

Power Manufacturing Transformation in the AI Era

How manufacturers can build an agile, resilient
foundation for AI from the factory floor to the cloud



Manufacturing Requires a Different AI Playbook

AI is rapidly becoming a practical tool in manufacturing, with production-level use cases emerging in predictive maintenance, quality inspection, supply chain optimization, and workforce enablement.

As adoption accelerates, many manufacturers see AI as a generation-defining opportunity to unlock new levels of productivity, resilience, and growth. In fact, **93% of industry leaders** believe that organizations that fully integrate AI will gain a significant competitive edge over those that do not.¹

While the promise is real and the momentum undeniable, moving from ambition to results is proving difficult. Many of the most valuable AI workloads depend on decades' worth of proprietary operational data that is locked inside fragmented legacy systems and environments. As a result, **56% of manufacturers** have faced data-related issues when implementing AI solutions.¹

The barriers are structural: Manufacturing is not a digital-first industry, and AI must operate in production environments where reliability and uptime are non-negotiable. Unplanned downtime directly affects revenue, safety, and customer commitments, and its financial impact can be steep. Manufacturers lose **\$255 million annually** from downtime, among the highest of any industry.²

At the same time, legacy production systems were never designed to deliver the contextualized data foundation AI requires. Manufacturing data spans IT, OT, edge, and plant-floor environments, making consistent governance and control difficult to achieve at scale.

Expanding digital footprints introduce new operational and security risks. As systems become more integrated, visibility gaps or inconsistent controls can allow small issues to spiral into costly disruptions.

Meanwhile, operational complexity is also increasing. Manufacturing work now spans physical facilities, connected equipment, remote teams, and cloud-based engineering environments. Workforce shortages add further strain, with **3.8 million net new roles** expected from now through 2033—nearly half of which may go unfilled without greater automation and intelligence.³

As AI momentum builds, manufacturers face a defining challenge: not whether to adopt AI, but how to do so without compromising uptime, safety, or the operational integrity that production depends on.

3.8M

net new manufacturing roles are projected by 2033, with nearly half at risk of going unfilled³

¹"Intelligent manufacturing: A blueprint for creating value through AI-driven transformation," KPMG, 2025.

²"The Hidden Costs of Downtime," Splunk, 2024.

³"Deloitte and The Manufacturing Institute Talent Study," Deloitte and The Manufacturing Institute, 2024.

Where AI Meets Manufacturing Outcomes

The industrial AI playbook requires an integrated foundation that supports data, execution, and resilience from the start.

Build an Agile Operational Backbone

For manufacturers moving beyond pilots, scaling AI is an operational discipline as much as a technical one. Success depends on having the right conditions for intelligence to run safely and consistently.

AI in manufacturing requires access to reliable, contextualized data. When OT data is siloed, poorly governed, or disconnected from IT systems, AI initiatives lose effectiveness. An industrial data foundation that unifies IT and OT data is essential for analytics, automation, and machine learning across manufacturing environments.

Infrastructure strategy has also become a key consideration. According to [73% of manufacturing IT decision-makers](#), AI workload growth will be the most impactful driver of change in enterprise computing and storage over the next two years.⁴

AI workloads vary significantly in their requirements. Many manufacturing use cases need low latency, local execution, and proximity to proprietary data, while others benefit from centralized analytics and large-scale compute. Supporting both requires flexibility, not rigid deployment models. Manufacturers must be able to run workloads where they perform best, while maintaining consistent security, visibility, and control across environments.

When the right foundation is in place, manufacturers can scale AI with confidence while protecting uptime and operational integrity. That in turn accelerates engineering and product innovation, strengthens performance, and enables new digital services and business models across the production lifecycle.

⁴“On-Premises AI Infrastructure for Manufacturing Security, Quality, and Scale,” IDC, July 2025.

Activate Intelligence Wherever Manufacturing Work Happens

In manufacturing, AI delivers value only when intelligence reaches people on the factory floor, at the edge, and across distributed teams. That’s when insight moves out of dashboards and into the workflows that drive production.

In AI-enabled environments, those insights flow directly to frontline teams in real time, supporting maintenance, quality, and production decisions without slowing work. Equipment health, quality signals, and supply constraints are visible in context, not buried in disconnected systems or reports. AI capabilities also run close to machines and production systems, enabling fast response even when connectivity to centralized platforms is limited.

When AI surfaces issues as they emerge on the factory floor, operators and remote experts can collaborate immediately around the same contextual data. At the same time, production and engineering teams gain visibility into the issue as it unfolds, allowing them to adjust plans and resources accordingly. The result is faster resolution, tighter coordination, and stronger knowledge transfer across facilities.

This is where AI proves its value. Embedded into frontline workflows and shared operational systems, it helps teams identify issues sooner, resolve them efficiently, and keep production moving.

96%

of manufacturers have experienced **operational and efficiency improvements** from AI¹

Maintain Resilience in AI-Driven Operations

As AI expands into maintenance, inventory, and production workflows, day-to-day operations grow more dependent on connected systems and less tolerant of disruption. That makes resilience an operational requirement. In such highly connected environments, small issues can quickly ripple across workflows, affecting safety, output, and revenue.

At the same time, manufacturers face persistent cyberthreats. Manufacturing has been the **most targeted industry for cyber attacks** since 2021.⁵ In this environment, protection must be continuous, not reactive. With operations spanning IT, OT, edge, and cloud, manufacturers need real-time visibility into how critical workflows are performing, not just infrastructure status.

End-to-end observability enables early detection of anomalies and faster response, reducing the likelihood that minor issues will escalate. Case in point: **78% of manufacturing respondents** credit observability with a significant or somewhat positive impact on product and service uptime and reliability.⁶

But visibility alone isn't enough; security must also operate at AI scale. Consistent, zero-trust controls protect production systems without slowing access, performance, or decision-making. Together, observability and security sustain the trust required to run AI-driven operations with confidence.

⁵"IBM X-Force 2025 Threat Intelligence Index," IBM, 2025.

⁶"State of Observability in Manufacturing in 2025," Splunk, 2025.



Where AI Falls Short in Manufacturing

Manufacturers rarely struggle to identify promising AI use cases. Most problems arise when intelligence moves from pilots into production-critical operations. Some common failure points:

- ! **Insights arrive too late to influence decisions.** AI that lives in dashboards or centralized systems often fails to reach frontline teams in the moments that matter, limiting its impact on maintenance, quality, and production outcomes.
- ! **Intelligence is disconnected from operational workflows.** When AI outputs aren't embedded into day-to-day processes, teams revert to manual workarounds and adoption stalls, even when model performance is strong.
- ! **OT data lacks context or accessibility.** Siloed or poorly contextualized operational data undermines trust in AI-driven insights, particularly in situations where accuracy and safety are on the line.
- ! **Frontline and remote teams can't see the same operational reality.** Without shared, real-time views, collaboration slows and issues take longer to diagnose and resolve, increasing the risk of downtime.
- ! **Blind spots allow small issues to escalate.** Limited visibility across IT, OT, edge, and cloud environments makes it difficult to detect anomalies early.

Industrial-Grade Infrastructure for the AI Era

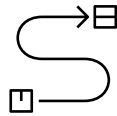
Manufacturing does not have the luxury of trial and error at AI scale. Success requires the right foundation from day one. Cisco and Amazon Web Services (AWS) bring decades of expertise in running mission-critical industrial and cloud environments. Together, they deliver the secure connectivity, unified infrastructure, and operational visibility needed to run AI wherever manufacturing work happens, helping turn AI ambition into production-ready results.



Build an AI-Ready Industrial Foundation

Run AI and manufacturing workloads anywhere to drive efficiency, innovation, and new revenue.

- Industrial data foundation for AI
- Secure, elastic core-to-cloud infrastructure
- Accelerated engineering and innovation
- Connected data to fuel new digital services



Future-Proof Work from Carpet to Concrete

Connect people, systems, and spaces to keep work moving safely and efficiently wherever manufacturing happens.

- Role-based access to real-time operational intelligence
- Faster production issue resolution with remote expertise
- Connected design, simulation, and production
- Knowledge sharing and collaboration across teams



Protect Every Workflow with Observability

Maintain uptime and safeguard operations with end-to-end visibility, intelligent detection, and rapid response.

- Unified visibility over IT, OT, edge, and cloud
- Continuous zero-trust protection across connected environments
- Faster anomaly detection and threat response
- AI-driven, actionable insights

Built for Manufacturing at AI Scale

Cisco and AWS combine secure industrial connectivity with scalable cloud infrastructure so manufacturers can expand AI without growing risk. Find out more about our partnership at cisco.com/go/aws.

And explore Cisco solutions on [AWS Marketplace](#).