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AI in Manufacturing From Automation to Transformation

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Manufacturing is at a defining inflection point. AI is no longer an incremental efficiency lever but a catalyst reshaping how value is created across the industrial ecosystem. PwC estimates that AI could contribute USD 15.7 trillion to the global GDP by 2030, underscoring its role as one of the most transformative forces of our time.¹ The adoption of AI in the global manufacturing market is projected to grow from USD 8.57 to USD 230.95 billion by 2034, expanding at a CAGR of 44.2%.² manufacturing market is projected to grow from USD 8.57 to USD 230.95 billion by 2034, expanding at a CAGR of 44.2%.²

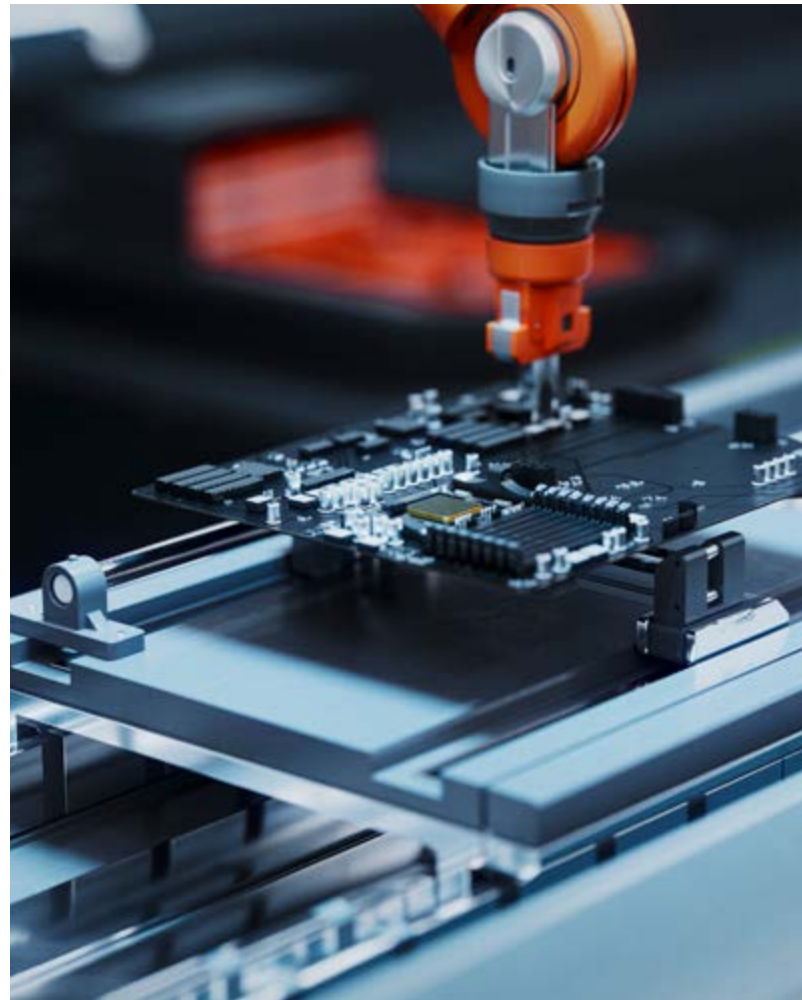
What began as a push for automation is rapidly evolving into a broader reinvention of factories, product engineering, and supply chain responsiveness. AI and Generative AI are no longer future-facing experiments. They are strategic imperatives for resilience, sustainability, and competitive differentiation.

This point of view explores how AI is redefining manufacturing, from operational disruption to human-machine collaboration, and what it means for leaders shaping the next industrial era.

The AI Revolution: From Human-Centric to AI-Augmented Manufacturing

Manufacturing began as labor-intensive, relying on skilled manual effort. The Industrial Revolution brought machines, reducing manual labor while retaining human oversight. Industry 4.0 introduced AI-led technology, further pushing boundaries. AI now augments some human roles, accurately predicts outcomes, and automates tasks with precision. It delivers actionable insights through predictive analysis, letting humans focus on high-concept innovation and complex problem-solving.

Manufacturing has shifted from manual processes to mechanization and, more recently, to AI in industrial automation. Today, manufacturers proactively use AI to generate predictive insights, enable real-time decision-making, and develop creative solutions at scale. Generative AI in manufacturing is transformative, reshaping processes and enabling greater efficiency, precision, and innovation. Unlike traditional AI, Generative AI designs products, optimizes workflows, and generates compliance documentation. This intelligence compresses innovation cycles, accelerates time-to-market, and redefines how manufacturing value is created.³



Top AI and Generative AI Disruptions Driving the Shift in Manufacturing

Manufacturing is undergoing a fundamental transformation driven by rapid AI adoption across the value chain. From shop floors to supply networks, AI is reshaping operations, product design, and fulfillment models to respond faster to market volatility.

AI-driven predictive analytics is reducing downtime, while intelligent systems are enabling seamless human-machine collaboration. Together, these capabilities unlock new levels of efficiency, agility, and creative problem-solving. Manufacturers that operationalize these disruptions position themselves as leaders in the next industrial evolution.



Predictive Maintenance

AI continuously monitors equipment, detects anomalies, and predicts failures—reducing downtime and extending machinery lifespan while saving operational costs.



Smart Supply Chain Management

AI-powered systems optimize inventory, forecast demand, and automate logistics, enabling manufacturers to adapt quickly to changing markets.



Generative Design

Generative AI creates a wide range of product prototypes, accelerating innovation and helping select the most efficient, creative designs.



AI-Powered Quality Control

Computer vision inspects products with high precision, minimizing defects and ensuring rigorous quality standards.



Human-Machine Collaboration

AI platforms empower employees with real-time insights, enhancing decision-making and fostering effective collaboration between humans and intelligent systems.

Predictive Maintenance

AI algorithms uninterruptedly monitor processes and equipment. AI helps detect anomalies with greater accuracy and predict failures before they occur. This helps in reducing downtime significantly and extending the lifespan of machinery, saving operational costs up to 41%.⁴

Smart Supply Chain Management

The adoption of AI-enabled systems optimizes inventory, forecasts customer demand, and automates logistics and supply chain. AI-driven solutions ensure seamless production and supply chain operations. This helps manufacturers in adapting to volatile markets with agility.

Generative Design

The use of Generative AI in manufacturing processes improves product design quality. AI helps in generating a wide range of prototypes based on specified criteria. As a Business Creativity partner, LTM has enabled a global engineering products manufacturer to select the most efficient and innovative designs.

AI-Powered Quality Control

Computer vision, powered by AI, inspects products with unmatched precision. This helps in reducing defects significantly and maintaining rigorous quality standards.

Human-Machine Collaboration

The adoption of AI platforms and tools empowers employees with real-time insights. AI helps improve decision-making, fostering a collaborative setting between humans and intelligent systems.

Futuristic AI Trends to Watch for

As AI and generative AI continue to advance at a rapid pace, the manufacturing sector stands on the brink of profound transformation. Forward-thinking manufacturers must keep a close eye on the latest AI-driven trends that are set to redefine how products are designed, produced, and delivered. These emerging trends promise to boost efficiency and innovation and challenge organizations to rethink their strategies around personalization, automation, ethics, security, and sustainability. Staying ahead of these developments will be crucial for manufacturers aiming to maintain a competitive edge and build resilient, future-ready operations in an increasingly digital and dynamic industrial landscape.



Hyper-Personalization

AI enables mass customization, tailoring products to individual customer preferences at scale.



Autonomous Factories

AI-driven systems manage end-to-end operations, paving the way for 24/7 smart factories with minimal human intervention.



Ethical AI in Manufacturing

Focus on adopting responsible AI ensures transparency, fairness, and a positive workforce impact.



Cybersecurity Advancements

Enhanced security frameworks protect interconnected AI systems and sensitive manufacturing data.



Green AI Initiatives

AI optimizes energy use and reduces waste, supporting sustainable and environmentally friendly manufacturing.

- 1. Hyper-Personalization in Manufacturing**
AI enables manufacturers to produce highly customized products based on consumer preferences and customer demands by leveraging data analytics to drive client personalization on a large scale.
- 2. Autonomous Factories**
AI systems take complete control of operations in fully autonomous factories with minimal human intervention. These AI-enabled smart factories operate 24/7, optimizing efficiency and reducing costs.
- 3. Ethical AI in Manufacturing**
With the growing influence of AI and Gen AI, ethical deliberations around data usage, decision-making transparency, and workforce impact would become imperative. Modern manufacturers must invest in AI-driven frameworks ensuring responsible AI integration.
- 4. Cybersecurity Advancements**
The interlinked nature of AI systems demands robust cybersecurity measures to protect sensitive data. These advancements will prevent interruptions in manufacturing processes.
- 5. Green AI Initiatives**
AI plays an essential role in sustainable manufacturing and helps optimize energy consumption and reduce wastage. Manufacturers must increasingly align novel AI strategies with their environmental and sustainability goals.

Key Challenges in AI Augmentation

AI solutions offer immense promise for the manufacturing landscape. Yet, its adoption comes with considerable challenges. Manufacturers must invest in advanced technologies and address workforce skill gaps. They need to ensure high-quality data as an input to AI. With the advent of AI, managing ethical concerns around job impacts and transparency is also a huge challenge. It is crucial to overcome cultural resistance and justify initial costs. Manufacturers are strategizing heavily to overcome the barriers in realizing AI's full potential and vigorously working towards building a future-ready AI-driven manufacturing environment.

Key Challenges in AI Augmentation

Skill Gap Continuous upskilling needed to leverage AI tools effectively.	Initial Investment High upfront costs can deter adoption, especially for smaller manufacturers.	Data Quality Reliable, accurate data is essential for successful AI integration.	Ethical Considerations Concerns about job displacement and decision-making transparency.	Cultural Resistance Hesitation to shift from traditional practices to AI-driven systems.
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- **Skill Gap:** The manufacturing workforce continuously needs to acquire new skills. Thus, to leverage AI tools effectively, substantial investment needs to be deployed in training, education and skill upliftment.
- **Initial Investment:** Implementing AI technologies involves sizable upfront costs. This may deter small or mid-sized manufacturers.
- **Data Quality:** AI vastly relies on the data for input. Thus, maintaining the accuracy and relevance of data becomes crucial. Several manufacturers find it challenging to integrate advanced data systems.
- **Ethical Considerations:** Manufacturers are concerned about AI's potential to replace jobs. They are also thinking deeply about the transparency of AI-driven decision-making processes.
- **Cultural Resistance:** Many employees and managements are unsure about the transition from traditional practices to AI-driven systems. There is a slight resistance for AI implementation in several organizations, if there is a lack of clarity.



Our 'AI in Action' Use Cases

Real-world use cases featuring our implemented solutions strongly demonstrate the transformative effects of AI in reimagining the manufacturing landscape. LTM has assisted a US-based elevator manufacturer in reducing service tickets by 15% via IoT and AI integration. For an aerospace leader, we helped them save over 200 hours per month with compliance automation using Generative AI. Similarly, our AI-powered surveillance solution helps a construction giant in Asia with 10,000+ safety non-compliance instances, preventing accidents before they occur.

These examples reinforce a clear truth: AI is not experimental. It is operational, measurable, and value-generating.

01

AI-powered, IoT-enabled Smart Elevators

Client

A leading US-based global manufacturer of vertical transportation systems, such as elevators, moving walkways, and escalators.

Challenge

The client struggled with fragmented legacy systems that lacked real-time analytics, predictive maintenance, scalability, disaster recovery, and persona-specific insights. This led to poor integration, limited visibility, inefficient scheduling, and complex global deployments.

LTM Solution

IoT-enabled monitoring and AI-driven predictive analytics for proactive maintenance.

Business Impact

- 15% reduction in service tickets
- 10–20% fewer maintenance hours
- Enhanced new equipment sales by 2–5%
- Increased service portfolio growth by 2–5%
- Improved customer experience

02

Generative AI for Compliance Automation

Client

A Fortune 500 multinational aerospace conglomerate that builds automation and safety solutions.

Challenge

The client struggled with inefficiencies in manually generating Tables of Compliance (TOC). This led to unnecessary delays, resource strain, and compliance risks in a highly regulated environment.

LTM Solution

Implemented a Generative AI-powered intelligent document processing solution. This automated TOC generation and helped compare product specs with customer requirements, ensuring compliance accuracy.

Business Impact

- 200+ hours saved per month
- TOC generation time reduced from days to hours
- Reduced dependency on technical consultants
- Enhanced compliance assurance and operational agility

03

AI-Powered Safety in Construction

Client

One of Asia's largest construction organizations, ranked among the world's top contractors, delivering large-scale EPC projects globally.

Challenge

The client needed a real-time AI-driven safety monitoring solution to detect PPE non-compliance and unsafe behaviors, reducing manual surveillance costs and improving workplace safety.

LTM Solution

Developed an AI-powered intelligent video analytics solution integrated with existing CCTV infrastructure to detect non-compliance, trigger alerts, and enable proactive safety measures.

Business Impact

- 10,000+ non-compliance instances detected
- Near real-time alerts for faster corrective action
- Reduced manual monitoring costs
- Scalable, modular solution for multi-site deployment



Conclusion

AI in manufacturing is not about automating tasks. It is about transforming how intelligence flows across the enterprise. When AI and Generative AI converge, factories evolve into adaptive ecosystems where human creativity and machine intelligence reinforce each other.

Manufacturers that approach AI strategically can unlock new growth pathways, build resilience, and redefine industry benchmarks. For those ready to lead, AI offers the foundation for a smarter, safer, and more sustainable manufacturing future.

It's time to Outcreate traditional manufacturing processes. For more information, write to us at mfg.communications@ltn.com.

About the Authors



Anup Karade

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Anup Karade is the Associate Vice President of AI Services at LTM, with a focus on driving and shaping LTM's intellectual capital, expertise, and industry knowledge in Artificial Intelligence and Generative AI across the country. He has held key positions, including Principal Director – Cloud Architecture and Senior Director – Cloud Architecture, where he led Azure Cloud Centers of Excellence and strategic initiatives.

His experience working with global companies in AI, cloud technologies, and digital transformation, spanning over two decades in the IT industry, has sharpened his market insight and understanding of enterprise-scale AI adoption, cloud engineering acceleration, and innovation-led business transformation.



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Ranjini Rajan Karukasseril is the Director of the Strategy & Transformation Office for Manufacturing at LTM, where she drives transformation programs that deliver measurable business outcomes for clients. With a proven track record in managing complex IT programs, Ranjini brings deep expertise in program and project management, supported by strong technical and domain knowledge across industries such as Manufacturing, Oil & Gas, Retail, Consumer Goods, and Life Sciences.

As a transformation catalyst, Ranjini is passionate about enabling real change for customers through strategic initiatives and innovation-led execution. Her experience spans cross-functional teams, ensuring operational excellence, and enhancing client satisfaction. Currently, she is spearheading initiatives to enable and adopt AI within the Manufacturing Delivery Unit, reinforcing LTM's commitment to customer-centric transformation.

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LTM is a global technology services and consulting company and the business creativity partner to the world's largest and most disruptive companies. We bring human insights and intelligent systems together to help enterprises across industries rewire their business models, accelerate innovation, and drive AI-centric growth. With our integrated operations, transformation, and business AI services, we design and deliver solutions that create new productivity paradigms and new roads to value. Together with 87,000 employees across 40 countries and our global network of hyperscaler partners, LTM — A Larsen & Toubro company — owns business outcomes for over 700 clients, helping them to not simply outperform the market, but to Outcreate it.