SPOTLIGHT

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AI is revolutionizing manufacturing by enhancing efficiency, decision-making, and operational visibility. Prioritizing scalable AI investments and careful AI implementation and application will drive optimal AI-driven data strategies.

A Strategic Approach for AI Implementation in Discrete Manufacturing

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Introduction

The manufacturing industry continues to experience major transformations due to Industry 4.0, utilizing advanced technologies such as automation, the Internet of Things (IoT), AI, and data analytics. These innovations drive digital transformation, enhance efficiency, and create smarter, more connected production systems. The manufacturing sector increasingly prioritizes digital transformation to tackle supply chain disruptions, improve productivity, reduce costs and waste, and enhance operational efficiency while meeting customer demands.

Figure 1 illustrates how manufacturing leaders focus on investments in emerging technologies, particularly AI, to improve operational efficiency, enhance decision-making, and provide comprehensive end-to-end visibility.

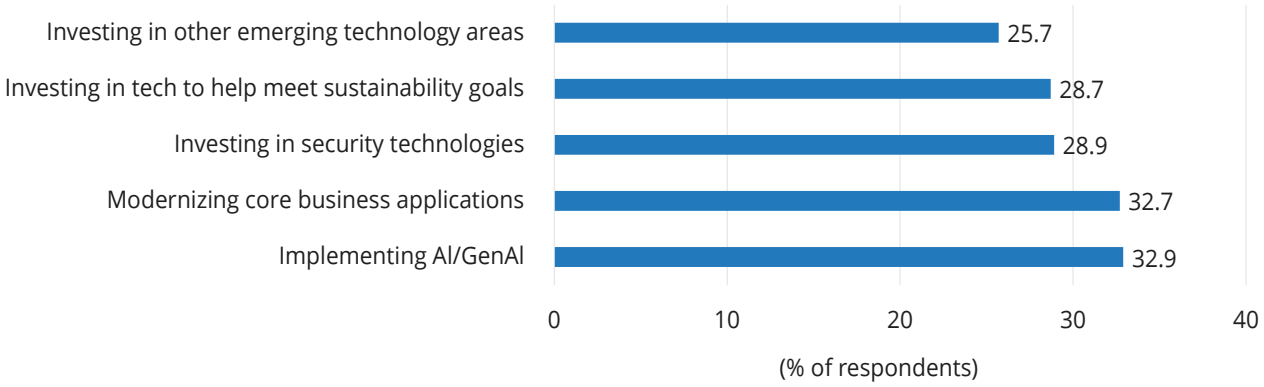
AT A GLANCE

KEY TAKEAWAY

AI-driven data strategies are revolutionizing manufacturing by facilitating smarter decision-making, enhancing resiliency, and accelerating innovation. To maximize data initiatives and ensure resilience and competitiveness in an increasingly complex market, manufacturers must adopt scalable AI solutions and invest in workforce upskilling.

FIGURE 1: ***Organizations' Top Technology Priorities***

Q *What are your organization's top technology priorities for the next 12 months?*



n = 119 for manufacturing

Source: IDC's Worldwide C-Suite Tech Survey, 2024

C-level executives understand that AI-powered insights enhance supply chain management and support predictive maintenance, thereby improving product quality in real time. This focus on optimization is further driven by talent and labor challenges that are pushing organizations to prioritize process and task automation. There is also a noticeable shift toward generative AI (GenAI) occurring. In IDC's February 2025 *Future Enterprise Resiliency and Spending Survey, Wave 1*, 41.2% of manufacturers indicated their AI investment plans were focused on GenAI, indicating a maturity in AI technology and its readiness for broader adoption. This transition could lead to innovative approaches that enable organizations to enhance their operations and interact with customers. Key capabilities of AI-driven design for manufacturing typically include automated coding, scenario simulations, and predictive maintenance. As AI operationalization accelerates, manufacturers are integrating technologies such as digital twins, edge AI, and automated analytics to gain deeper visibility into operations. This shift reflects a broader trend where AI is a strategic initiative and a core component of digital transformation efforts, ensuring resilience and competitiveness in an increasingly complex market.

The Importance of AI-Driven Data Strategies

AI-driven data strategies are transforming the manufacturing industry, enabling smarter decision-making, improving resiliency, and accelerating innovation. By leveraging AI-powered querying, predictive analytics, and real-time data processing, manufacturers can detect anomalies faster, efficiently investigate root causes, and optimize operations with precision. These capabilities enhance supply chain visibility, minimize downtime through predictive maintenance, and drive operational efficiency. In addition, driven by recent moves toward software-defined manufacturing to optimize and automate production processes, AI can foster a stronger ecosystem by integrating suppliers, partners, and customers into a data-driven framework to facilitate a more seamless collaboration and partnership.

However, implementing AI-driven strategies creates challenges, including high up-front costs, uncertainty about where to start, and the need to address industry-specific constraints such as legacy systems and data silos. Manufacturers must prioritize investments in scalable AI solutions and upskill their workforce to maximize value from data initiatives.

Discrete Versus Process Manufacturing

Manufacturing includes various production methods, such as process and discrete manufacturing, to efficiently create products at scale:

- **Process manufacturing** typically combines raw materials or ingredients per a formula or a recipe. The final product does not typically disassemble back into its original components and often exists in liquid, powder, or bulk form. Examples of process manufacturing include pharmaceuticals, foods and beverages, and chemicals.
- **Discrete manufacturing** focuses on producing distinct, countable products by assembling individual parts and components. The final product typically allows disassembly into its original components. Examples include automobiles, electronics, aerospace products, and furniture.

Between the two, discrete manufacturers tend to be more advanced in AI adoption and leverage well-defined metrics to evaluate success. IDC's 2024 *Future Enterprise Resiliency and Spending Survey* revealed that discrete manufacturers had higher maturity in AI adoption and the greatest ROI from GenAI use cases with predictive analytics, automation, and innovation.

However, discrete manufacturing faces unique challenges, including complex supply chains, frequent design changes, and high variability in production processes. Their AI strategies must address these intricacies by integrating real-time data from IoT sensors, optimizing production schedules, and ensuring quality control. As a result, data needs are diverse, requiring structured data models, advanced analytics, and scalable AI solutions to support operational agility and competitiveness.

Types of AI in Manufacturing

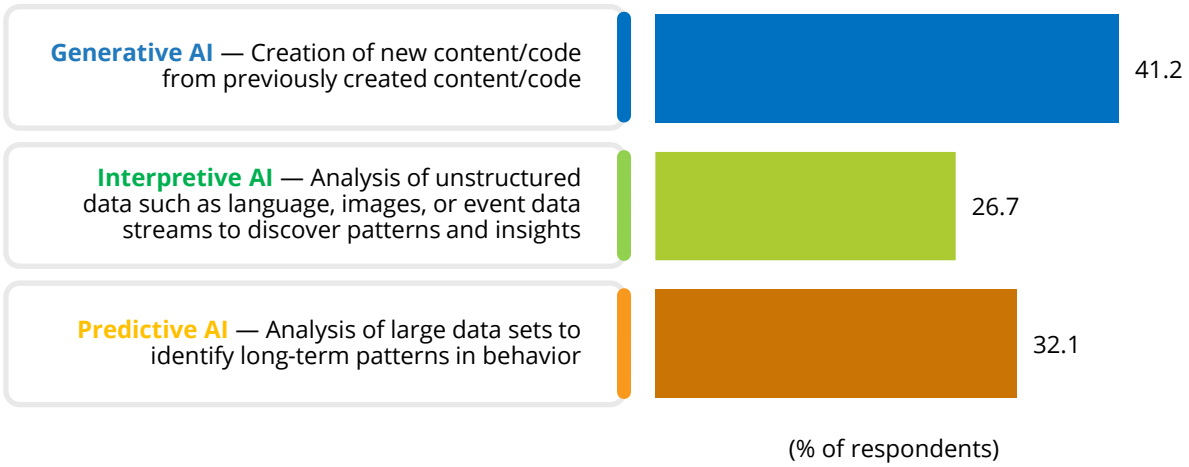
AI in manufacturing falls under three categories: predictive AI, interpretive AI, and GenAI. Each type plays a distinct role in enhancing efficiency, decision-making, and innovation across manufacturing operations:

- **Predictive AI** analyzes historical and real-time data alongside statistical models and machine learning algorithms to predict future outcomes. Organizations commonly use predictive AI in demand forecasting, predictive maintenance, risk assessments, and quality control. This technology allows businesses to anticipate potential issues and enhance their decision-making processes.
- **Interpretive AI** focuses on understanding, analyzing, and extracting insights from complex data such as text, images, and speech. It powers applications, including natural language processing, defect detection, sentiment and real-time analysis, and computer vision, to help businesses make sense of unstructured data for informed decision-making.
- **GenAI** generates new content, including text, images, and code, by recognizing patterns learned from training data. Organizations use generative AI in various areas, such as automated content creation, design optimization, knowledge management, and data generation. It helps businesses accelerate innovation and enhance creativity.

According to IDC's February 2025 *Future Enterprise Resiliency and Spending Survey,* manufacturers are shifting their focus on AI investments. While their emphasis was on interpretive AI in 2024, they will direct most of their AI investments toward GenAI in 2025 (see Figure 2). This showcases the maturity of the manufacturing industry and signals an increased readiness for wider AI adoption.

FIGURE 2: ***AI Investments Focus, 2025***

Q What is your best estimate of how your total 2025 investments in AI-related development, data, and infrastructure assets will be allocated across the following?



n = 127 for worldwide

Source: IDC's Future Enterprise Resiliency and Spending Survey, Wave 1, February 2025

Optimizing AI: Getting Started with AI in Discrete Manufacturing

To optimize AI in discrete manufacturing, businesses must establish clear business objectives and identify data sources to ensure alignment with AI initiatives and strategic business goals, such as improving production efficiency, reducing downtime, and enhancing demand forecasting.

Building an AI-ready infrastructure is crucial and requires investments in cloud computing, IoT integration, and data management systems to support real-time analytics. Skills development and change management are also essential, as workforce training and leadership buy-in are key to successful AI adoption.

The right AI tools and technology partners are important for scalability and long-term impact. Promoting cross-functional collaboration among IT, operations, and data science teams encourages AI-driven decision-making.

Manufacturers must continuously measure ROI, refine AI strategies based on performance insights, and adapt to changing business needs to sustain value. This approach ensures that AI remains a powerful enabler of agility and competitiveness in discrete manufacturing.

Use Case Approach

As discrete manufacturers evaluate AI implementation, they should take a structured, use case–driven approach, starting with a clear project scope. This involves defining the purpose and objectives of AI adoption to align with business goals

such as improving efficiency and reducing downtime. Identifying AI's business value, including cost savings or quality improvements, is crucial to securing executive support.

Moreover, it is important to understand the necessary data and map its flow for seamless integration. Manufacturers should develop a proof of concept by focusing on high-impact, measurable use cases such as predictive maintenance or AI-driven quality control.

An agile approach with iterative improvements and phased deployment helps refine AI models and expand successful pilots. Gradually scaling AI from small projects to broader initiatives enables manufacturers to minimize risks and enhance ROI, laying a strong foundation for AI-driven innovation.

Applications for AI in Discrete Manufacturing

AI is transforming discrete manufacturing through various applications that enhance prediction capabilities, enable real-time simulations, optimize operations, automate workflows, and improve customization in production. This section provides some AI applications that discrete manufacturers are currently exploring.

Prediction: Demand Forecasting and Predictive Maintenance

AI-driven demand forecasting uses machine learning to analyze historical sales data, enhancing the accuracy of future predictions. This helps manufacturers optimize production and reduce excess inventory. Predictive maintenance with AI and IoT sensors monitors equipment health in real time, detecting potential failures early and reducing downtime and maintenance costs.

Simulation: Digital Twins and Production Line Optimization

Digital twin technology creates virtual replicas of physical assets, enabling manufacturers to simulate production scenarios to improve designs and optimize layouts. AI-driven production line optimization analyzes machine performance and workflow to enhance efficiency.

Optimization: Scheduling and Inventory Management

AI-driven scheduling algorithms enhance production planning by dynamically adjusting to fluctuations in demand, labor availability, and machine capacity. Intelligent inventory management systems leverage AI to optimize stock levels, preventing shortages or overstock while improving supply chain efficiency.

Automation: Robotics, Quality Control, and Intelligent Workflows

Digital twin technology creates virtual replicas of physical assets, helping manufacturers simulate production scenarios to enhance product designs, optimize layouts, and identify inefficiencies. AI-driven optimization analyzes machine performance, worker productivity, and workflow bottlenecks to ensure smooth manufacturing processes.

AI-Driven Customization and Supply Chain Responsiveness

AI enhances mass customization in configure-to-order and make-to-order models by analyzing customer preferences and automating design changes. This results in improved lead times, greater production flexibility, and optimized supply chain responsiveness while providing real-time insights to anticipate demand shifts and personalize products effectively.

AI is driving significant advancements in discrete manufacturing by improving efficiency, reducing operational costs, and enabling greater agility in production. As AI technologies evolve, manufacturers that integrate AI-driven decision-making, automation, and predictive analytics will gain a competitive edge in an increasingly dynamic market.

Data Security and AI Governance

AI adoption in discrete manufacturing poses data integrity, privacy, and regulatory compliance challenges. In IDC's *2024 Worldwide C-Suite Tech Survey*, leaders reported security and risk management concerns as their top hurdles, highlighting the need for responsible and ethical AI frameworks and data management practices to enable the successful adoption of new technologies. Ensuring high-quality and accurate data is crucial, as the reliability of AI-driven insights depends on the quality of data they have training on.

Privacy concerns arise from collecting and using sensitive customer and operational data, requiring compliance with strict data protection regulations. Furthermore, the increasing reliance on AI and connected systems heightens cybersecurity risks, making it essential for manufacturers to implement robust security measures to prevent data breaches, intellectual property theft, and operational disruptions.

Considering Splunk

Splunk AI is designed to empower security operations, ITOps, and engineering teams with domain-specific generative and agentic AI technologies. The solution aims to accelerate detection, investigation, and response times from hours to minutes with automated workflows and predictive insights. Splunk AI helps reduce alert fatigue, enhance visibility, and boost productivity. Organizations can use the solution to stay ahead of AI-driven threats and make informed decisions with instant data insights.

Challenges

Implementing AI in discrete manufacturing poses several challenges, including high initial costs, integration complexities, and lack of workforce readiness. Many manufacturers find it challenging to transition from legacy systems that do not have the necessary infrastructure to support AI-driven automation and analytics as they often rely on a mix of legacy applications that may not easily integrate with modern data analytics solutions like Splunk. This may lead to deployment complexities, higher integration costs, and delays in gaining actionable insights. Manufacturers will need to work closely with the Splunk team to ensure they have the right implementation road map and connectors to ensure smooth data flow and ingestion to gain access to real-time operational insights.

Poor and inconsistent data quality and lack of availability are also significant obstacles, as AI models require clean, structured, and comprehensive data sets to generate accurate insights. Manufacturers will need to ensure they have proper data management practices in place along with strict governance frameworks.

Conclusion

AI-driven data strategies are transforming manufacturing by enabling smarter decision-making, enhancing resilience, and accelerating innovation. While discrete manufacturing is further advanced in AI adoption compared with process manufacturing, it faces unique challenges such as complex supply chains and high variability in production processes. Its AI strategies must integrate real-time data, optimize production schedules, and ensure quality control.

The following are some strategic recommendations for AI adoption:

- Prioritize investments in scalable AI solutions and upskill the workforce to maximize value from AI-driven data strategies.
- Establish clear business objectives and identify data sources to align AI initiatives with strategic goals, such as improving production efficiency, reducing downtime, and enhancing demand forecasting.
- Implement robust security measures and ethical AI frameworks to address data integrity, privacy, and regulatory compliance challenges, ensuring the reliability of AI-driven insights and protecting against cybersecurity risks.
- Adopt a structured, use case–driven approach for AI implementation, starting with high-impact, measurable projects like predictive maintenance or AI-driven quality control and gradually scale AI initiatives to minimize risks and enhance ROI.

AI is driving remarkable advancements in discrete manufacturing, improving efficiency, cutting costs, and enabling greater agility. It offers organizations a significant opportunity to achieve competitive advantage in a progressively digital and automated manufacturing landscape.

Manufacturers that adopt AI-driven strategies will secure a competitive edge, ensuring resilience and competitiveness in a more complex market, where focusing on automating tasks and processes remains a crucial aspect of business growth.

About the Analyst

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Sarah Lee is research director for IDC's Manufacturing Insights responsible for the IT Priorities and Strategies (ITP&S) practice. Lee's core research coverage includes IT investments made across the manufacturing industry and manufacturers' progress with digital transformation. Based on her background covering the manufacturing space, Lee's research also includes an emphasis on the technology enablers that help manufacturing executives make better informed operational decisions.

MESSAGE FROM THE SPONSOR

Manufacturers must keep operations running smoothly while defending against cyber threats and costly downtime. AI and ML-driven observability and security solutions are essential to stay ahead of risks. Splunk's unified platform leverages AI and ML to detect anomalies, correlate events, and accelerate incident response — turning chaos into clarity in today's data-driven manufacturing landscape.

With AI-powered insights, manufacturers detect threats faster, reduce downtime costs, and improve IT operations efficiency. Machine learning pinpoints anomalies, accelerates root cause analysis, and automates responses — freeing teams from firefighting to focus on innovation. Bosch Manufacturing Solutions cut query times from 15 minutes to 20 seconds using Splunk — a game-changer for operational agility.

Splunk eliminates data silos, reduces alert fatigue, and delivers full-stack observability. Whether securing supply chains, optimizing production, or preventing outages, Splunk's AI-driven analytics provide a competitive edge.

Manufacturing is complex. Managing it doesn't have to be. Explore Splunk today.

For more information, please visit www.splunk.com/manufacturing.

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