2025 State of **Smart Manufacturing Report**

10TH ANNUAL

Rockwell Automation

expanding **human possibility**™

Welcome

Global manufacturers share their priorities, concerns, and the next steps around how AI-powered smart manufacturing will create new opportunities—and new risks. Find out where investment trends are headed to address internal and external factors and ultimately improve quality and create sustainable growth.

Rockwell Automation

Thriving in uncertainty

How smart manufacturing and emerging tech are building resiliency and shaping the future

Leading through transformation requires both innovation and resiliency. As industrial companies navigate a complex and changing landscape, technology advancements are creating new opportunities to improve speed, productivity and agility. In this year's State of Smart Manufacturing Report leaders globally noted the important inflection point we are at – where the combined potential of people and technology will shape our future.

Industrial transformation is gaining momentum, with 56% of manufacturers piloting smart manufacturing, 20% using it at scale, and 20% planning future investments. Other trends include:

12% GROWTH in Generative and Causal AI investments

14% INCREASE in efficiency-driven sustainability efforts

5% RISE in the importance of analytical and AI skills for leaders

In the next 12 months, AI and machine learning will shape quality control, cybersecurity, and process optimization, ensuring we can take full advantage of accurate, timely data.

The insights included in this report are designed to help inform your decisions in this evolving landscape—and help us all realize the vision of a world where technology helps people reach their highest potential.

Together, with knowledge and innovation, we can move more confidently into the future, simplifying complexity and building companies that are more resilient, agile, and sustainable.

Blake Moret
Chairman and CEO, Rockwell Automation

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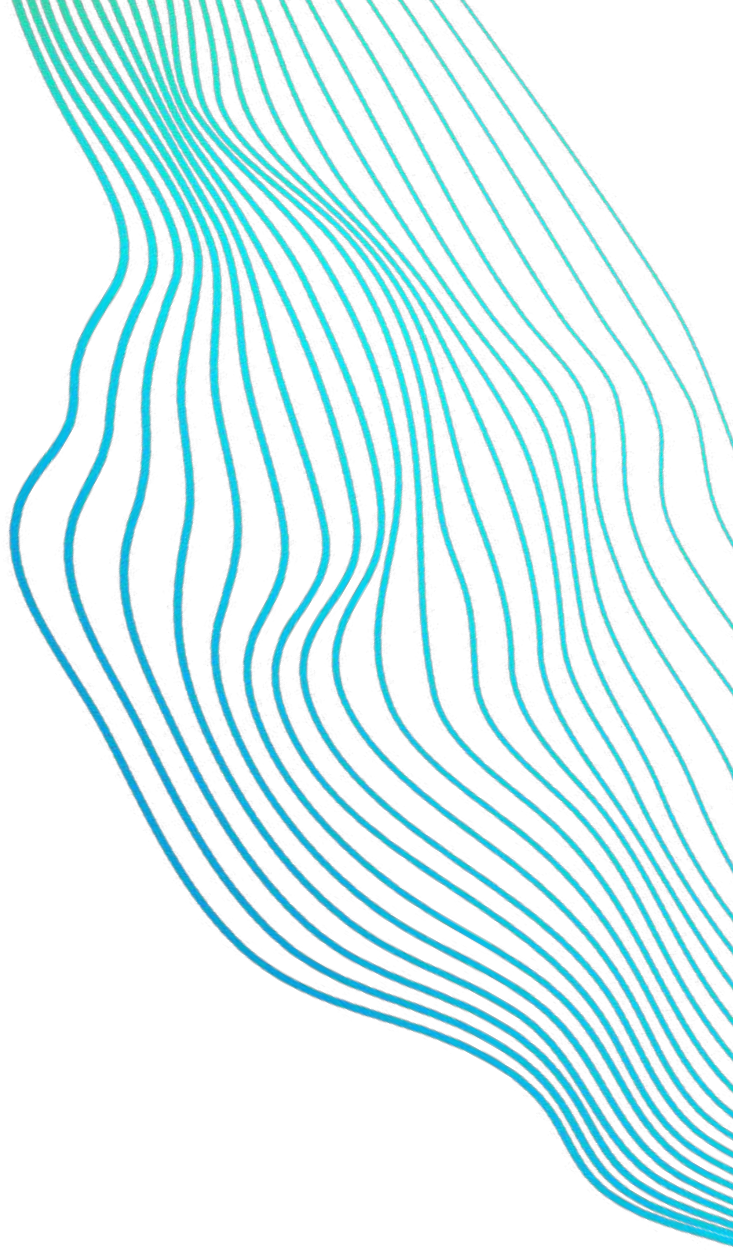


Executive Summary

I N S I G H T

AI offers a solution ... and remains a challenge.

AI is identified as a potential solution to labor shortages, skills gaps, quality control, and managing external pressures. Respondents also indicated that implementing this technology posed internal challenges. People recognize the promise of AI and have successfully deployed it for quality assurance, but continue to look for ways to alleviate pressures like the labor shortage and skills gap.

41% introducing AI/ML tech + increasing automation to fill the skills gap and labor shortages

An industry under pressure turns to smart technology.

Respondents identified inflation and slow economic growth as the biggest external obstacles to their organization's growth in the next 12 months. With geopolitical and supply chain issues, manufacturers are under extreme pressure to rapidly adapt, and many are turning to smart manufacturing technologies to address these challenges.

34% name inflation + economic growth as the biggest external obstacles for growth in the next 12 months

Smart manufacturing transformations require more people, not fewer.

While the skills gap and labor shortage remain primary business challenges, data from this year's report shows that the shift towards smart manufacturing solutions is not correlated with reduced hiring. Respondents instead asserted their organizations' plans to hire more people with technology skillsets and to retrain current employees.

83% identify analytical thinking + communication / teamwork as most important factors when recruiting the next generation

Executive Summary

I N S I G H T

Cybersecurity is an internal AND external risk.

Cybersecurity risks are a major, ever-present obstacle and a vital skill for future hiring and use cases, and ranked third in the biggest obstacles to growth in the next 12 months. More than a third of respondents identified strengthening Information Technology (IT)/Operational Technology (OT) architecture security as part of their plan to drive positive business outcomes over the next five years.

Cybersecurity jumped to #2 for external risk

Quality remains an AI use case frontrunner.

Quality is a practical AI use case right now and key to business operations and strategy. Half of respondents plan to use Artificial Intelligence/Machine Learning to support quality control in the next 12 months, and 38% will use data collected from current sources to drive product quality monitoring and improvements. Globally, 43% of respondents said product quality/safety mattered most to their sustainability program.

55%
state that improving efficiencies is a key driver to pursue sustainability – up 13% from the last survey

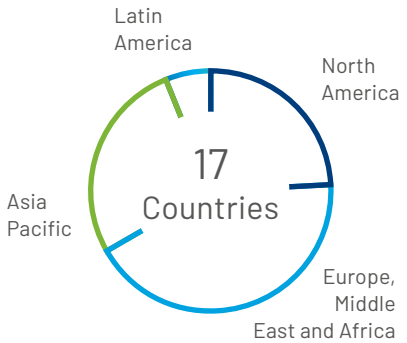
Introduction

Over 1,500 leaders in manufacturing worldwide contributed to this year's State of Smart Manufacturing Report. The survey reveals that an industry under pressure is turning to smart technology. With global risks, including tariffs and supply chain disruptions, manufacturers are under extreme pressure to adapt rapidly. Of the respondents not currently adopting smart manufacturing, 69% plan to invest in the next 12 months.

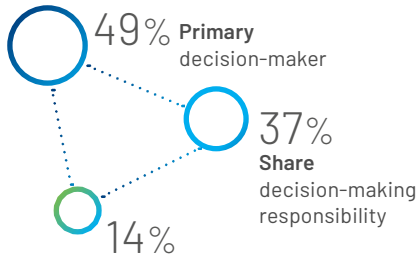
These are just a few of the important insights garnered through feedback from 1,560 decision-makers from 17 of the top manufacturing countries. More than half of these respondents (58%) work for firms with over $1B in revenue.

This report from **Rockwell Automation**, in association with **Sapio Research**, includes **a plan to start your journey** alongside the research findings to help you turn insights into action.

Geographic Split



Respondent roles



Top Industries Surveyed


20% Hi-Tech, Electronics, Semiconductor


12% CPG (Food & Beverage, Home and Personal Care)


12% Metals, Metal Fabricators, Metal Formers


9% Energy Transition, Renewable Energy

View all **survey demographics**

Growth remains a challenge. Find out why.

While improved costs pushed energy out of the top concerns, cybersecurity risks, competition, and workforce challenges joined inflation and economic growth to round out the top challenges to growth in the next 12 months.

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Obstacles: What's topping the charts?

The **main internal factors** hindering organizations from outpacing their competition remain **consistent**.

Across all job roles, perceptions of the **biggest internal obstacles have changed**. The challenges differ across regions, however the top 5 concerns are:

Internal Obstacles

	2025	2024
1	Deploying and integrating new technology	Attracting employees with desired skillsets
2	Balancing quality and profitable growth	Deploying and integrating new technology
3	Integrating smart manufacturing technology	Internal budget constraints
4	Internal budget constraints	Balancing quality and growth
5	Attracting employees with desired skillsets	Capturing and contextualizing data to improve

For the third year in a row, **inflation is the biggest external obstacle**.

Cybersecurity, which debuted in the top five of external risks last year, shot up to second place. As AI continues to expand, so do the opportunities for cyber attacks. There's growing awareness of risks to IT/OT networks from the increasing interconnectivity of digital and physical infrastructure.

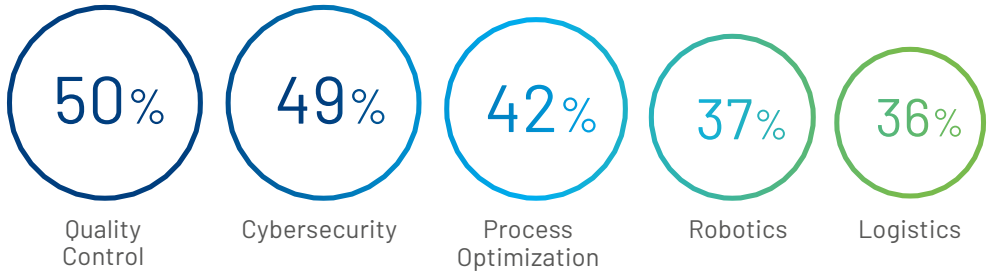
Supply chain disruption is the biggest concern for a fourth of respondents, with mining and pharmaceuticals feeling the most strain. Companies are increasingly focused on reshoring and nearshoring operations to bring production closer to customers, address persistent supply chain challenges, and mitigate the effects of global trade volatility. Emerging technologies and smart manufacturing will be key to more responsive and flexible operations, improving logistics and competitiveness in markets reliant on speed.

Workforce issues continue to rank in the top 5 for external and internal obstacles to growth. Of equal concern internally is the ability to deploy and integrate new technology. The results highlight the importance of the relationship between people and smart technology. Over half of the respondents plan to repurpose existing employees to new or different roles, suggesting that sustainable success depends on a workforce that can evolve, as training drives organizational resilience and growth.

AI's evolving role in smart manufacturing

Compared to previous survey results, more organizations are planning to use AI/ML for cybersecurity in the next 12 months, highlighting the evolving role of advanced technologies in **enhancing cybersecurity measures**. AI/ML are also poised to **transform supply chain management**, with a third of respondents planning to use them for managing their supply chain.

Top uses for AI/ML over next 12 months



- 23% of organizations lack the technology to outpace competitors.
- Deploying and integrating new technology (21%) and balancing quality and profitability (21%) are the biggest internal obstacles to growth in the next 12 months.
- 50% of respondents plan to use AI/ML to support quality control in the next 12 months.

Smart manufacturing today starts with smart investment in AI

As operational complexity increases and the business and geopolitical climate continues to change, manufacturers are emphasizing risk reduction. Manufacturers need solutions that combine automation, AI, and secure architectures from edge to cloud to optimize operations and reduce exposure to cyber, compliance, and operational risk, while building the resilience needed to navigate uncertainty with confidence.

Many are finding that success in AI starts with the right foundation—products with native AI and a professional services team that has capabilities in strategy, use case prioritization, data architecture, implementation, and scalability.

While respondents use many methods to address the labor shortage and skills gap, introducing AI and automation were most often cited as part of their strategy (41% for each).

An industry under pressure turns to smart technology

Dynamic market conditions, internal and external obstacles, and margin pressures are driving organizations to look for smarter, more optimized operations throughout the supply chain.

28% of organizations are actively evaluating critical suppliers as a response to external risks, forcing organizations to reevaluate sourcing, pricing, and overall costs.

A vast majority of manufacturers (81%) say the obstacles they face – both within their organization and externally – are accelerating digital transformation. This figure rises above 90% in Brazil, India, Japan, and the Middle East. Mexico, Spain, and the U.K. have seen significant increases in obstacles.

Industrial companies are eager to find applications for AI

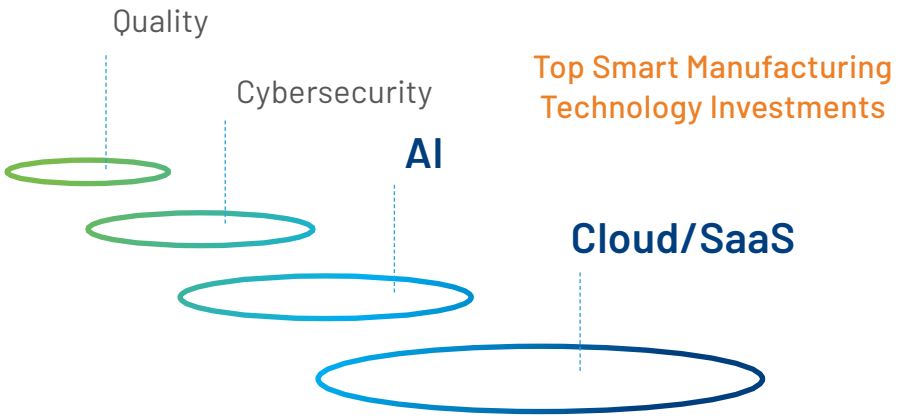
Cloud/SaaS and AI consistently ranked as the top two technology investments, with cybersecurity and quality rounding out the top four spots. Cloud/SaaS and AI have proven value in delivering smart manufacturing capabilities that drive business outcomes, and the emergence of cyber and QMS signals a shift toward resilience and reliability as key contributors to ROI.

Data fuels success

38% will use data collected to drive cybersecurity protection

While respondents are collecting more data than ever, less than half (44%) of the data collected is used effectively. This suggests a gap between data collection capabilities and the ability to leverage this data for decision making and operational improvements.

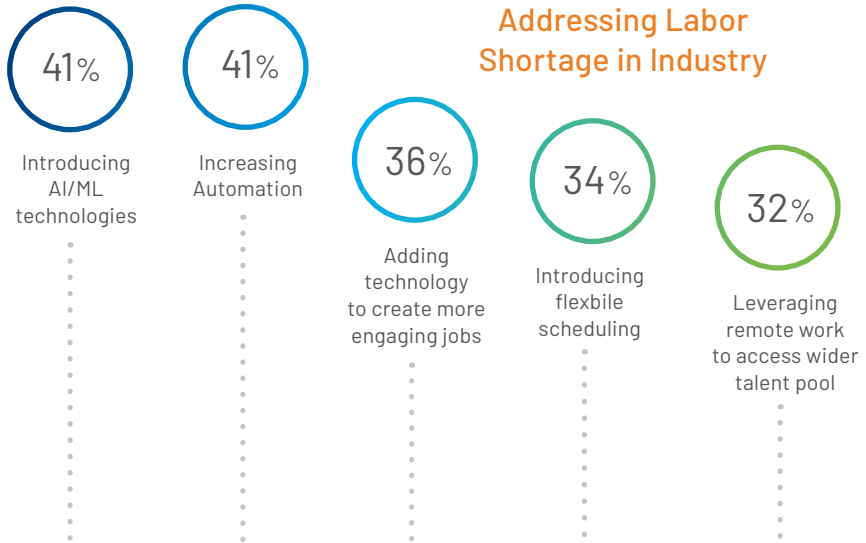
Organizations are also using data collected to enhance security and operational resilience; 37% are using data from tech, processes, and devices for cybersecurity protection, while 29% are using these analytics to monitor supply chain risk.



Smart manufacturing requires more skilled people, not fewer

Manufacturers again cited a lack of skilled workforce as the top reason they will struggle to outpace the competition, and 41% are introducing AI/ML technologies and increasing automation to fill the skills gap and address the labor shortage.

Organizations of all revenue levels are looking to adopt smart technology and upskill existing talent to amplify their workforce, plug the skills gap, and maintain quality against a backdrop of employee churn. In 2025, 47% of respondents worldwide indicated that applying AI was an "extremely" important skill in their organizations, a 10% increase from 2024.



83% respondents said analytical thinking + communication / teamwork are the most important skills when recruiting the next gen

Workforce Transformation and Reskilling

Smart manufacturing technology transformations are increasing the demand for more people with AI and cybersecurity competencies, and manufacturers cite AI as the technology that will have the biggest impact on workforce challenges. Investing in technology allows decision makers to move talented workers to more value-added tasks, increasing production/productivity.

Process optimization is one of the top three planned uses of AI/ML in the next 12 months. Manufacturing decision makers think these technologies will play a critical role in saving time by 2027 because they will minimize manual tasks and allow time to concentrate on value-added activities.

Through increased use of smart manufacturing technology, 48% expect to repurpose workers to different roles or hire more workers. Sustainable success depends on a workforce that can evolve, making continuous training not just a support function but a driver of organizational resilience and growth.

Turning resistance into resilience

The shifting global landscape and fast moving technologies like AI/ML can feel disruptive.

Leaders can address both the technical impact and the human response to change by:

- Demystifying the technology with a focus on use cases that **enhance the work of people.**
- Linking the technology to meaningful outcomes and **improved decision-making.**

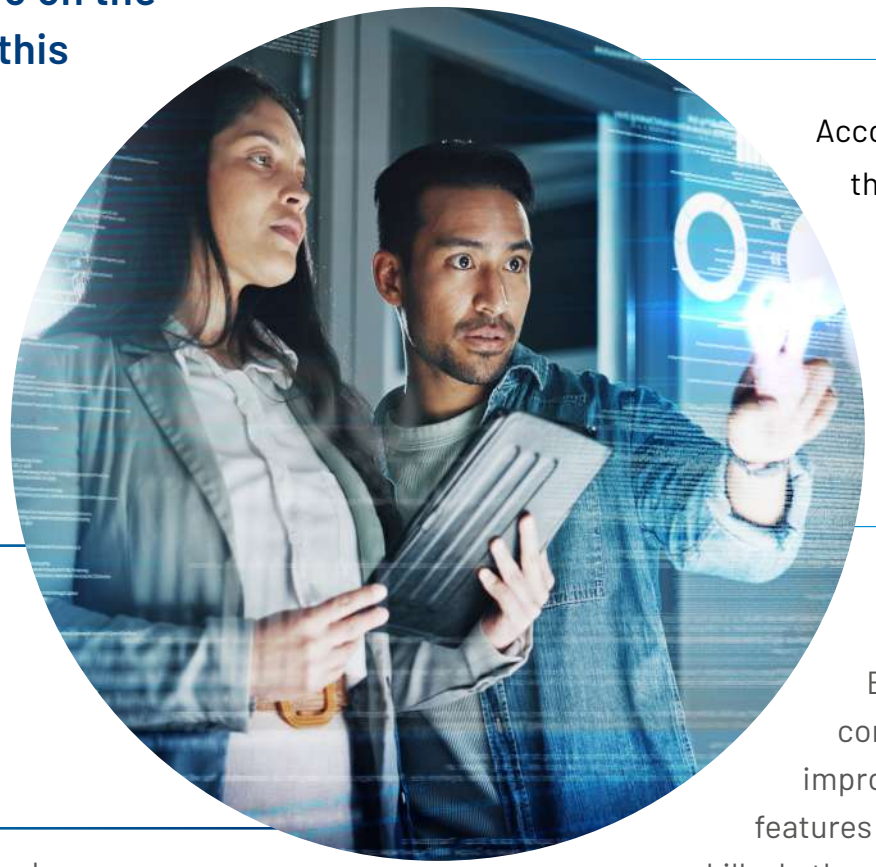
Biggest leadership obstacles in the next 12 months

Cybersecurity risks continue to rise

Cybersecurity jumped to number two on the list of external obstacles to growth this year, and is a key smart technology use case, showcasing that cybersecurity is becoming even more complex in an increasingly interconnected world.

Cybersecurity will become even more tightly intertwined with smart manufacturing priorities.

- 49% plan to use AI/ML for cybersecurity (up from 40% in 2024)
- 38% are leveraging data for cybersecurity protection (up from 31% in 2024)



> According to a study released by Black Kite, the manufacturing sector accounts for 21% of ransomware attacks and places manufacturing entities at a significantly high risk, making them more than three times as likely to suffer a ransomware attack.
>
> DarkReading.com

At the same time, cybersecurity skills and standards are becoming a higher priority in hiring, with 47% identifying them as extremely important (up from 40% in 2024), reinforcing that security is now a critical business competency, not just a technical one.

Because manufacturers are looking for a combination of people plus technology to improve their security posture, cybersecurity features prominently at the top of required employee skills. In the next five years, the most critical workforce skills will be a combination of **knowledge of AI** and **cybersecurity**, and **strong problem-solving** and critical thinking skills.

Quality remains an AI use case frontrunner

Although much of the conversation around AI in manufacturing focuses on topics like closing the skills gap, a consensus among respondents is that quality is a vital AI use case. Quality is key to business operations and strategy, and half of the respondents plan to implement AI for this use case in the next 12 months.

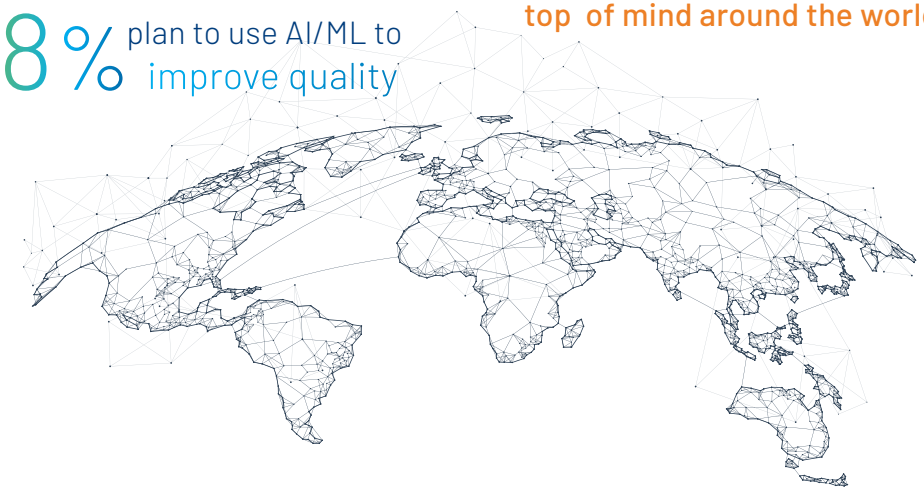
Survey respondents already recognized the emerging potential of AI for quality use cases – it was ranked the top answer in 2024 at 45%. Over the past year, it has held its lead. As manufacturers navigate greater uncertainty and adapt to rapidly changing conditions, applications for improving quality may help organizations maintain product standards in conditions where they might have degraded in the past.

Quality and Sustainability

Over half (55%) state that **improving efficiency is the top reason to pursue better sustainability**, an increase of 14% from the last survey. **Product quality/safety (43%)** and **energy management (42%)** are factors that matter the most to organizational sustainability programs—both areas saw a significant increase (10% and 7%, respectively) from the last survey.

48% plan to use AI/ML to improve quality

Using AI to improve quality is top of mind around the world



up 10% from last year

Key attribute to organizational sustainability progam

43% respondents said product quality + safety matters the most to organizational sustainability program

FUTURE OF SMART MANUFACTURING

Momentum. Despite barriers, industry eyes smarter future.

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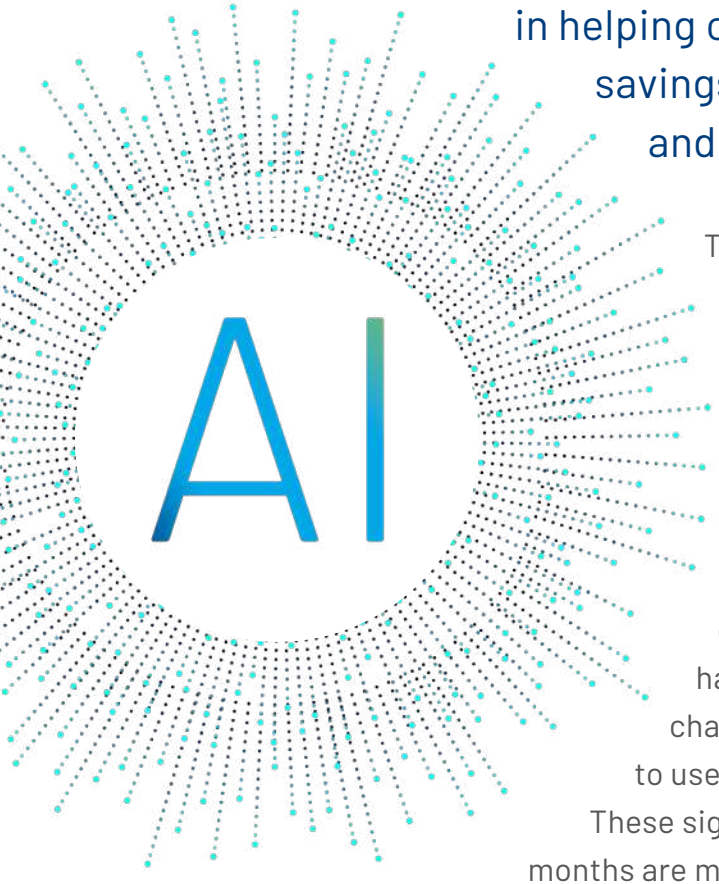

By 2027, organizations see AI playing a critical role in helping companies drive cost and time savings, and in creating efficiency and streamlining processes.

This year's results underline **significant increases in the role of AI in quality control, cybersecurity, and process optimization.** More organizations are planning to use AI/ML for cybersecurity in the next 12 months than in the last survey, highlighting the evolving role of advanced technologies in enhancing cybersecurity measures. AI is poised to have a transformative impact on supply chain management, with a third planning to use it for managing their supply chain. These significant increases over the next 12 months are more than a step-change in the attitude of manufacturers toward AI/ML, with a swing to seeing AI/ML as a core of technology strategy.

95% have either invested in or plan to invest in AI/ML and GenAI or Causal AI in next five years

> AI adoption in the manufacturing sector is outpacing other industries, especially among companies with over $1B in revenue.
>
> Omdia
> *2025 Trends to Watch: Manufacturing Technology*

This is a transformation from five years ago, when more than 80% of AI use cases focused on predictive maintenance. Cybersecurity is second only to quality control in use cases for AI/ML, to address vulnerabilities in AI-enabled process automation.

Organizations are increasingly prioritizing technologies that offer the highest ROI. For example, Cloud/SaaS and Generative AI or Causal AI, each cited by 15% of respondents as having the biggest ROI over the last 12 months, are being leveraged to streamline operations and enhance decision-making capabilities.

NEXT STEPS

Start the journey

Manufacturers start their digital transformation journey in one of two places:

1. I'm ready to begin an assessment and develop a strategy

2. I have a strategy and I'm ready to start piloting program implementation

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Realize the promise of digital transformation

1

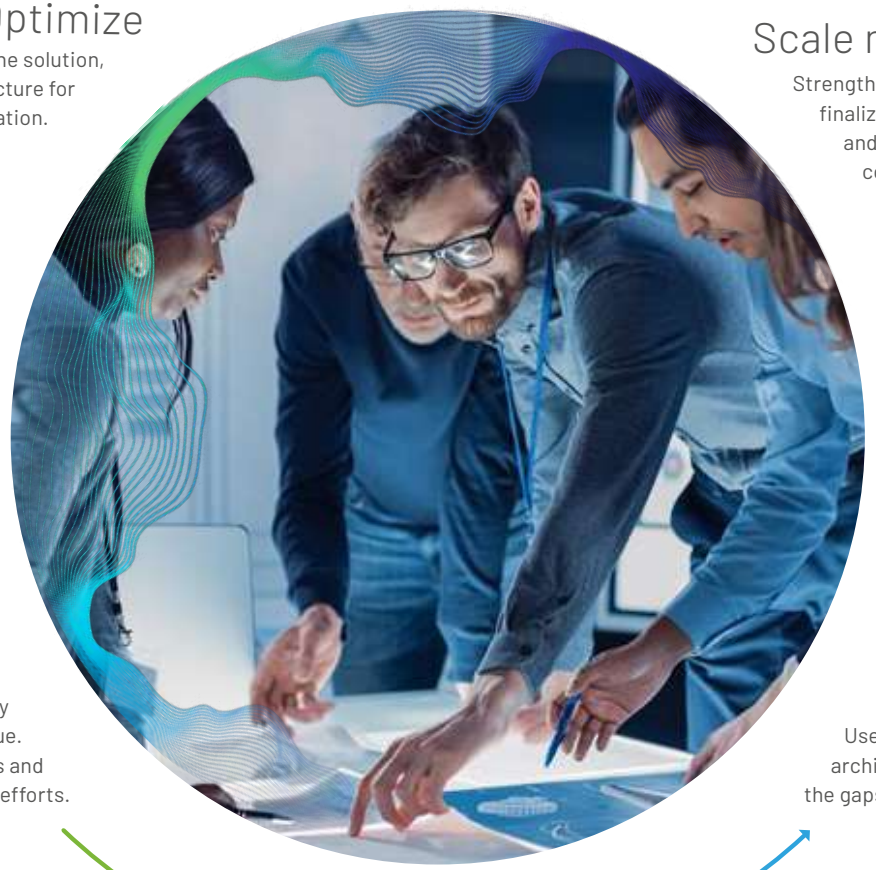
I'm ready for an assessment starts here

Identify your greatest needs

Gather the people connected to the change. Diverse perspectives clarify the key opportunity areas, whether disconnected systems, people, processes, supply chains, unexpected downtime, poor quality, lack of visibility, control and / or something else.

Prioritize, justify and roadmap

Prioritize use cases that address your opportunity areas, balancing value creation and time-to-value. Develop your business case tied to business imperatives and build a strategy and roadmap to orchestrate and focus efforts.



Optimize

Maintain and continuously improve the solution, architecture and people infrastructure for sustained and widespread value realization.

Scale minimum viable products

Strengthen the solution through updating functionality, finalizing the architecture, setting system specifications and defining plant specific customization rules. Scale core capabilities to new assets, lines and plants while expanding to add additional use cases.

2

I have a strategy starts here

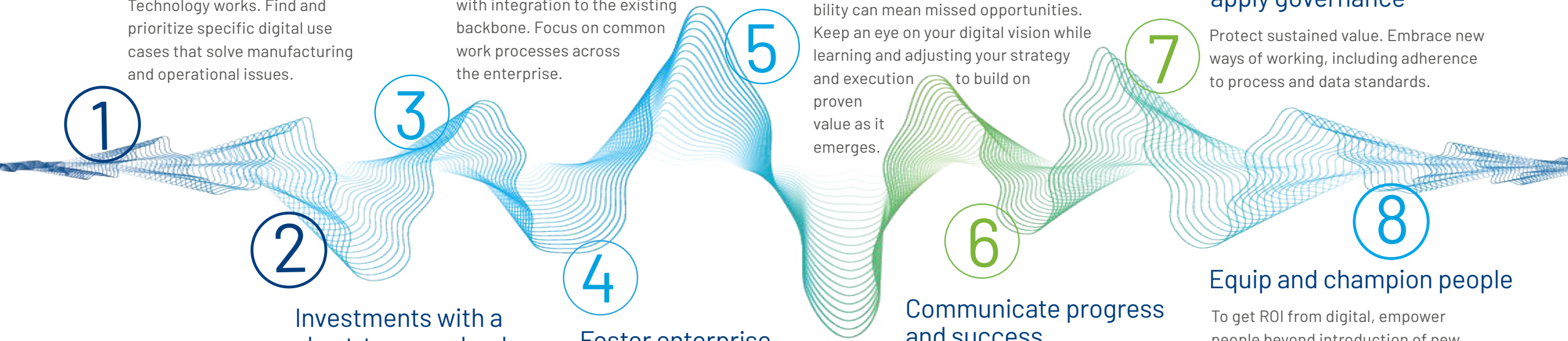
Stand up minimum viable products

Focus on priority MVPs per your roadmap that deliver a full stack of capabilities in a specific area to realize value early. Aim to implement additional MVPs every 90-100 days to quickly build a foundation to scale.

Define your OT/IT architecture

Use case enablement requires an enterprise-level OT/IT architecture. Define your future state vision, identify the gaps and select potential solutions to fill the gaps.

8 steps to drive value, achieve success



1 Prove value vs. technology

Technology works. Find and prioritize specific digital use cases that solve manufacturing and operational issues.

2 Investments with a short-term payback

Transformations stall when ROI is slow. Build rapid, steady flow of value to drive adoption and self-funding.

3 Plan for scalability

To deliver desired outcomes at scale, plan for the optimal set of technologies with integration to the existing backbone. Focus on common work processes across the enterprise.

4 Foster enterprise collaboration

Siloed solutions are a dead end. Enterprise (OT / IT) digital connectivity and collaboration unlock exponential value.

5 Learn, iterate and improve

Long-term planning helps, but inflexibility can mean missed opportunities. Keep an eye on your digital vision while learning and adjusting your strategy and execution to build on proven value as it emerges.

6 Communicate progress and success

Momentum matters. Spread the word beyond the impacted group to build and maintain excitement for what's possible.

7 Define and apply governance

Protect sustained value. Embrace new ways of working, including adherence to process and data standards.

8 Equip and champion people

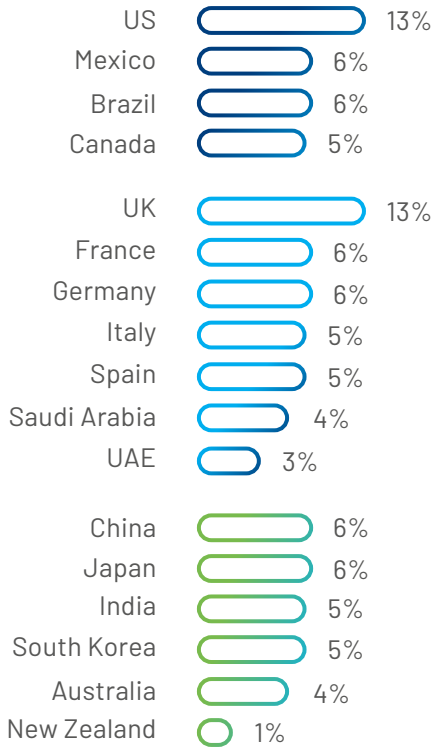
To get ROI from digital, empower people beyond introduction of new technology. Skills and mindsets that support new ways of working are key to success and driving self-service.

Learn more about our respondents

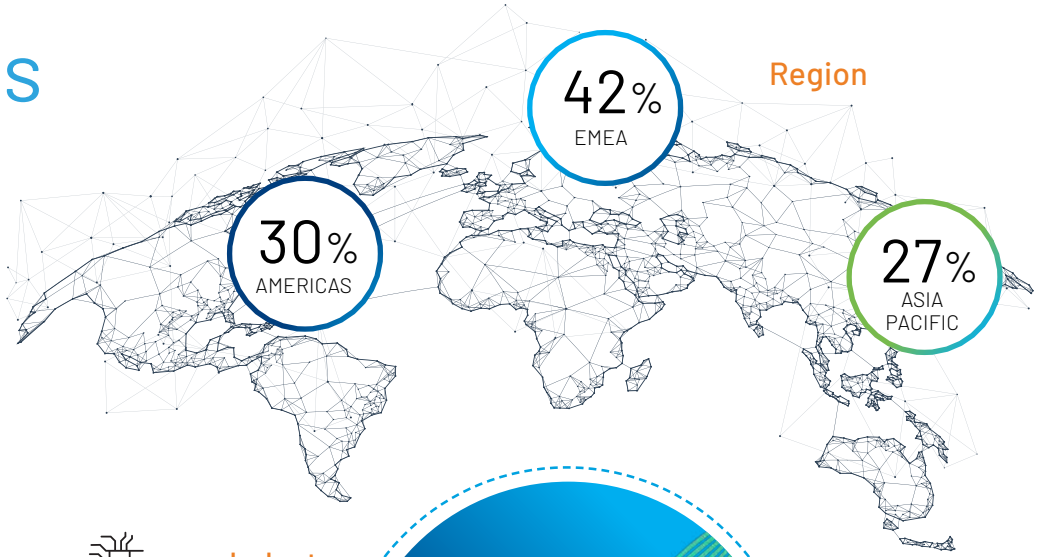
This survey was conducted among 1560 hardware, software, and services decision makers working within manufacturing type industries.

Our respondents

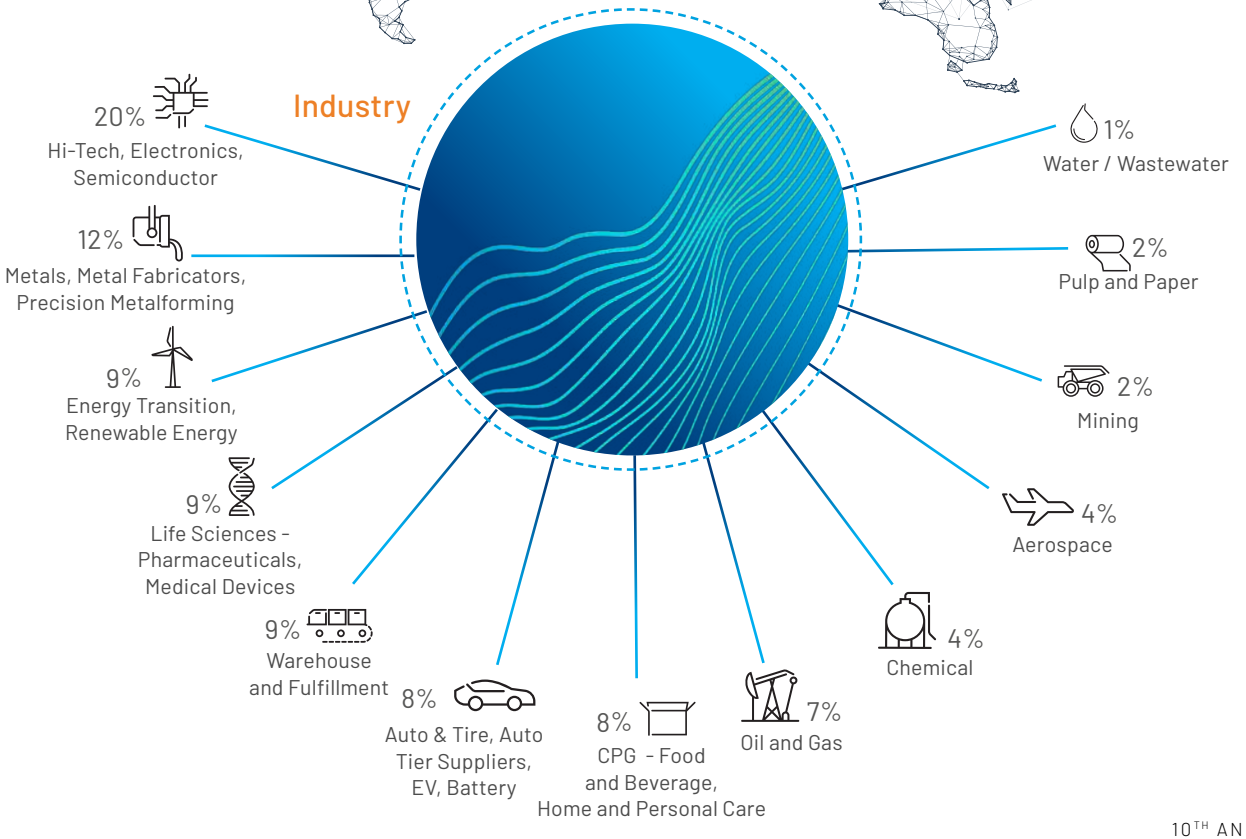
Company location



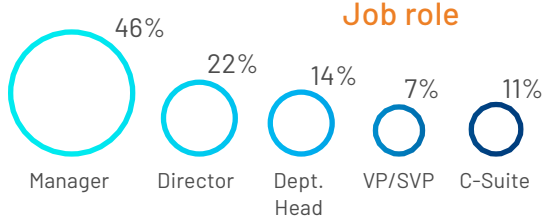
Region



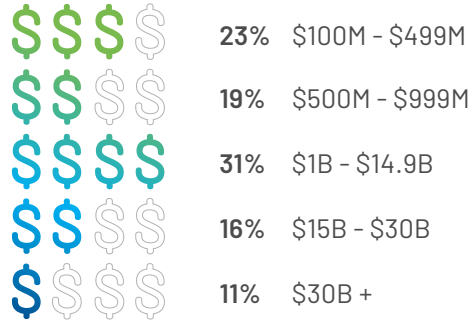
Industry



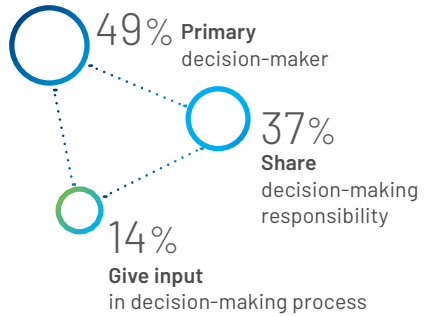
Job role



Annual revenue



Respondent roles



APPENDIX

Smart manufacturing terms defined

Smart manufacturing technologies

Enterprise Resource Planning (ERP) automates front- and back-office processes across business management and related functions.

Manufacturing Execution Systems (MES) track and document the transformation of raw materials into finished goods, providing real-time production management to drive enterprise-wide compliance, quality and efficiency.

Distributed Control Systems (DCS) use decentralized elements to control dispersed systems, such as automated industrial processes or large-scale infrastructure systems.

Asset Performance Management (APM) combines process, operational and machine-level data through dashboards to monitor machine and plant health.

Supply Chain Planning (SCP) combines data from multiple departments to sync demand and supply forecasting to improve inventory accuracy and production management.

Computerized Maintenance Management Systems (CMMS) help organizations track and manage maintenance and repair activities for their facilities, equipment and other assets in one place.

Quality Management Systems (QMS) standardize and automate quality documentation, processes and measurements.

Production Monitoring provides seamless connectivity to machines on the plant floor, delivering transparent, real-time operational KPIs like Overall Equipment Effectiveness (OEE).

Design & Visualization tools transform raw ideas into intuitive HMIs and immersive VR simulations for smarter, faster production.

Power Control drives continuous flow of valuable process and diagnostic data that informs the design environment, visualization systems and information software.

Industrial Control Systems improve processes and production quality at every stage of your operation and provide seamless data exchange.

Production Logistics delivers an orchestrated, agile, zero touch material flow through manufacturing operations with autonomous mobile robots (AMRs).

Analytics use data to solve manufacturing bottlenecks, optimize output and quality and provide new insights, tapping into the power of Industrial AI.

Robotics accelerate autonomous / semi-autonomous operations and contribute to systems that are more intelligent, intuitive and flexible.

Smart Devices are self and system-aware assets that acquire, process and monitor operating data.

> Smart Manufacturing is the intelligent, real-time orchestration and optimization of business, physical and digital processes within factories and across the entire value chain. Resources and processes are automated, integrated, monitored, and continuously evaluated based on all available information as close to real-time as possible."
>
> **MESA International**

Glossary of AI terms

Artificial Intelligence (AI)
is a transformative force within the manufacturing industry, driving improvements in efficiency, optimization, and decision-making. AI advancements have enabled it to act as a valuable tool for tasks like predictive maintenance, optimizing production processes, and enhancing supply chain resilience. These developments are shaping the way products are brought to market, with personalized experiences and responsive production becoming increasingly important for consumer satisfaction. For manufacturers of all sizes, AI is a mainstream driver of innovation, growth, and efficiency, as it redefines the manufacturing ecosystem.

Causal artificial intelligence (Causal AI)
identifies and utilizes cause-and-effect relationships to go beyond correlation-based predictive models and toward AI systems that can prescribe actions more effectively and act more autonomously.

Generative AI (GenAI)
refers to AI techniques that learn a representation of artifacts from data and use it to generate new, unique artifacts that resemble but don't repeat the original data. Generative AI can produce novel content (including text, images, video, audio, structures), computer code, synthetic data, workflows, and models of physical objects.

Industrial AI*
is the application of AI in an industrial setting, focused on harnessing real-time data to feed learning processes that can predict, automate, and interpret action from large and complex data sets.

Advanced **machine learning (ML)** algorithms are composed of many technologies (such as deep learning, **neural networks** and **natural language processing)**, used in unsupervised and supervised learning, that operate guided by lessons from existing information.

Gartner® Glossary
* Term not defined in Gartner Glossary

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