multiple asset data streams together.

One of the tools gives maintenance engineers better visibility over the 20,000 miles of railway track and countless other assets that make up the network. Today, employees use a solution called Insight to understand data 50% faster than before and improve efficiency, passenger experiences, and safety—all while saving costs.[6]

Read the story

Get started: Improve factory safety and frontline productivity through connectivity and integration.

- Unify your foundational manufacturing data and teams with Microsoft Azure.

- Simplify hybrid data integration across operations with Azure Data Factory.

[6]Microsoft, Network Rail embraces a more efficient and safer data-driven future with Microsoft Azure, 2024.

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The technology we have built with Microsoft Azure and Power BI allows our engineers to digest and understand the data 50% quicker than they could before. With it, we have achieved massive efficiencies for the workforce. Now, users can spend more time doing the things that matter. Rather than trying to manage paper and spreadsheets, they can go out and maintain the railway.

Martin Mason

Senior Program Manager of Intelligent Infrastructure, Network Rail

Empower frontline workers with purpose-built AI tools

Enable knowledge and frontline worker productivity through immersive visualization, AI collaboration, and training experiences.

Product, facility, and supply data aren't just useful for the production line and factory operations. They also unlock better connections for customer-facing teams. By equipping sales, marketing, and service workers with AI-powered tools, you can boost productivity, safety, and job satisfaction.

Use case: Enhance contact center and sales support

Sales and support professionals can easily feel disconnected from product development and manufacturing processes. This can lead to knowledge gaps that could potentially affect sales or erode customer trust.

You can enable better decision-making and insights by making R&D, asset, process, and supply chain information discoverable across distributed endpoints. Field users in every corner of your business can deploy generative AI search and summarization capabilities to "talk to their data." This improves employee productivity, reduces cognitive overload, and removes drudgery from repetitive tasks.

Sales and customer support teams can use existing AI solutions or extend them through low-code agent or app development. The tools they create have the power to streamline workflows, improve productivity, and provide more accurate service tailored to your customers' needs.

Connecting the field to the factory

- **Improve demand planning:** AI can track and revise demand to streamline processes, helping your field teams enhance demand forecasting and refine sales and operations planning to ensure on-time delivery without overstocking inventory.

- **Standardize and accelerate reporting:** Through dashboards connected to intelligent analytics assistants, AI provides data visualizations and quickly creates reports. This gives all members of your salesforce access to common reports and dashboards, driving consistency and a shared source of truth.

- **Improve the employee experience:** Connecting employees to the reasoning behind supply and demand decisions builds buy-in and helps your sales and support professionals manage timelines and keep customers informed.

- **Address communication gaps:** AI agents can act as communications liaisons to simplify virtual collaboration between design engineers, frontline workers, and other teams across business functions. As a result, your manufacturing and supply chain teams get better feedback more quickly, while sales teams get access to the expertise they need.

Alltech®

Case study

Alltech fortifies business operations with Dynamics 365

Alltech is a global leader in the agriculture industry, helping farmers raise healthy plants and animals, feed the world, and protect the environment through nutrition and scientific innovation. Headquartered in Kentucky, the global company employs more than 5,000 people and produces specialty ingredients, premixes, supplements, feed, and other animal nutrition technologies to serve customers in more than 120 countries.

By unifying its legacy ERP systems under Dynamics 365, Alltech will be able to harmonize multiple disparate business units seamlessly. The company has now launched a multi-year digital transformation based on Dynamics 365, aimed at increasing efficiency and productivity while continuing to enhance user experience and customer satisfaction.

Read the story

Get started: Enhance contact center and sales support through connected, intelligent solutions.

- Increase seller efficiency to close more deals with Dynamics 365 Sales.

- Empower service representatives to resolve issues quickly with Dynamics 365 Customer Service.

- Deliver intelligence, automation, and efficiency across channels with Dynamics 365 Contact Center.

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One of Alltech's core values is to 'Seize the opportunity with speed.' Dynamics 365 empowers our team to make the most of the unprecedented opportunities for agriculture to make a positive impact on our planet.

Dr. Mark Lyons

President and CEO, Alltech

Use case: Improve field service through AI

Many field service technicians and plant workers don't have access to the product lifecycle management (PLM) tools that tap them into the production side of manufacturing. As a result, they can't report issues with product design and manufacturing or seek out information for highly technical customer challenges.

Closing the gaps between business functions can tighten up the feedback loop and provide access to crucial information your field service workers need to support customers properly. By making data for products, assets, processes, and the supply chain more discoverable, you help your field teams take a more informed approach to their work.

Democratizing and disseminating support expertise

- **Deliver better support:** Through continual connection to crucial product, production, and supply chain data, your workers become extensions of the most up-to-date and accurate information in real time. This enables more robust and efficient service for customers.

- **Augment employee skills:** Using AI assistants that operate through natural language queries, field service workers can learn on demand by accessing step-by-step instructions and demonstration videos from across your organization's knowledge base.

- **Access expertise:** A connected environment with access managed by AI agents enables input in the moment from experts who operate from centralized locations. Real-time problem solving at scale and at a distance means less need for on-site supervision from management and site visits from experts.

- **Improve prediction and planning:** More intelligent insights give field support teams the information to predict maintenance needs more accurately and plan accordingly. With this knowledge, you can provide greater transparency to customers so they can know sooner when downtime will be necessary.

Case study

Siemens connects frontline workers and engineers for real-time problem solving using Azure AI Foundry

Siemens Digital Industries Software saw the need to enable better cross-functional communication and collaboration for the industrial companies that use its tools. Specifically, field and shop floor workers needed to be able to communicate with operations and engineering teams to unlock innovation and efficiency and rapidly address problems as they arise.

The company envisioned an AI-powered collaborative app to help people working across the product lifecycle close feedback loops faster, solve challenges together, and feel more connected and included as part of the larger organization. Siemens DI decided to work with Microsoft using Microsoft Azure AI Foundry to create a Microsoft Teams app for their industry-leading product lifecycle management (PLM) solution.

Teamcenter uses natural language processing to help customers report issues in real time. The app automatically translates informal speech data in the speaker's language to create a summarized problem report and route it to relevant design, engineering, or manufacturing experts who access the report in their own language.

Read the story

Get started: Improve field service through intelligent connectivity.

- Transform field service operations to improve customer experiences with Dynamics 365 Field Service.

- Build your own AI agents or extend Microsoft 365 Copilot to address specific manufacturing needs with Microsoft Copilot Studio.

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With AI, we're helping people report problems in their native language and automatically translate it to a common language. This is a game-changer. With Azure OpenAI, we can empower millions of workers who do not have access to product lifecycle management tools today to impact the design and manufacturing process more easily as part of their existing workflows.

Joe Bohman

Executive Vice President, Siemens Digital Industries Software

Accelerate innovation, connect your data, and empower your workforce

Accelerate manufacturing AI transformation with Microsoft

AI has crossed the threshold from distant possibility to present-day viability. The manufacturers at the leading edge of AI adoption are already seeing gains in speed, productivity, and resilience.

The impact is real, and it's available now to industrial organizations with the vision to design, build, and operate AI solutions effectively. Capturing those benefits depends on connecting strategy to scenarios and data to decisions.

Unified data is the starting point. A successful AI implementation requires a connected, scalable foundation. From there, you can build capacity and extend your capabilities through AI agents and intelligent apps that unlock value at every level of your organization—from design to production to frontline workers.

The path forward begins with an understanding of what your company needs. The next step is to plot a course through reimagining core processes and implementing new possibilities.

Microsoft can help you:

- Identify high-impact use cases that align with your goals.

- Empower your people with tools that support their natural workstyles and day-to-day needs.

- Partner with a secure and responsible platform that grows with you.

The technology to create the AI-first future of manufacturing has arrived. It's time to take your next steps toward capturing the most impact for your organization, creating the best conditions for your employees, and providing the greatest value for your customers.
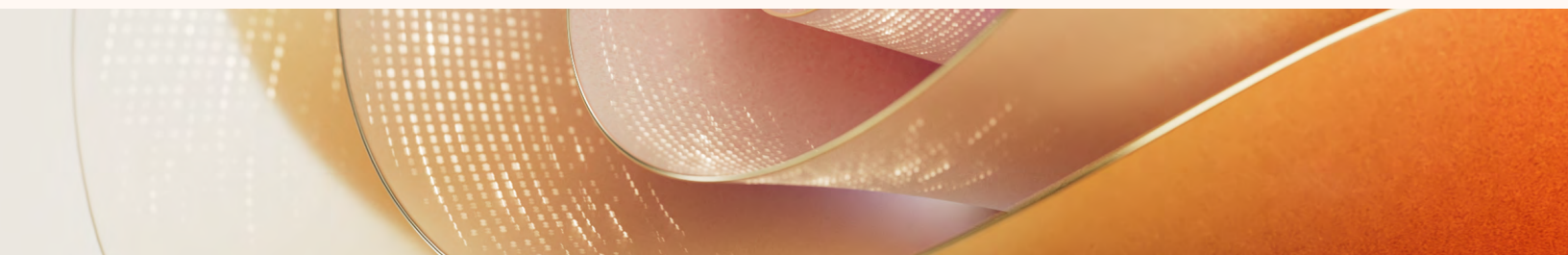
Microsoft

Ready to transform your manufacturing experience?

Discover solutions that can help you make the most of your data, get better products to market faster, and build the workforce of the future.

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→ Read the [Microsoft Manufacturing and Mobility Industry Blog](#) for trends, insights, and practical tips to help you win with AI.

→ Follow [Microsoft Cloud](#) on LinkedIn for the latest product updates and industry conversations.