Digital Transformation NETWORK

A Business Software Alliance Initiative

AI and Manufacturing

How AI Is Transforming American Manufacturing

From the first wave of computer-aided design to digital transformation, manufacturing innovation has always started with better ways to design and make things. Artificial intelligence (AI) represents the next major leap, enabling manufacturers to create new products faster, strengthen supply chain resilience, reduce waste, and help workers do their best, safest work.

Today's leading US manufacturers are using AI before a factory even exists, simulating how components will perform, how equipment should be placed, and how workers can operate more efficiently and safely. As production moves closer to home to support resilient supply chains, AI is enabling a new era of advanced, digitally driven American manufacturing.

"For manufacturers, AI promises to be a game-changer at every level of the value chain," PWC wrote in their white paper on AI and manufacturing.[1] Product design, direct automation, predictive maintenance, reduced downtime, improved safety, lower operational costs, greater efficiency, better quality control, and faster decision making are "just some of the rewards on offer to organizations that embrace the transformation and master the implementation of AI."

As manufacturers reach Industry 4.0—also known as the fourth industrial revolution, or 4IR—where manufacturing systems are characterized by AI, automation, smart factories, and data-driven decisions, they are discovering dozens of new use cases. For their workers, it offers easier training, safer job sites, and a chance to develop valuable new skills.

This report highlights how AI is delivering results for productivity, for workers, and for US competitiveness.

AI is reshaping work, too. According to research by the Manufacturing Institute and Deloitte,[2] by 2033, 3.8 million manufacturing jobs will likely be needed. Attracting and retaining talent is a serious concern for many companies in the sector: AI can help bridge this gap. Younger workers are stepping into higher-value tasks through faster training and digital guidance. Experienced employees are extending careers with more ergonomic and less hazardous roles. Instead of replacing talent, AI is helping teams design better, make smarter, and build more competitively in the United States.

President Trump's America's AI Action Plan[3] highlights the importance of manufacturing industries in achieving the "unquestioned and unchallenged global technological dominance" referenced in the President's foreword.[4] "The Federal government should prioritize investment in these emerging technologies and usher in a new industrial renaissance," the Executive Order notes.

This report highlights where that transformation is delivering results for productivity, for workers, and for US competitiveness.

SECTION 1

AI Across the Value Chain: From Product Design to Production

The pace of AI adoption in US manufacturing has accelerated dramatically since BSA's 2022 report on digital transformation.[5] According to the Manufacturers Alliance Foundation, nearly 80 percent of manufacturers say they expect to increase their AI use over the next two years.

Leading US facilities are applying AI throughout the manufacturing lifecycle, from product design, to factory optimization, to continuous performance improvement during operation. AI-powered digital twins allow teams to simulate products and production environments before anything is physically built, reducing waste and enabling smarter investment decisions. Meanwhile, additive manufacturing creates faster prototyping and more customized products that meet customer and market needs. The World Economic Forum's (WEF) Global Lighthouse Network highlights America's advanced AI-driven factories, including Schneider Electric's Smart Factory in Lexington and Fast Radius in Louisville—both recognized for pioneering smart automation and additive manufacturing. Their success demonstrates how AI now acts as a "conductor" of 4IR technologies, orchestrating new levels of performance and sustainability, as described in the WEF's *Adopting AI at Speed and Scale*[6] white paper.

These capabilities empower companies of all sizes, including small- and mid-sized manufacturers, to innovate quickly and compete globally, provided they have access to training and modern digital tools. As manufacturers embrace AI, they are advancing a culture of improvement, adaptability, and increased output that benefits their workforce and strengthens US supply chain resilience.

By continuously challenging how things are made, AI is helping redefine American manufacturing, driving a culture of improvement, adaptability, and global competitiveness.

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AUTODESK

Full Speed Ahead With AI-Enabled Design

The North Carolina-based Stewart-Haas racing team[7] used AI-enabled design software from **Autodesk** to reduce weight in the brake pedal on Cole Custer's #41 Mustang. The resulting pedal was 32 percent lighter and 50 percent stiffer than the previous part, helping to lightweight the vehicle and make it faster without reducing safety. Cole Custer was the 2023 NASCAR Xfinity Series champion.

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IBM

AI Drives Improvements in Indiana

At Toyota's Indiana Assembly, a new car rolls off the assembly line every minute. To ensure every part of the process is flawless and keeps to zero downtime, Toyota turned to **IBM** Maximo Health[8] and Predict to create a smarter, more digital factory.

IBM Maximo Application Suite is a unified asset and facilities lifecycle management solution that streamlines the maintenance, inspection, and reliability of critical equipment and infrastructure by leveraging generative AI, advanced analytics, and the Internet of Things (IoT). It gave new insights into how Toyota's factory works.

Factory floor equipment, combined with AI and IoT technologies, generated critical insights into reducing downtime and defects. Leveraging this shop floor enabled Toyota to reduce downtime by 50 percent, reduce breakdowns by 70 percent, and reduce overall maintenance costs by 25 percent.

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ORACLE

Five Stars for the Review Roundup

What do consumers really think of your products? Manufacturers can find out easily by using AI tools and large language models (LLMs) to analyze and interpret customer feedback and product reviews at scale. The **Oracle** AI technology stack[9] including Oracle Database 23ai and Oracle Supply Chain Management (SCM) Cloud Product Information Management can analyze thousands of online reviews to provide an overview of customer sentiment, allowing businesses to understand general perceptions of their products.

By analyzing user feedback and identifying requests for new features or improvements to existing products, manufacturers can then feed this information back into the product development cycle. The AI can also report on the emotional tones of reviews, such as excitement, frustration, and disappointment, providing a deeper level of insight than simple sentiment analysis.

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SAP

Adding Value to Value-Add Assembly

Based in the Motor City, Detroit Manufacturing Systems LLC provides value-add assembly and vertically integrated contract manufacturing solutions for the automotive, defense, and aerospace industries.

They decided to transition from an on-premises enterprise resource planning (ERP) Core Component system to **SAP** S/4HANA Cloud, which has transformed their capabilities.[10] Employees equipped with scanners can collect data, locate items in inventory, and enable real-time visibility into operations. They have recorded a 15–20 percent gain in production efficiency, and reduced their negative inventory by 90 percent, slashing it to $200k from $2 million.

SECTION 2

Safer, Smarter, Skilled-Up: What AI Can Do for American Workers

Skilled workers are the backbone of American manufacturing, and AI is helping ensure they remain central to the industry's future. When thoughtfully deployed, AI supports workers by simplifying complex tasks, improving safety, and accelerating training. These tools strengthen career resilience and make modern manufacturing more attractive to the next generation. As BSA emphasizes in its US Enterprise AI Adoption Agenda,[11] "AI can augment human capabilities and drive innovation, productivity, and opportunity across the economy."

AI increasingly serves as a copilot, giving workers the right information at the right moment. These tools help close generational knowledge gaps, enabling new workers to learn from experienced colleagues and adapt to evolving technologies. Designers and engineers can iterate faster with digital insights. Technicians can diagnose and resolve issues without searching through thousands of pages of documentation. Operators can adapt confidently to new processes with real-time guidance.

Through predictive maintenance and round-the-clock monitoring, AI minimizes costly equipment downtime—estimated at $36,000 per hour in the fast-moving consumer goods sector and $2.3 million per hour in automotive manufacturing, according to the Siemens True Cost of Downtime 2024 report.[12] At the same time, AI strengthens cybersecurity and asset management, giving workers the tools to safeguard data and systems across increasingly connected industrial environments.

Skilled workers are critical to the revitalization and technological success of American manufacturing. Investing to help American workers thrive in the AI era while ensuring that progress delivers shared economic growth will pay dividends. Software-driven innovation is critical to unlocking human potential. By pairing digital transformation with workforce investment, manufacturers can ensure that technological progress delivers shared economic benefits, rewarding skilled work and supporting regional economies across the United States.

But infrastructure and tools alone are not enough. Without a robust pipeline of AI-enabled workers, US manufacturers risk falling behind global competitors. Autodesk's 2025 State of Design & Make (D&M) report[13] shows that 59 percent of business leaders in D&M now say lack of access to skilled talent is a barrier to their company's growth, up sharply from 44 percent the year before. Nearly two-thirds (62 percent) say new employees with the right technical skills are hard to find, and 47 percent report having to let people go because they lack needed technical skills—intensifying the pressure on already stretched teams.

Looking ahead, manufacturers recognize that AI capability itself is becoming a core job requirement: 47 percent of leaders in D&M say the ability to work with AI will be a top hiring priority in the coming years. That means the AI ecosystem America builds has to include not only physical infrastructure, but also training, upskilling, and workforce pathways that ensure workers can safely and effectively use these tools. Without AI-capable workers, AI infrastructure will be underused and US competitiveness will suffer.

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Microsoft

Flying High With AI-Assisted Pilot Training

Boeing is pioneering a new era in aviation training by harnessing **Microsoft**'s cutting-edge cloud and simulation technologies. Through the launch of its Virtual Airplane Procedures Trainer (VAPT),[14] Boeing leverages Microsoft Azure and Flight Simulator to deliver immersive, flexible, and highly accessible training experiences for pilots and flight teams. This innovative platform empowers users to practice procedures on lightweight devices from anywhere, while intuitive authoring tools enable rapid customization and deployment of lessons. By integrating Microsoft's technology, Boeing is advancing efficiency, consistency, and safety in pilot training. This partnership accelerates digital transformation in aerospace and equips the workforce to meet the demands of modern aviation with confidence.

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SIEMENS

A Clear Win for AI Innovation

You can see right through what Dutch company Sollas does: the clear plastic that encloses cosmetic, pharmaceutical, and confectionary products worldwide is applied by machines they make. They used AI to take this to a whole new level of performance, enabling them to wrap 160 cosmetics boxes per minute; until recently, the machines were able to wrap "only" 120 boxes per minute.

"We wanted to go from 120 to 160 products per minute, but we were having trouble," explains Engineering Manager Dirk Verbeek from Sollas. "The machine's mechanics could handle it, but not the packaging foil. We just couldn't get the control software to work in such a way that the film was unrolled evenly."

They went to **Siemens**, who used AI to create a neural network[15] that directly controls a part of the packaging machine. First, they made a digital twin of the machine, to train the neural network via reinforcement learning. Through this approach, an optimized AI-based control is automatically identified without the need for any additional data.

"The technician who worked on the machine didn't know that the machine had been updated with an AI-based control," says Verbeek. "The AI was integrated into the existing program seamlessly." Thanks to AI, the machine's throughput was increased by 33 percent, without a single adjustment to the physical hardware.

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The Sweet Taste of Cybersecurity Success

Just as some of us like to keep our candy well hidden, stashing Mars bars, Skittles, Snickers, and Twixes in secret locations, the company that makes these sweet treats takes a robust approach to cybersecurity. From its global headquarters in McLean, Virginia, Mars runs industrial equipment throughout 124 global sites, but at the same time mandates that critical operational technology (OT) devices remain disconnected from the internet.

After assessing available options, Mars chose **Microsoft** Defender for IoT.[16] Rick Nicola, Senior Industrial Cyber Security Engineer at Mars, describes an intensive search for the right solution. "The diversity of our factories and the different levels of expertise in the IT teams at each one makes it challenging to provide standardized security," he says. Fortunately, his extensive experience working directly with associates on the factory floors had seeded trust. "The associates in our factories recognized the need, but their normal to-do lists are long," he explains. "Ensuring that they understood why this was such a high priority was key to our Defender for IoT rollout's success."

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ATLASSIAN

Driven by Luxury...and AI

Newark, California's Lucid Motors manufactures the Lucid Air, a state-of-the art luxury sedan, featuring a California-inspired design underpinned by race-proven technology. They turned to **Atlassian**[17] to help them steer them on this journey. Using Jira, Confluence, and Jira Service Management will support Lucid's aggressive plans for growth and enable the kind of seamless collaboration needed to innovate in a constantly changing industry.

"I'm fortunate to work with incredibly smart people, each of whom has a different kind of expertise, sometimes from a different industry," says Lucid's Atlassian Service Owner Laurent Bordier. "Collectively, we're able to transform all that knowledge into a unique product that will set a new luxury car standard. To achieve that, we need to assure high quality, share knowledge effectively, collaborate seamlessly, and optimize all of our internal processes. Atlassian does all that and more."

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Working Better, Faster, Together

Siemens and **Microsoft** have joined forces to bring generative AI to the heart of industrial automation with Siemens Industrial Copilot. This AI-powered assistant helps engineers and frontline workers generate, optimize, and debug complex automation code in minutes, accelerating innovation and reducing downtime across manufacturing and other sectors. Built on Siemens' Xcelerator platform and Microsoft Azure OpenAI Service, Industrial Copilot integrates seamlessly with tools like Microsoft Teams to enable real-time collaboration. Already adopted by leading companies such as Schaeffler and thyssenkrupp, the partnership aims to make industrial AI accessible at scale—empowering businesses to boost productivity, address skilled labor shortages, and drive sustainable growth.

SECTION 3

An AI Ecosystem for America

AI will help determine whether the United States remains a global manufacturing leader. To capture that opportunity, America must build and maintain the full ecosystem that AI depends on: modern data centers, resilient and affordable energy, secure connectivity, and widespread access to digital design and manufacturing tools. BSA's US AI Adoption Agenda[18] identifies data and infrastructure as core pillars of AI adoption, urging policymakers to lease federal land, modernize permitting, and address the full range of infrastructure requirements—from data centers and broadband networks to energy systems—that enable AI development and deployment.

At the same time, manufacturers themselves are central to this transformation. They produce the advanced components, machinery, and systems that underpin AI infrastructure, and they are using AI to design and operate that infrastructure more efficiently and sustainably. According to the 2025 Autodesk State of Design & Make report, most D&M organizations say their digital transformation initiatives have already delivered more than a 50 percent return in innovation, productivity, or other key areas.

These are more than marginal efficiency tweaks. In D&M, an estimated 80 percent of a product's environmental impact is influenced by decisions made at the design stage, meaning AI-powered design and simulation can have outsized impact on material use, product performance, and lifecycle emissions. When manufacturers apply AI early and while products and facilities are still on the digital drawing board, they can reduce waste, improve energy performance, and build more resilient supply chains from the start.

Across the country, companies are already demonstrating what is possible when advanced infrastructure and skilled people come together.

Additionally, a recent NAM survey[19] shows that 80 percent of manufacturers want the Trump administration and Congress to advance comprehensive permitting reform to accelerate infrastructure modernization—supporting both AI growth and the broader industrial economy.

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An AI Miracle in the Midwest

In the heart of the American Midwest, a modern marvel is rising. **Microsoft** has nearly completed building Fairwater, the world's most powerful AI datacenter,[20] in Mount Pleasant, Wisconsin. As well as being an astounding technological feat, the data center is a promise to invest and create opportunities for Wisconsin and for the nation.

Fairwater is due to come online in early 2026, fulfilling Microsoft's initial $3.3 billion investment pledge. "We've already begun hiring full-time employees to support its operation…Engineered to train the next decade of artificial intelligence, our Mount Pleasant facility will house hundreds of thousands of the world's most powerful NVIDIA GPUs, operating in seamless clusters connected by enough fiber to wrap the planet four times over," says Brad Smith, Microsoft Vice Chair and President. These processors will handle training for frontier AI models—delivering 10 times the performance of today's fastest supercomputers.

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Solstice, Equinox, and an AI Zenith

NVIDIA and **Oracle** recently announced plans to build the US Department of Energy's (DOE) largest AI supercomputer to dramatically accelerate scientific discovery. The Solstice system will feature a record-breaking 100,000 NVIDIA Blackwell GPUs and support the DOE's mission of developing AI capabilities to drive technological leadership across US security, science, and energy applications. Another system, Equinox, will include 10,000 NVIDIA Blackwell GPUs and is expected to be available in the first half of 2026.

"At Oracle, we are proud to partner with the Department of Energy to deliver sovereign, high-performance AI capabilities," said Clay Magouyrk, CEO of Oracle. "Our collaboration at Argonne, tapping into the power of OCI [Oracle Cloud Infrastructure], will provide a critical resource to address the nation's most complex challenges and accelerate the next wave of scientific breakthroughs."[21] The AI supercomputers will serve as the foundation for a larger-scale collaboration across science, energy, and national security to deploy next-generation infrastructure and further secure US leadership in AI for decades to come.

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salesforce

Finding Out What Gets Customers Buzzing

Schneider Electric—which has a WEF Global Lighthouse smart factory in Lexington, Kentucky—offers electrification, automation and digitization to smart industries, resilient infrastructure, future-proof data centers, intelligent buildings, and intuitive homes. It provides AI-enabled industrial IoT solutions through connected products, automation, software, and services, and creates digital twins to enable profitable growth for our customers.

To know what customers really think, Schneider turned to **Salesforce**[22] to enhance its customer relationship management (CRM) platform with AI tools. The tool ingests data from a wide range of sources—including accounts, orders, customer assets, and even IoT data from those assets—to identify clients that may need to upgrade, modernize, or replace their systems.

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Unlocking Lockheed Martin's AI Potential

Lockheed Martin—a global leader in aerospace and defense technology—teamed up with IBM to transform its business with AI, starting with its valuable but disconnected data. With the help of **IBM**, Lockheed Martin streamlined its data landscape[23] and overcame the complexities of data integration, by going from 46 systems to a single integrated platform.

With the help of IBM, Lockheed Martin replaced those systems with a single, connected and accessible environment. Accessible data fueled the Lockheed Martin AI Factory, a secure AI ecosystem where 10,000 engineers can build, iterate on, and deploy large-scale AI solutions—fast. IBM® Granite®, a family of open AI models, accelerates application deployment within the AI Factory, so engineers can rapidly rollout intelligent solutions at scale.

Conclusion

AI provides the ability to transform large amounts of complex manufacturing data into actionable and insightful information. These insights can transform the ways products are designed and factories and production lines function, improve the daily lives of workers, and expand America's energy networks and infrastructure capacity.

Manufacturers are already investing and proving that digital transformation can unlock new growth. They are designing smarter, building faster, strengthening sustainability, and bringing critical production back to the United States. What they need now is an ecosystem that keeps pace: modern AI infrastructure that can support widespread deployment, resilient and sustainable supply chains that support economic security, and a workforce equipped with the technical skills required to lead. As Autodesk's State of Design & Make Report shows, the ability to work with AI is rapidly becoming a core manufacturing job requirement, and without robust support for training, development, and adoption readiness, America risks leaving potential on the table.

Federal policy has a critical role to play. With the right support and a forward-looking regulatory environment, the United States can accelerate national competitiveness, empower workers through new pathways into high-skill manufacturing roles, and fuel innovation by enabling responsible, trusted AI adoption across the sector. The expanding use cases of AI in manufacturing—on the shop floor and beyond—require a regulatory environment that is optimized for the development and deployment of these groundbreaking technologies.

"We have a tremendous opportunity to realize our collective mission to revitalize American manufacturing," Autodesk Executive Vice President Jeff Kinder told the House Committee on Energy and Commerce. "Embracing AI will increase innovation and productivity, strengthen the competitiveness of American manufacturing, and fuel long-term economic growth and prosperity."[24]

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dtninfo@bsa.org

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