9TH ANNUAL

State of **Smart Manufacturing Report**

How global manufacturers are harnessing emergent technology to maximize workforce potential, reduce risk, increase quality and deliver sustainable growth

Rockwell Automation

expanding **human possibility**™

A letter from our CEO and Chairman

Creating the **Future of Industrial Operations**

Welcome to Rockwell Automation's *2024 State of Smart Manufacturing Report.*

Rockwell Automation, together with our customers and partners, is creating the future of industrial operations. While the technology has certainly changed over our 120 years, our approach has been proven time and again, around the world and in diverse industries.

In this year's State of Smart Manufacturing Report, we explore current disruptors, including emerging technologies like industrial AI, and their potential to alleviate the biggest challenges facing manufacturers.

We take a uniquely human-centric approach to automation; the winning hand is technology thoughtfully applied by an engaged and inspired workforce. This is even more essential with the rapid acceleration of technology adoption, driven first by the necessities of the pandemic, continuing with the need for

greater resilience and underscored by subsequent supply chain shortages. Resilience includes the ability to weather these shortages in the future, to deal with pervasive scarcity of skilled labor and to create more sustainable business models. The results of our survey reflect these views.

We are pleased to share these results with you and hope that this global benchmark report provides a guide for successful decision-making throughout 2024, driving the positive business outcomes that will deliver a competitive edge, profitable growth and a sustainable future.

With best wishes for a productive and successful 2024,

Blake Moret

Blake Moret
Chairman and CEO,
Rockwell Automation

Key report
results ///////////

94%
expect to **maintain or grow their workforce** as a result of smart manufacturing technology adoption

95%
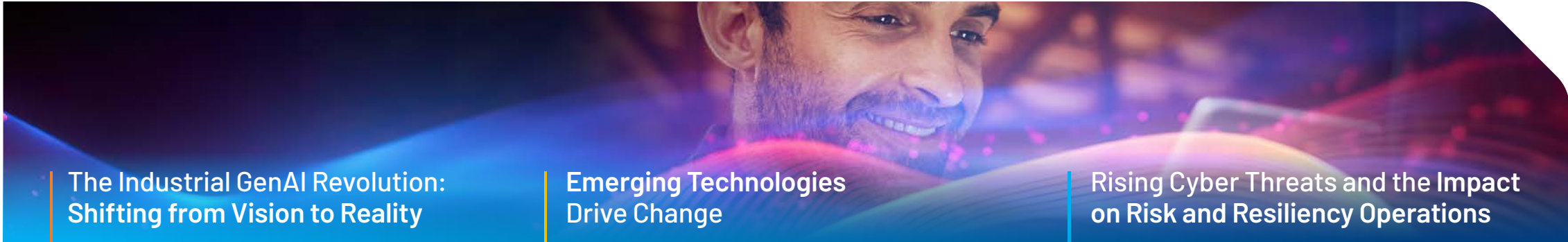are **using or evaluating smart manufacturing technology,** up from 84% in 2023

98%
have a sustainability / ESG policy in place, with almost half of those having company-wide formalized policies

Table of **Contents**

Executive **Summary**

The Industrial GenAI Revolution: Shifting from Vision to Reality

Generative artificial intelligence (GenAI) rocketed up the technology priority list over the last twelve months, creating fierce demand for industrial applications embedded with this transformative technology.

83% anticipate using **GenAI in their operations in 2024**

GenAI ranked #2 for ROI, behind only **Cloud / SaaS**

GenAI is the #1 new area for **technology investment** over the next 12 months

Artificial Intelligence

Emerging Technologies Drive Change

Looking to supplement and amplify the workforce, **cobots, autonomous mobile robots (AMRs), automated guided vehicles (AGVs) and wearables** all ranked prominently in new areas for technology investment in 2024.

94% expect to **maintain or grow their workforce** as a result of smart manufacturing technology adoption

81% plan to be using **wearable technology by the end of 2024**

Change management is the top workforce-related obstacle in 2024

Workforce

Rising Cyber Threats and the **Impact on Risk and Resiliency Operations**

The lines between OT and IT continue to blur, increasing the connectivity between digital and physical operations. This elevates the **need for cybersecurity awareness and action** to mitigate the risk of a breach or attack.

Cybersecurity broke into the **top 5 external risks** for the first time, ranking 3rd overall

Cybersecurity ranked as the **#1 skill employers are seeking in 2024**

Cybersecurity predicted as **#2 most impacted by AI** in the next three years, just behind quality
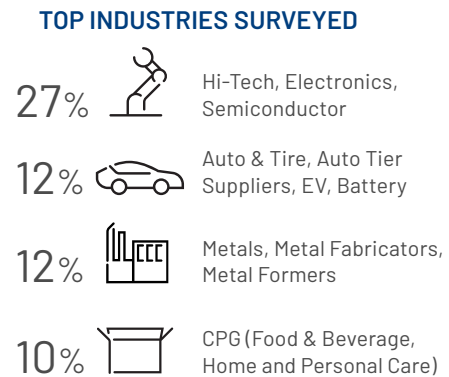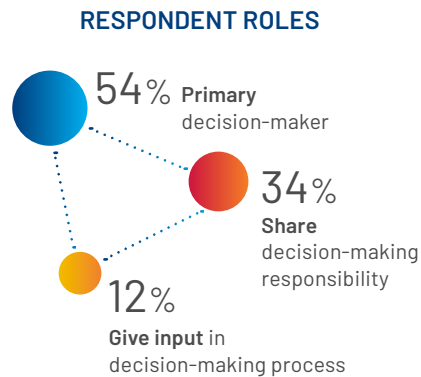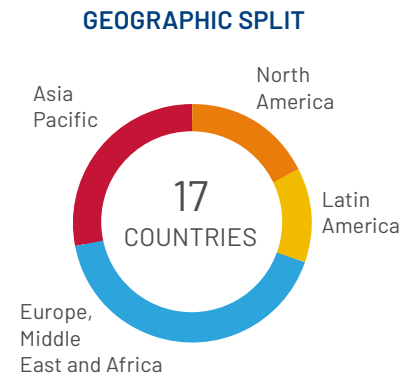
Cybersecurity

Overview

Over 1,500 manufacturers around the world contributed to this year's State of Smart Manufacturing Report. The survey reveals optimism as advanced industrial operations technology delivers results that offer hope in the face of evolving economic conditions, labor shortages, skills gaps and cybersecurity concerns.

The 9th annual edition of the State of Manufacturing Report is the largest to date. **1,567 decision-makers** from **17 of the top manufacturing countries** took part, nearly two-thirds of whom (64%) work for firms with **over $1B in revenue**.

WHAT IS Smart Manufacturing?

"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

This report from **Rockwell Automation**, in association with **Sapio Research**, includes **a plan for taking action** alongside the research findings to help you turn insights into action. Refer to our **glossary of AI-related terms** used throughout the report.

GEOGRAPHIC SPLIT

Asia Pacific
North America
Latin America
Europe, Middle East and Africa

17 COUNTRIES

RESPONDENT ROLES

54% **Primary** decision-maker

34% **Share** decision-making responsibility

12% **Give input** in decision-making process

TOP INDUSTRIES SURVEYED

27% — Hi-Tech, Electronics, Semiconductor

12% — Auto & Tire, Auto Tier Suppliers, EV, Battery

12% — Metals, Metal Fabricators, Metal Formers

10% — CPG (Food & Beverage, Home and Personal Care)

View all **survey demographics**

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What are examples of **smart manufacturing technology?**

INDUSTRIAL OPERATIONS

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.

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

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

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

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.

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

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

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

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.

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.

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

THE CURRENT STATE OF
SMART
MANUFACTURING

Manufacturers report a tough operating climate of **inflationary pressures, high energy prices** and **ongoing skills shortages.**

The drive to find incremental efficiencies pervades the organization, from the boardroom to the factory floor.

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Industry obstacles **and outlook**

For the second year in a row, **inflation is named as the primary obstacle to growth**. This year it is compounded by rising energy costs, which ranked second.

Cybersecurity ranked third, appearing in the top 5 for the first time. Risks to OT and IT networks are increasing from the interconnectivity of digital and physical infrastructure.

Workforce issues continue to dampen growth, ranking in the top 5 for both external (4th) and internal (1st) obstacles. Deploying and integrating new technology remains a top concern, highlighting the importance of the relationship between people and technology to drive results.

Supply chain disruption dropped in the rankings this year, but it is important to remain vigilant with a strategic approach to planning in order to mitigate future supply chain instability.

EXTERNAL OBSTACLES

	2024	2023
1	Inflation	Inflation
2	Rising energy costs	Supply chain disruption
3	Cybersecurity risks	Raw materials / microchip shortage / prices
4	Shortage of skilled workers	Shortage of skilled workers
5	Supply chain disruption	Impact of COVID-19 pandemic

Q. What do you see as the biggest external obstacle(s) to your organization's growth for calendar year 2024? Select all that apply. Base: 1567

Q. What do you see as the biggest external obstacle(s) to your organization's growth for calendar year 2023? Select top 5. Base: 1353

INTERNAL OBSTACLES

	2024	2023
1	Attracting employees with desired skillsets	Balancing quality and growth
2	Deploying and integrating new technology	Deploying and integrating new technology
3	Internal budget constraints	Worker retention / knowledge retention
4	Balancing quality and growth	Using and understanding data to improve
5	Capturing and contextualizing data to improve	Onboarding new employees

Q. What do you see as the biggest internal obstacle(s) to your organization's growth for calendar year 2024? Select all that apply. Base: 1567

Q. What do you see as the biggest internal obstacle(s) to your organization's growth for calendar year 2023? Select top 5. Base: 1353

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Technology investment **up 30%**

Prompted by inflationary pressures and rising energy costs, manufacturers are stepping up technology investment to counter risks.

Spending in this area **increased 30% year-over-year**: from 23% to 30% of operating budget.

23% 2023

30% 2024

Technology investment
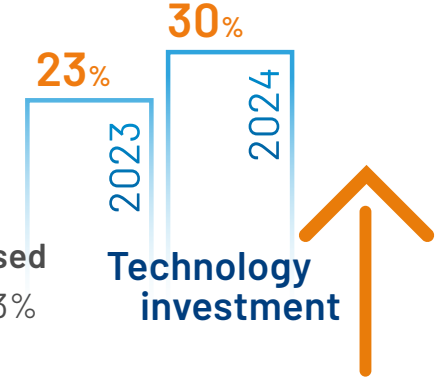
Adoption of technology is seen by manufacturers as the best way to mitigate against both external and internal risks.
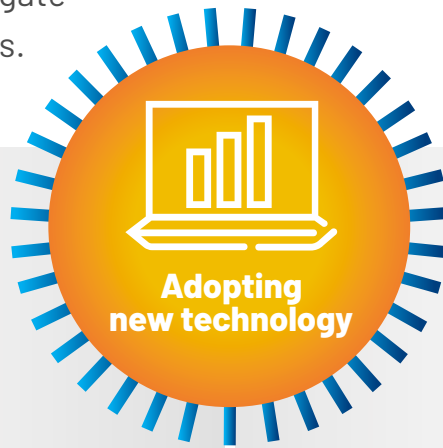
Adopting new technology

Adopting / using artificial intelligence

Digitizing business through smart manufacturing technology adoption and automation
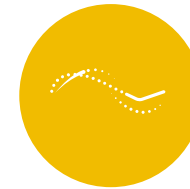
Hiring new or different types of talent or upskilling existing talent

Upskilling existing talent

Adopting smart technology / smart manufacturing technology

Hiring new or different types of talent

EXTERNAL RISK MITIGATION

Q. How is your organization mitigating the external risk mentioned in the previous questions? Select all that apply.
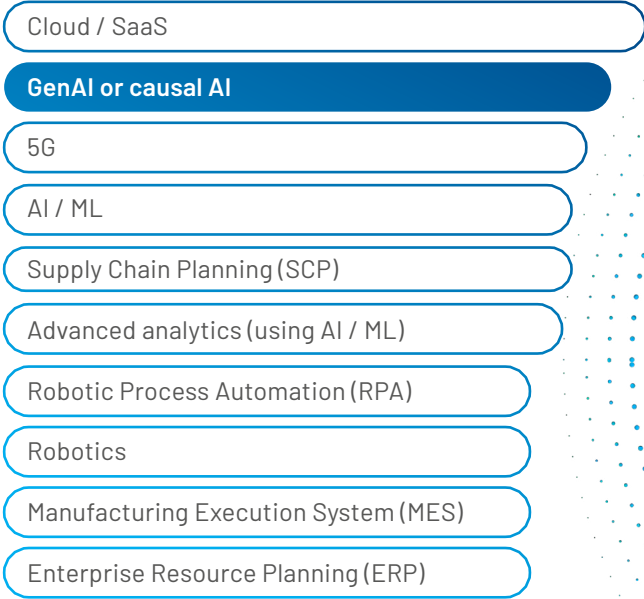
INTERNAL RISK MITIGATION

Q. How is your organization mitigating the internal risk mentioned in the previous questions? Select all that apply.

Base: 1567

AI use cases deliver outcomes, **drive ROI**

BIGGEST ROI

Cloud / SaaS

GenAI or causal AI

5G

AI / ML

Supply Chain Planning (SCP)

Advanced analytics (using AI / ML)

Robotic Process Automation (RPA)

Robotics

Manufacturing Execution System (MES)
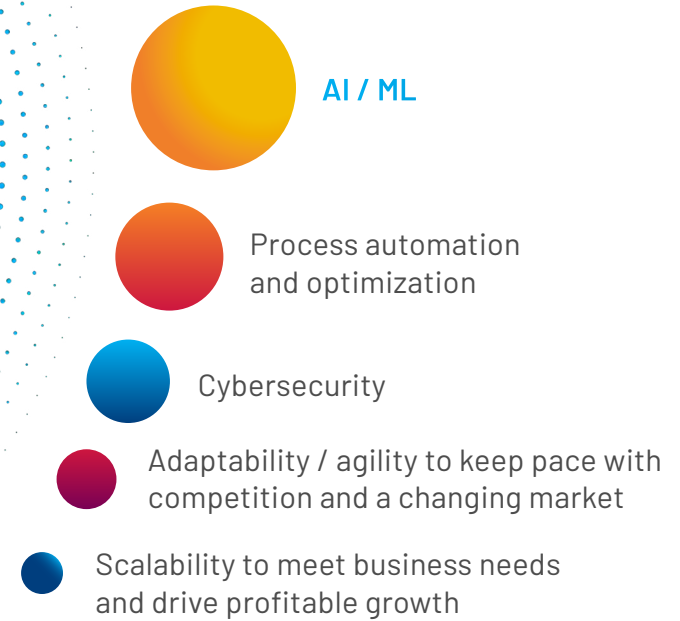
Enterprise Resource Planning (ERP)

Q. Which of the technologies that your company has invested in had the biggest ROI over the last 12 months? Select top 3. Base: 1562

Results show that
AI is core to technology strategies and roadmaps.
Adopters are seeing tangible results, with only Cloud / SaaS delivering more ROI than GenAI and causal AI.

AI / ML deliver bigger business outcomes
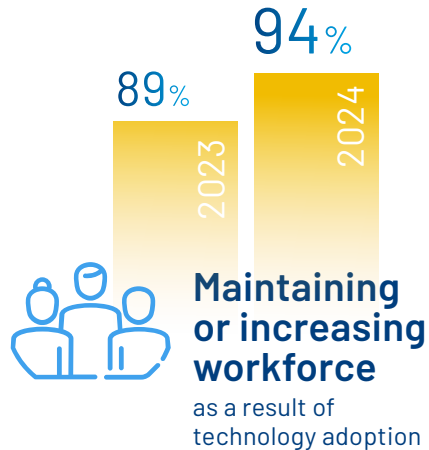than all other smart manufacturing capabilities.

CAPABILITIES THAT DELIVER OUTCOMES

AI / ML

Process automation and optimization

Cybersecurity

Adaptability / agility to keep pace with competition and a changing market

Scalability to meet business needs and drive profitable growth

Q. What smart manufacturing features / capabilities do you think drive the biggest business outcomes? Select all that apply. Base: 1567

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Skills gap **reduces competitiveness**

For two years in a row, **manufacturers have cited a lack of skilled workforce as the top reason they will struggle to outpace the competition**.

COMPETITIVE WEAKNESS

Skilled workforce

Technology

Speed

Innovation

Ability to use data
to make decisions

89% 2023

94% 2024

Maintaining or increasing workforce
as a result of technology adoption

Respondents plan to use new and emerging technology to amplify their workforce, fill the skills gap and maintain quality against a backdrop of employee turnover. **Through increased use of smart manufacturing technology, 94% expect to hire more workers or repurpose workers to new or different roles.**

Q. By increasing your use of smart manufacturing technology in the next 12 months, which best describes changes to your workforce? 'We will...' Base 1567

Q. Please read the statement below and select the answer options that apply to your organization: "My organization lacks the _____ to outpace the competition over the next 12 months." Select all that apply. Base: 1567

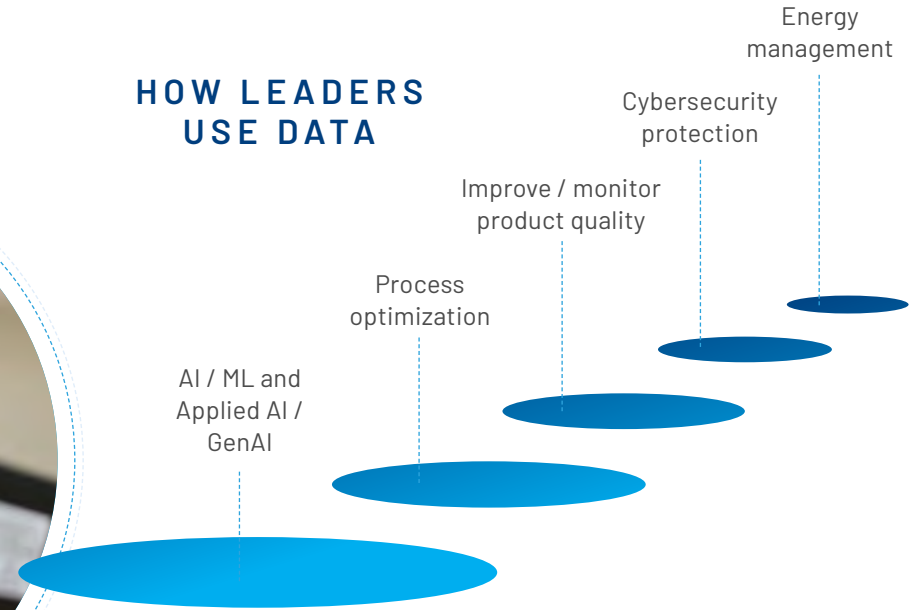# Better data management needed to **fuel AI and empower teams**

Respondents believe **those at the forefront of the manufacturing industry are using data to fuel AI / ML and optimize processes.** However, those surveyed believe their own organizations use **less than half** of collected data effectively.

Leaders in the industry are accessing contextualized data to drive informed, real-time decision-making.

HOW LEADERS USE DATA

Energy management

Cybersecurity protection

Improve / monitor product quality

Process optimization

AI / ML and Applied AI / GenAI

Q. How do you perceive leaders in your industry are using the data collected from their currently employed technologies, processes, connected devices, etc.? Select all that apply. Base:1567
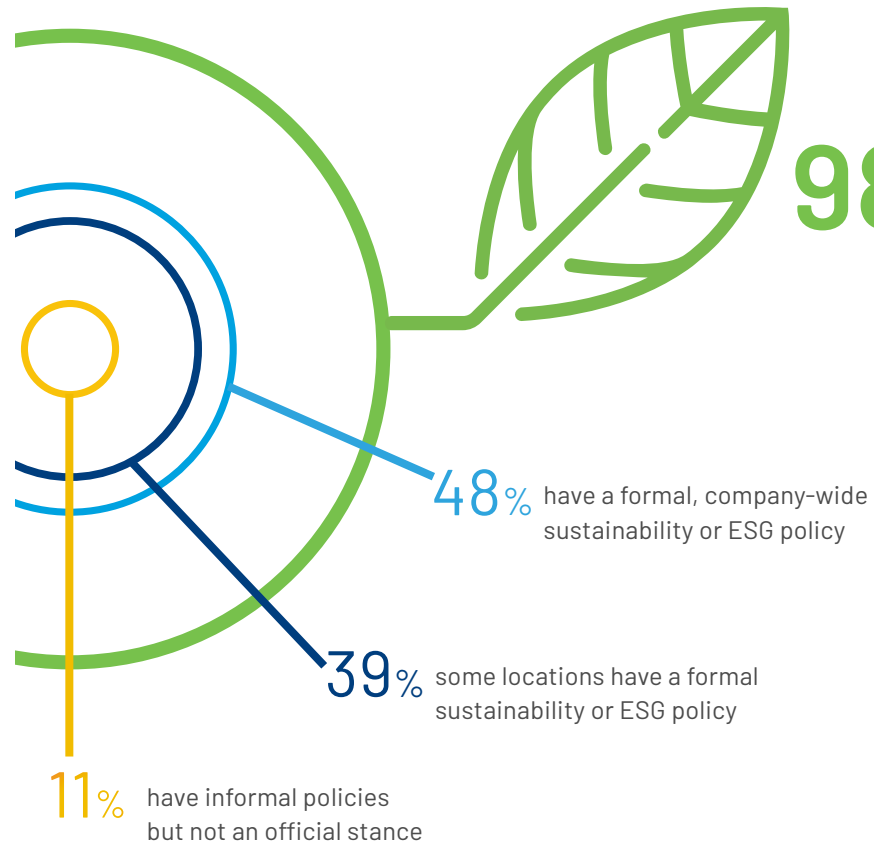
only 44% of **data is being used effectively**

❝ As IT and OT worlds continue to integrate, and with subdued customer demand in many sectors, continuing above average historical rates of inflation, rising energy costs and a changing manufacturing workforce, the adoption of IT technology in OT environments together with new as a service offerings is key to competitive advantage."
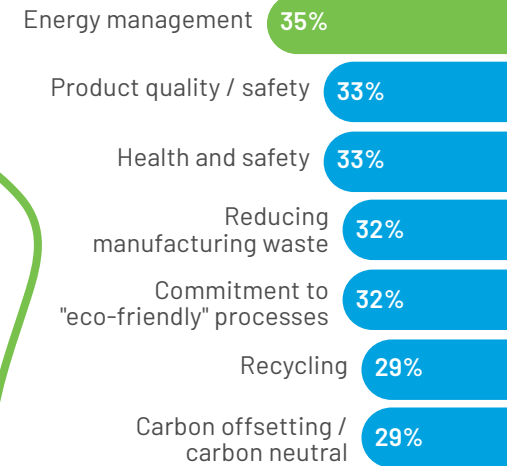
Mark Watson | Senior Director, Government & Manufacturing, Omdia,
Omdia Tech Trends to Watch 2024

Sustainability and ESG policies increasingly driven by **energy concerns**

98% of organizations have some form of sustainability or ESG policy

48% have a formal, company-wide sustainability or ESG policy

39% some locations have a formal sustainability or ESG policy

11% have informal policies but not an official stance

We've seen an increase in the adoption of sustainability and ESG policies over the last year. **The number of organizations with some form of policy increased to 98%, and those with formal policies is 86%, up from 78% in 2023**.

WHAT MATTERS MOST FOR 2024

Energy management	35%
Product quality / safety	33%
Health and safety	33%
Reducing manufacturing waste	32%
Commitment to "eco-friendly" processes	32%
Recycling	29%
Carbon offsetting / carbon neutral	29%

Q. What matters most to your organization's sustainability / ESG policy? Select all that apply. Base: 1567
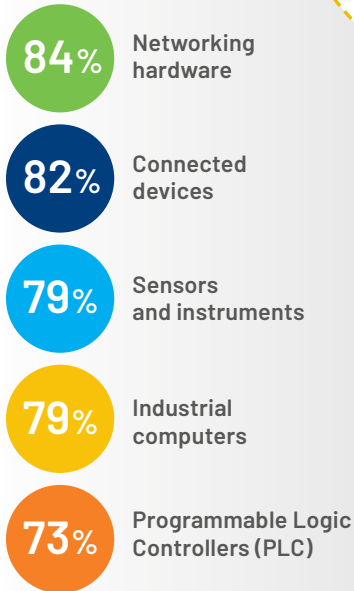
Q. Which of the following best describes your organization's current efforts around sustainability / ESG (Environmental, Social, and Governance)? Select one. Base: 1567

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Factory floor processes see most **smart manufacturing adoption**

PERCENT OF SMART MANUFACTURING ADOPTION

HARDWARE / DEVICES

Q. Which of the following smart manufacturing hardware / smart devices has your company adopted or has plans to adopt? Base: 1567

Manufacturers are upgrading their networking infrastructure and investing in more connected hardware devices. More data from systems allows companies to capitalize on their software investments and further empower their workforce with information to optimize operations in real time.

84% Networking hardware

82% Connected devices

79% Sensors and instruments

79% Industrial computers

73% Programmable Logic Controllers (PLC)

SOFTWARE

Q. Which of the following smart manufacturing software solutions has your company adopted or has plans to adopt? Base: 1567
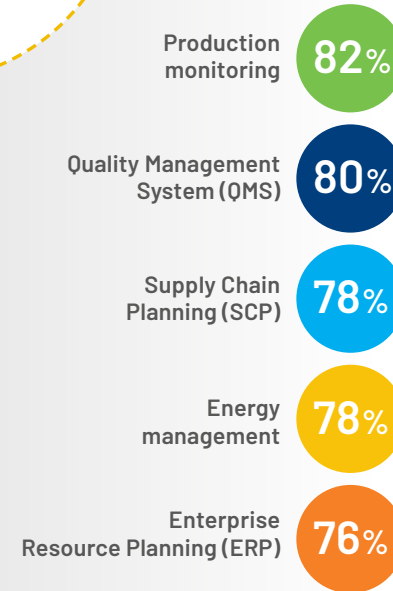
Manufacturers are benefitting from modular, scalable smart manufacturing solutions **that can be deployed quickly at a lower cost than more highly complex, rigid legacy systems.** These practical applications require fewer resources, are easier to integrate and deploy and deliver a faster return on investment.
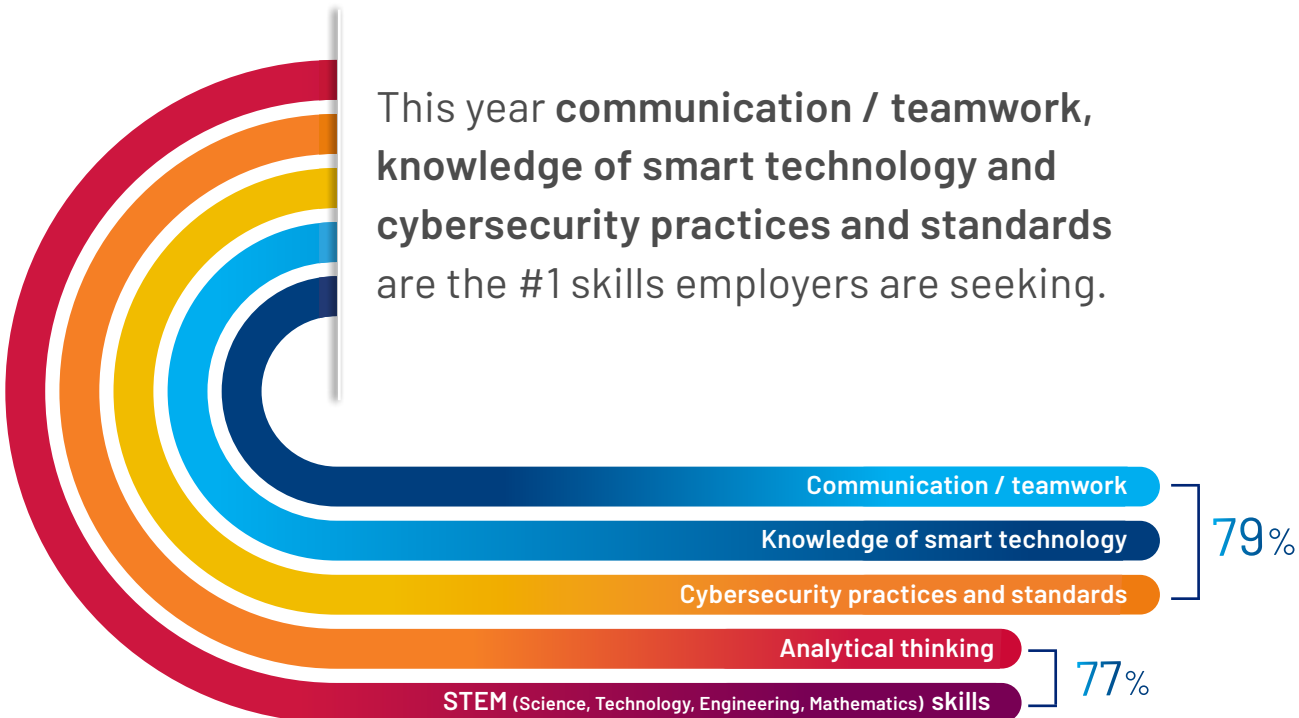
Production monitoring **82%**

Quality Management System (QMS) **80%**

Supply Chain Planning (SCP) **78%**

Energy management **78%**

Enterprise Resource Planning (ERP) **76%**

MANUFACTURERS'
BIGGEST
CHALLENGES

The severity of today's global labor shortage and skills gap intensifies the problem of attracting, managing and retaining skilled workers, but there is hope.

New and emerging technology, like GenAI, robotics and wearables, are filling skills gaps and amplifying effort rather than replacing workers.

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Industry 4.0 **skills shortages**

This year **communication / teamwork, knowledge of smart technology and cybersecurity practices and standards** are the #1 skills employers are seeking.

Communication / teamwork
Knowledge of smart technology
Cybersecurity practices and standards

79%

Analytical thinking
STEM **(Science, Technology, Engineering, Mathematics) skills**

77%

Q. Over the next 12 months, how important are the following knowledge and / or skills as your organization recruits its next generation of employees? Base: 1567

Skills shortages are holding manufacturers back. Attracting skilled employees and training the workforce to adapt to new systems and software will be vital for success in 2024.

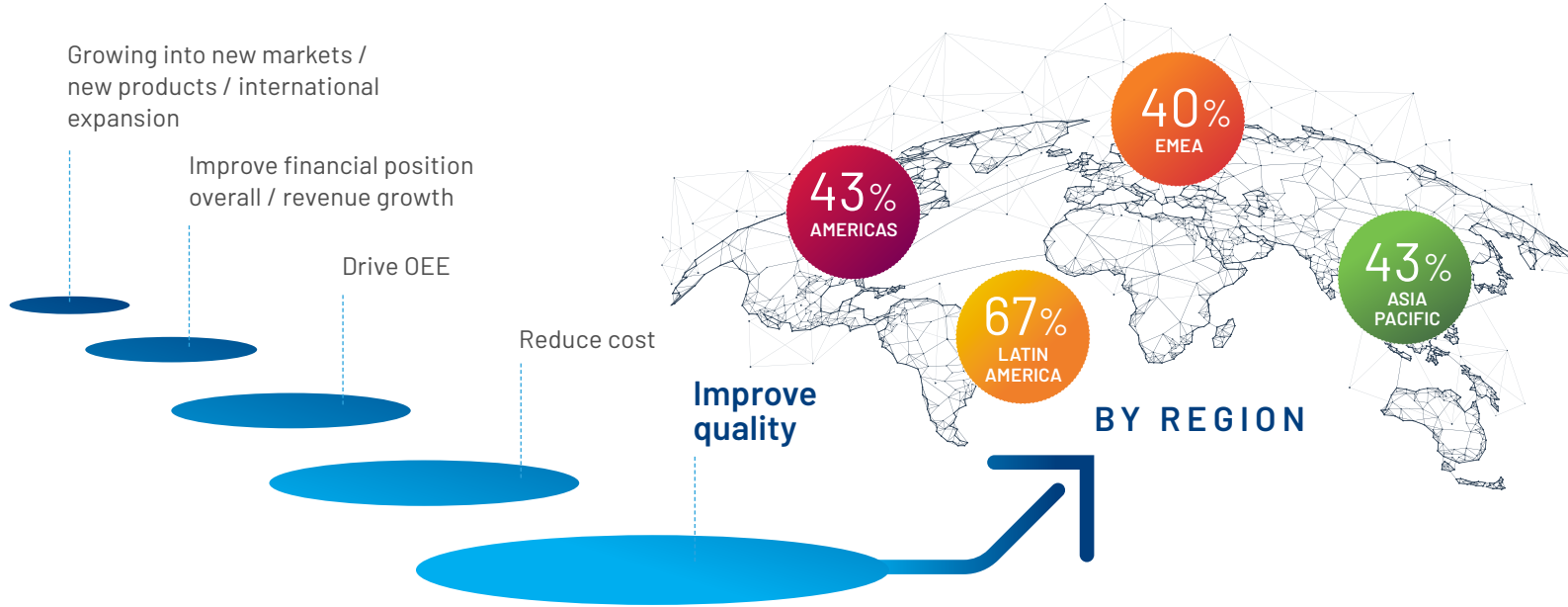## BARRIERS TO SMART MANUFACTURING ADOPTION

1. **Cost / Expense**
2. **Lack of skill set to implement**
3. **Lack of skill set to optimize**
4. Employee resistance to change
5. Replacing / upgrading legacy systems
6. Technology infrastructure readiness / data readiness
7. Lack of commitment to or understanding of Organizational Change Management (OCM)
8. Leadership resistance to change

Q. What are the barriers to adopting smart manufacturing? Select all that apply. Base: 1567

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Quality #1 focus for smart manufacturing

Improved quality is the number one outcome respondents hope to achieve from existing smart manufacturing technology.

SMART MANUFACTURING IS DRIVING BUSINESS OUTCOMES AROUND THE WORLD

Growing into new markets / new products / international expansion

Improve financial position overall / revenue growth

Drive OEE

Reduce cost

Improve quality

43% AMERICAS

40% EMEA

67% LATIN AMERICA

43% ASIA PACIFIC

BY REGION

Q. What positive business outcomes are you looking to achieve from your smart manufacturing technology? Select all that apply. Base:1567

Quality control tops the chart for planned AI / ML use cases in 2024.

45% Quality control

40% Cybersecurity

39% Process optimization

34% Supply chain management

33% Robotics

Q. Where do you plan to use AI / ML in 2024? Select all that apply. Base:1567

The focus on **cybersecurity intensifies**

As the technology landscape becomes more complex, and OT systems are further integrated into enterprise IT networks, the opportunities for cyber attacks quickly increase.

Manufacturers are looking to a **combination of human skill and emerging technology to strengthen their security posture** in the face of this growing concern.

Cybersecurity broke into the
the top 5 external risks
for the fist time, ranking 3rd overall
See **page 8**

Cybersecurity ranked
#2 use case for AI / ML
over next three years, just behind quality control
See **page 17**

Cybersecurity ranked as the
#1 skill employers are seeking in 2024
See **page 16**

Cybersecurity ranked **3rd for driving biggest outcomes**
through smart manufacturing technology
See **page 10**

"With over 71% of all ransomware attacks on industrial organizations focused on manufacturing, ransomware continues to broadly target many manufacturing sectors and subsectors. As ransomware activity increases, it results in more risk for OT networks, particularly networks with poor segmentation."
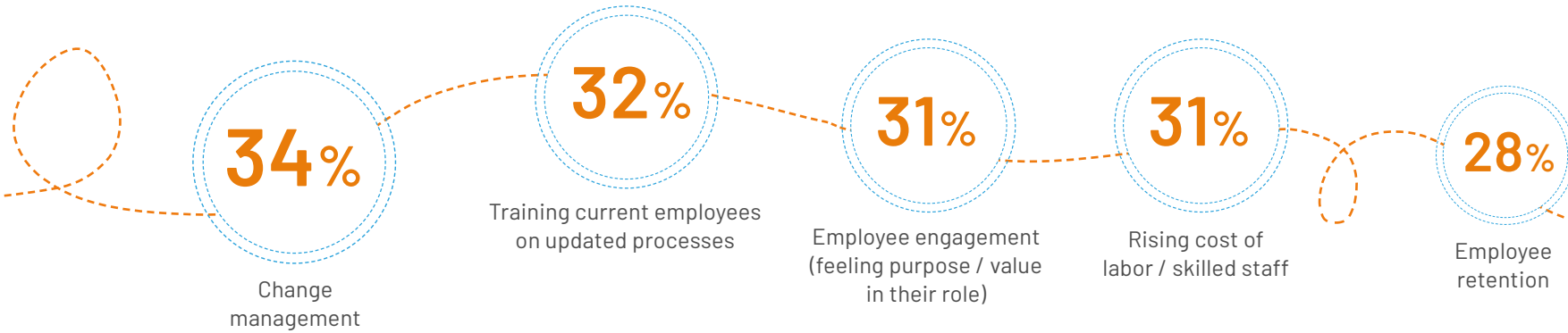
Dragos, **2023 OT Cybersecurity Year in Review**

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Employees navigating **seismic change**

Helping employees adapt to seismic shifts within the industry will distinguish successful manufacturers from the rest. **Change management and training employees on updated processes are the top two workforce-related obstacles.** Number three on the list is also linked: helping employees stay engaged and feel valued in their roles.

34%
Change management

32%
Training current employees on updated processes

31%
Employee engagement (feeling purpose / value in their role)

31%
Rising cost of labor / skilled staff

28%
Employee retention

Q. Which of the following are the biggest workforce-related obstacle(s) your organization faces in the next 12 months? Select all that apply. Base:1567

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Improving efficiency top reason
for pursuing sustainability and ESG

Reducing energy usage, repurposing / recycling and maximizing resources are must-haves as technology is being used to squeeze every ounce of efficiency from operations.

Manufacturers are turning to smart manufacturing technology to achieve their sustainability and ESG goals, with a focus on improving quality, cutting costs and driving OEE.

Smart Manufacturing technology drives efficiency:

1 Improve quality

2 Reduce cost

3 Drive OEE

Q. What positive business outcomes are you looking to achieve from your smart manufacturing technology? Select all that apply. Base: 1567

TOP 10 MOTIVATIONS TO PURSUE SUSTAINABILITY / ESG

1 Improve efficiencies

2 Competitive differentiation

3 To address potential environmental issues before they arise

4 Fosters a collaborative environment

5 Government regulations

6 A desire to do good

7 To build our presence in the community

8 To address social inequalities suppresing talent in the workforce

9 Supplier / Customer demands

10 It's good for the bottom line

Q. Which of the following drives or motivates your organization to pursue sustainability / ESG? Select all that apply. Base: 1567

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The **data divide**

Manufacturers with annual revenues less than $500 million use only 38% of their data effectively, compared to those with revenues of over $30 billion who effectively use more than half (51%).

While ARC believes recent generative AI breakthroughs are an evolutionary step in the domain of Industrial AI, its impact on the user interaction paradigm for industrial software solutions, and democratization of access to AI is likely to be revolutionary."

Colin Masson | Director of Research, ARC Advisory Group
How Leaders Are Embracing Industrial AI
ARC Advisory Group

Size of manufacturer matters when it comes to using data effectively

51%

38%
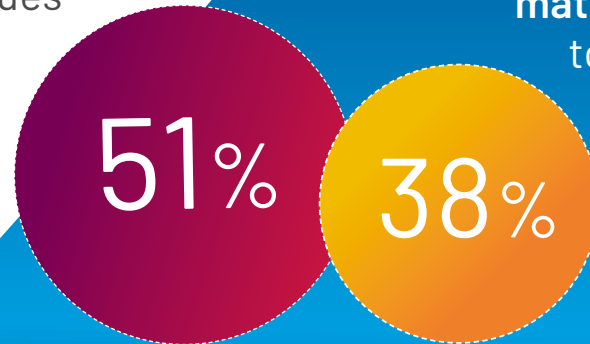
Manufacturers with revenue more than $30B

Manufacturers with revenue less than $500M

Q. What percentage of the data you collect is used effectively? Select one. Base: 1567

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Adversity **accelerates transformation**

The vast majority of manufacturers (83%) say the obstacles they face are accelerating digital transformation.

This figure rises above 90% in Brazil, China, India, Japan, Saudi Arabia and the United Arabs Emirates (UAE).

Given supply chain disruptions over the last few years, the warehouse and fulfilment industry sees the highest acceleration of digital transformation, followed by the renewable energy and chemical sectors.

83% say the obstacles they face are **accelerating digital transformation**

91% UAE, SAUDI ARABIA

92% CHINA

94% BRAZIL

91% INDIA

91% JAPAN
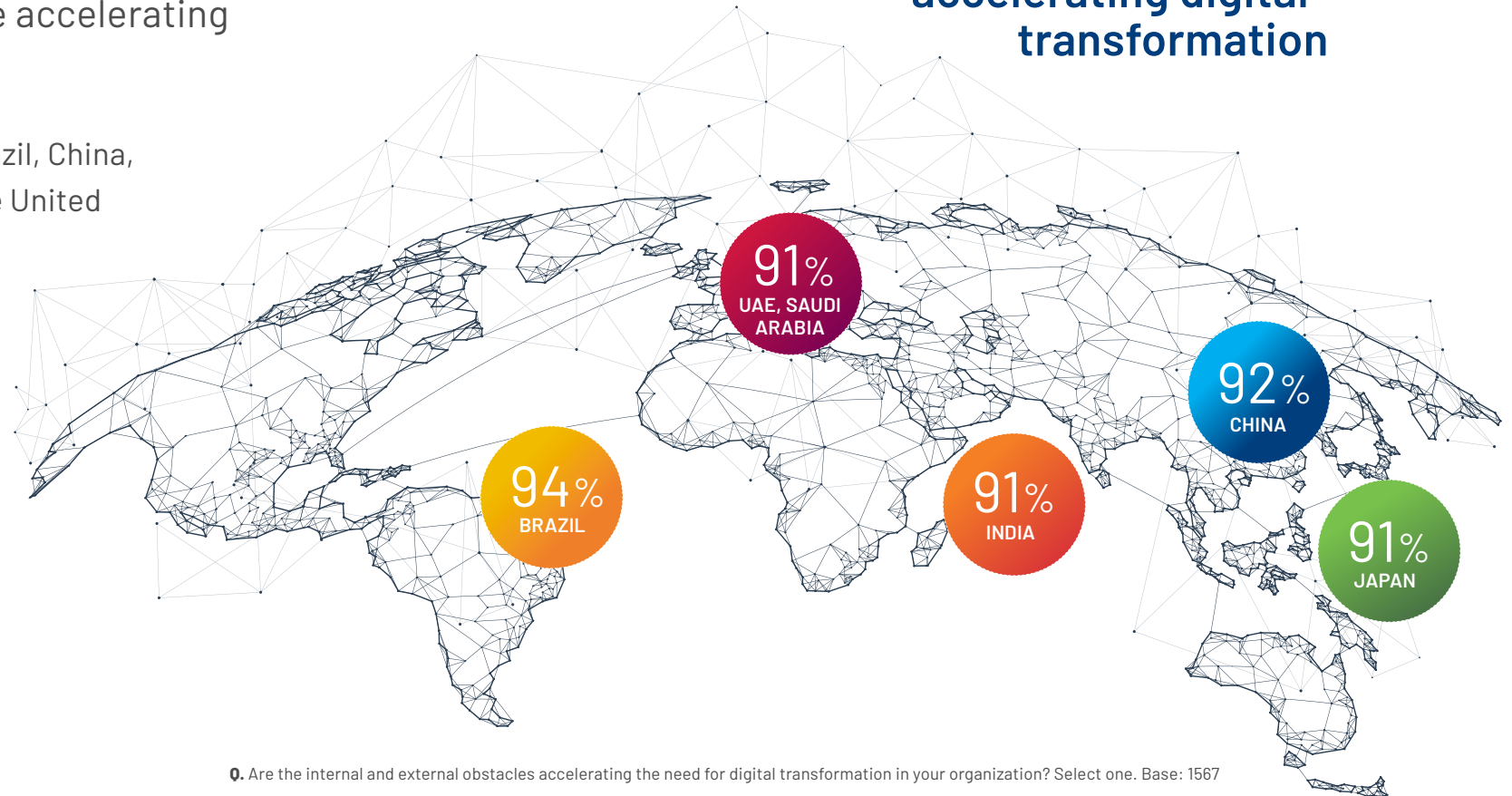
Q. Are the internal and external obstacles accelerating the need for digital transformation in your organization? Select one. Base: 1567

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THE FUTURE OF
SMART
MANUFACTURING

Today's emerging technologies will be tomorrow's table stakes, and organizations that become early adopters will be set up for future success.

Balancing people, technology and sustainability and ESG practices will be key to industry leadership.

RA Rockwell Automation

The race to **capitalize on AI**

GenAI and causal AI, cobots and AMRs have already been adopted by manufacturers to enhance and complement the workforce, while reducing errors, increasing speed to value and improving quality.

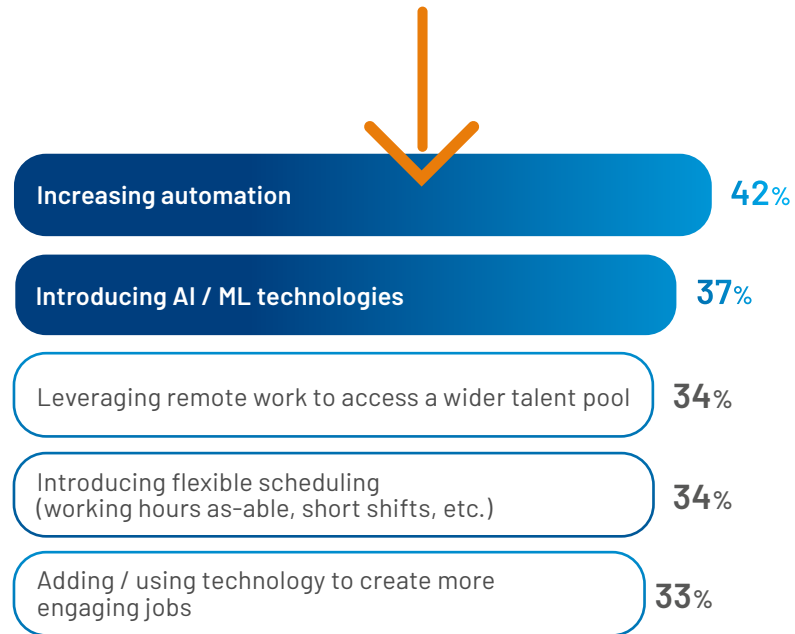**85%** have already invested or plan to invest in **AI / ML** this year.
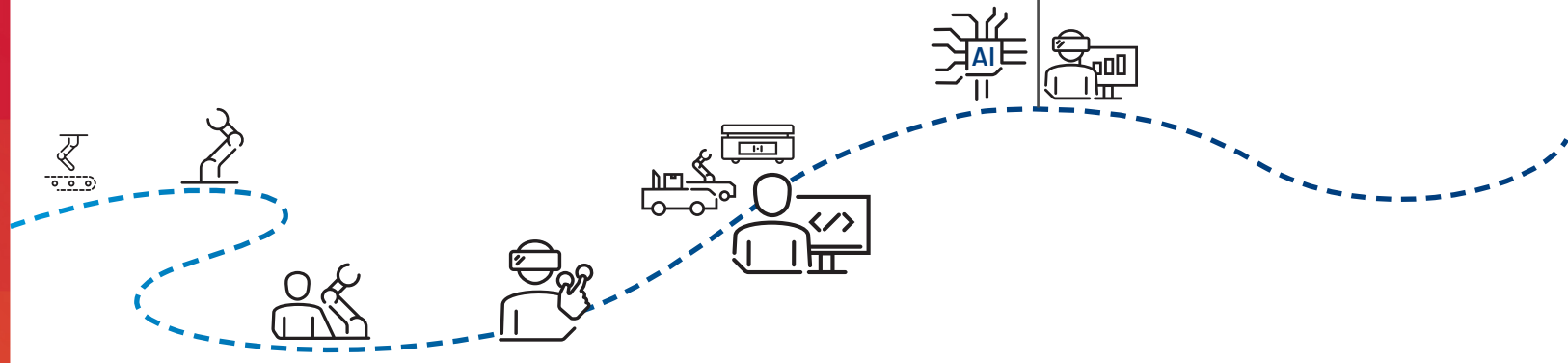
1 GenAI or causal AI

2 Cobots (Collaborative Robots)

3 Autonomous Mobile Robots (AMRs) and Automated Guided Vehicles (AGVs)

4 Zero trust architecture

5 Generative design

6 AI / ML

7 Industrial metaverse

8 RFID / geotagging

9 Voice recognition / Natural Language Processing (NLP) technology

10 Digital thread

Q. Which of the following technologies has your company invested in? Respondents selected: Plan to invest in the next 12 months from four options. Base: 1567
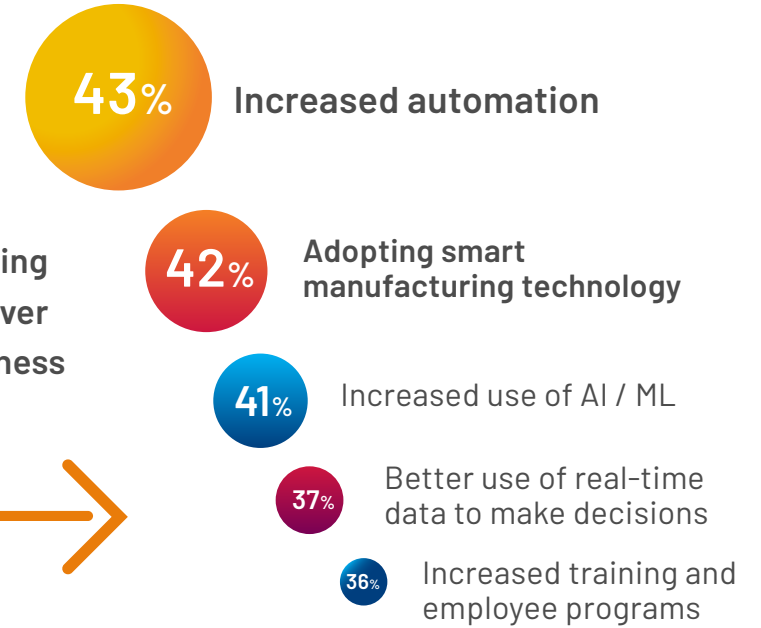
Automation **crucial for success**

The top ways manufacturers are addressing the industry's labor shortage and skills gap are **increasing automation** and **introducing AI / ML**.

Increasing automation	**42**%
Introducing AI / ML technologies	**37**%
Leveraging remote work to access a wider talent pool	**34**%
Introducing flexible scheduling (working hours as-able, short shifts, etc.)	**34**%
Adding / using technology to create more engaging jobs	**33**%

Q. How are you addressing the manufacturing industry's labor shortage and skills gap? Select all that apply. Base: 1567

Use of automation, smart manufacturing technology and AI / ML will increase over the next 5 years to drive positive business outcomes, along with investment in employee training and programs to accelerate successful technology adoption and optimization.

43% **Increased automation**

42% **Adopting smart manufacturing technology**

41% Increased use of AI / ML

37% Better use of real-time data to make decisions

36% Increased training and employee programs

Q. How do you plan to drive positive business outcomes over the next five years? Select all that apply. Base: 1567

At Microsoft, we see a future where intelligent factories powered by people using AI and Generative AI become the norm, not the exception. Emerging technologies delivered through partnered ecosystems are helping to pave the way for sustainable, autonomous operations that redefine productivity. Imagine production lines optimized by data insights, robots collaborating seamlessly, and materials sourced responsibly. This isn't just a vision, it's a reality we're building together. Let's unlock the future of manufacturing, one innovation at a time."

Gary Nafus | Vice President, US Manufacturing

Sustainability and ESG at **heart of risk mitigation**

Manufacturers have signaled their intent to make sustainability and ESG a core priority. **The top way respondents are mitigating against internal risk, alongside upskilling existing talent, is adopting technology for tracking and quantifying sustainable practices,** an increase from third place last year.

No matter where you are in your journey, IT is a critical enabler for that (sustainability) transformation and for value generation through corporate sustainability practices, and it is important to understand how to best leverage technology to move up to the next stage."

Bjoern Stengel, Global Sustainability Research Lead, Sustainable Strategies and Technologies at IDC
IDC FutureScape: Worldwide Sustainability/ESG 2024 Predictions

TOP 3 APPROACHES TO MITIGATE INTERNAL RISK

1 Adopting technology for tracking / quantifying sustainable practices

2 Upskilling existing talent

3 Adopting smart manufacturing technology

Q. How is your organization mitigating the internal risk mentioned in the previous question? Select all that apply. Base: 1567

Technology investment drives **long-term business resilience**

Despite current challenges and setbacks, manufacturers are looking at their businesses through a long-term lens. **By investing in technology, they expect to elevate their competitive advantage and build business resilience into the future.**

62%
long-term impact on the business

57%
top-level business objectives / outcomes

At the same time, a third of respondents selected **Emergency / Immediate need due to broken, non-operational technology, which highlights the global obsolescence** organizations are facing in 2024.
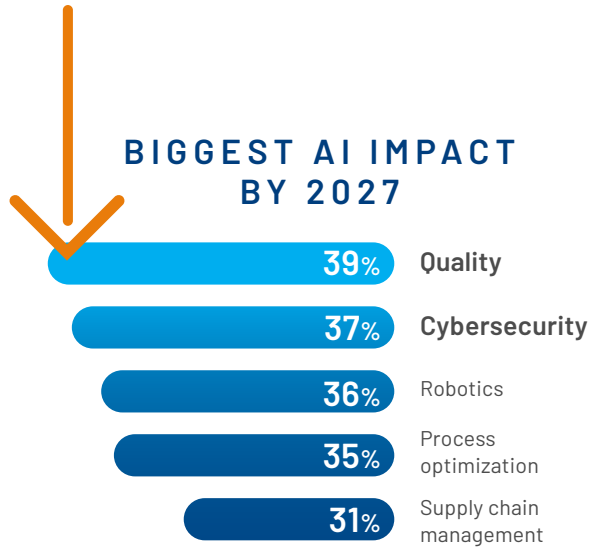
31%
emergency / immediate need due to broken, non-operational tech

MAIN DRIVER OF TECHNOLOGY INVESTMENTS

Q. What was the main driver of your technology investments? Select all that apply. Base: 1567

AI will **improve quality and lower risk**

Over the next three years, **the areas most impacted by AI will be two of manufacturing's evergreen concerns: maintaining quality** and **reducing risk**, specifically cybersecurity.

BIGGEST AI IMPACT BY 2027

39%	**Quality**	
37%	**Cybersecurity**	
36%	Robotics	
35%	Process optimization	
31%	Supply chain management	

Q. What areas will AI most impact the manufacturing industry by 2027? Select all that apply. Base: 1567

Manufacturers cite AI as the technology that will have the biggest impact on workforce challenges.

" – According to Gartner®,
"By 2026, more than 80% of enterprises will have used generative AI APIs, models and/or deployed generative AI-enabled applications in production environments, an increase from fewer than 5% today."

Top Strategic Technology Trends 2024, Democratized Generative AI, Gartner, 2023
2024 Gartner Top Strategic Technology Trends: Detailed Guide (eBook)

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TOP 10 TECHNOLOGIES TO ADDRESS WORKFORCE CHALLENGES

1 GenAI or causal AI

2 Advanced analytics (using AI / ML)

3 AI / ML

4 Robotics

5 Cloud/SaaS

6 Robotic Process Automation (RPA)

7 Autonomous Mobile Robots (AMRs) and Automated Guide Vehicles (AGVs)

8 5G

9 Supply Chain Planning (SCP)

10 Manufacturing Execution System (MES)

Q. Which of the technologies that your company has invested in will have the biggest impact on workforce challenges over the next 12 months? Select top 3. Base: 1562

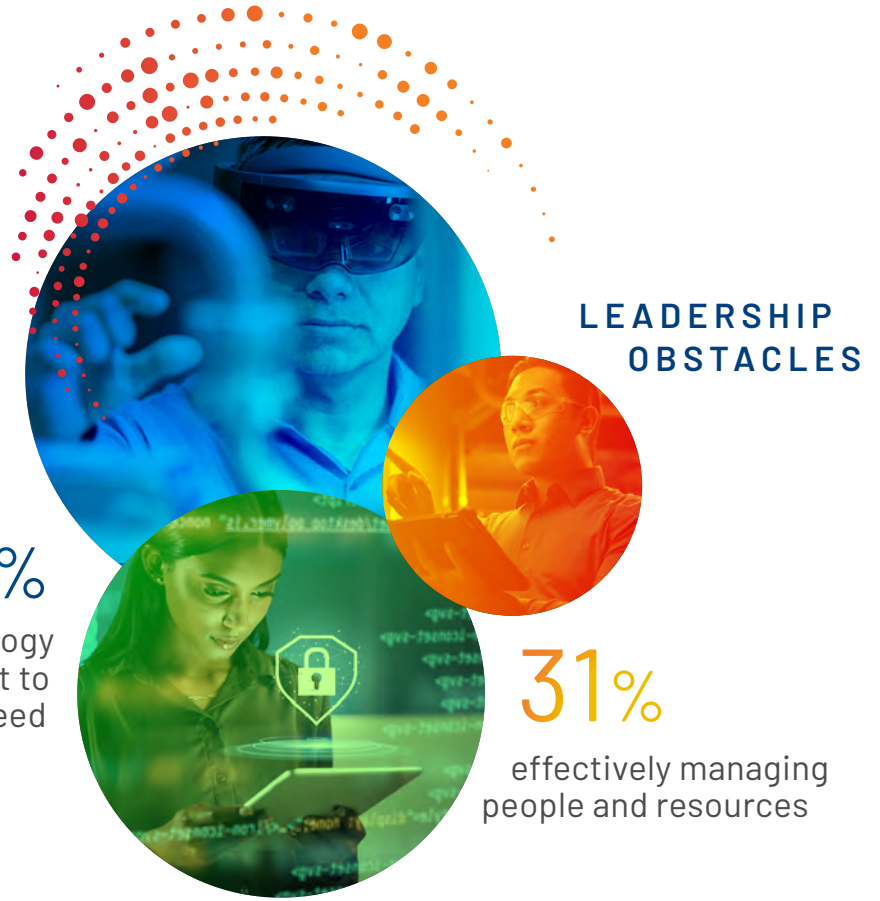# Leaders will balance **people, process and technology**

When asked about **leadership obstacles**, manufacturers identified **two interlinked areas: assessing business and technology / talent fit** and **effectively managing people and resources.** Respondents recognize that it's not an either / or scenario. Both adopting the right technology to complement their team and managing their team to capitalize on resources will be equally crucial.

"

The workforce of 2019 is not coming back. Developing a sustainable workforce strategy is critical to successfully navigate daunting manufacturing challenges. Leaders are winning the war for talent by embracing this new reality and with a laser focus on three imperatives:

1. Total Employee Experience
2. Servant Leadership
3. Connected Frontline Workforce (CFW) Applications

Allison Kuhn, Principal Analyst at LNS Research
Attract and Retain a Quality Workforce with Future of Industrial Work Initiatives

LEADERSHIP OBSTACLES

31%
matching technology and talent to business need

31%
effectively managing people and resources

Q. Which of the following are the biggest leadership obstacle(s) your organization faces in the next 12 months? Select all that apply. Base: 1567

TAKING
ACTION

Smart manufacturing technology enables manufacturers to stay competitive, increase agility and unlock long-term opportunities by connecting and automating the business.

Use the information in this report to plan or continue your digital transformation journey.

Rockwell
Automation

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**

Realize the promise of **digital transformation**

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.

OPTIMIZE

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

I'm ready for assessment starts here

I have a strategy 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.

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.

Manage the change, measure value, communicate results, iterate and improve

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.

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.

Rockwell Automation

8 steps to **drive value, achieve success**

Prove value vs. technology

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

Investments with a short-term payback

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

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.

Foster enterprise collaboration

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

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.

Communicate progress and success

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

Define and apply governance

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

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.
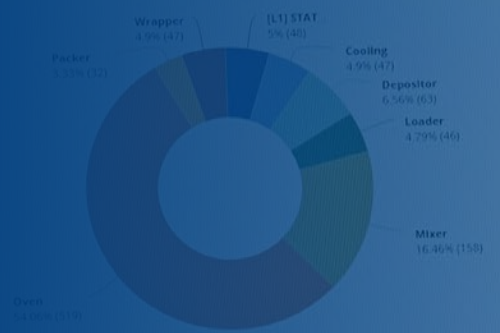
DEMOGRAPHICS /
FIRMOGRAPHICS

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:: DEMOGRAPHICS / FIRMOGRAPHICS ::

REGION

- 41% EMEA
- 31% AMERICAS
- 28% ASIA PACIFIC

JOB ROLE

- 43% Manager
- 20% Director
- 17% Dept. Head
- 9% VP / SVP
- 12% C-Suite

COMPANY LOCATION

- US 13%
- Mexico 6%
- Canada 5%
- Brazil 6%

- UK 13%
- France 6%
- Germany 6%
- Italy 5%
- Spain 5%
- UAE 4%
- Saudi Arabia 2%

- China 6%
- Japan 6%
- Australia 5%
- India 5%
- South Korea 5%
- New Zealand 1%

Our survey respondents

INDUSTRY

- 27% Hi-Tech, Electronics, Semiconductor
- 12% Auto & Tire, Auto Tier Suppliers, EV, Battery
- 12% Metals, Metal Fabricators, Precision Metalforming
- 10% CPG - Food and Beverage, Home and Personal Care
- 10% Energy Transition, Renewable Energy
- 7% Life Sciences - Pharmaceuticals, Medical Devices
- 7% Warehouse and Fulfillment
- 5% Oil and Gas
- 3% Chemical
- 2% Aerospace
- 1% Mining
- 1% Pulp and Paper
- 1% Water / Wastewater

ANNUAL REVENUE

- 17% $100M – $499M
- 19% $500M – $999M
- 31% $1B – $14.9B
- 21% $15B – $30B
- 12% $30B +

RESPONDENT ROLES

- 54% **Primary** decision-maker
- 34% **Share** decision-making responsibility
- 12% **Give input** in decision-making process

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Appendix

Artificial Intelligence is fundamentally changing the **Manufacturing Ecosystem**

There are many AI-related terms used throughout this report that we define below for clarity.

Artificial intelligence (AI)

applies advanced analysis and logic-based techniques, including machine learning, to interpret events, support and automate decisions and take actions.

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. It includes different techniques, such as causal graphs and simulation, that help uncover causal relationships to improve decision-making.

Deep learning

is a variant of machine learning algorithms. It uses multiple layers to solve problems by extracting knowledge from raw data, and transforming it at every level. These layers incrementally obtain higher-level features from the raw data, allowing the solution of more complex problems with higher accuracy and less manual tuning.

Industrial AI*

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

Generative AI (GenAI)

refers to AI techniques that learn a representation of artifacts from data, and use it to generate brand-new, unique artifacts that resemble but don't repeat the original data. These artifacts can serve benign or nefarious purposes. GenAI can produce totally novel content (including text, images, video, audio, structures), computer code, synthetic data, workflows, and models of physical objects. GenAI also can be used in art, drug discovery, or material design.

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.

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