
DELL Technologies
NVIDIA
AI at the
Manufacturing Edge
Get Started

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Why is AI moving to the manufacturing edge?

The evolution of smart manufacturing.

Modern manufacturers are finding new ways to leverage their sensor data. Smart manufacturing is powered by technologies that capture and analyze data closer to the point of creation — also known as the edge — for better insights and enhanced efficiencies. Edge computing's capability to support vast networks of internet of things (IoT) sensors, as well as deliver faster inputs for decision-making compared to the data center and cloud, are key drivers behind its deployment.

69% of manufacturing IT infrastructure will be deployed at the edge within the next 24 months.[1]

At the same time, the vast influx of data at the edge can paradoxically become a barrier to transformation. Expanding data sets, including new data types across new edge locations, can overwhelm edge technology with its sheer volume — even as user expectations for real-time insights increase.

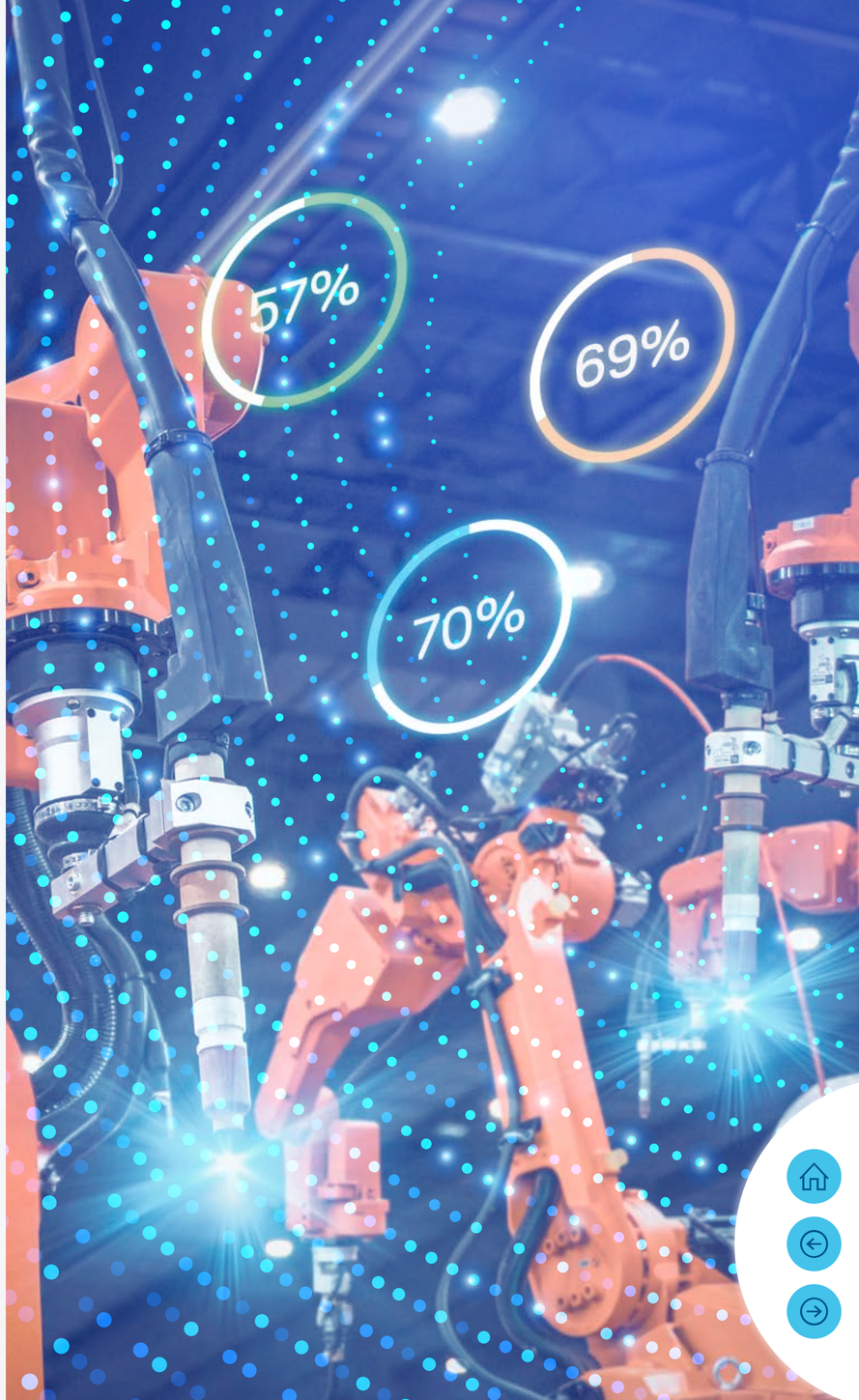
70% of organizations gather data faster than they can use it.[2]

Despite these challenges, manufacturers and other industrial firms continue to innovate at the edge, differentiating themselves based on their ability to derive value from edge data. Today, that means making use of artificial intelligence (AI) and machine learning (ML) to process massive data sets and return insights in near real time at the point of data creation and consumption.

57% of manufacturers already perform AI/ML inferencing at the edge.[1]

[1] 451 Research sponsored by Dell Technologies, S&P Global Market Intelligence, August 2021.

[2] Forrester Consulting on behalf of Dell Technologies, Unveiling Data Challenges Afflicting Businesses Around The World, May 2021. Base: 4,036 director + decision-makers responsible for data and data strategies in North America, Europe, Asia, Pacific and Japan, Greater China or Latin America.



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The factory of the future is data-driven and AI-optimized.

Zero accidents, defects, breakdowns or knowledge gaps.

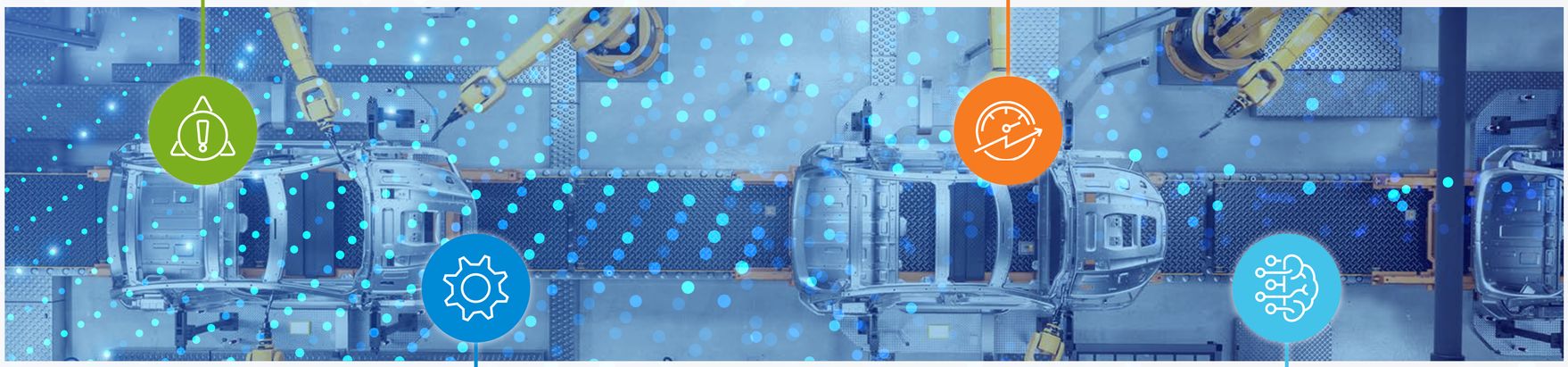
The benefits of AI in action at the edge are numerous and incredibly impactful. AI can advance your organization's ability to protect workers, enhance production quality, avoid maintenance issues and fill in skills gaps with machine intelligence. All of this helps you stay more relevant and competitive.

Zero accidents

AI computer vision monitors workers to make sure they're operating machinery safely. For example, the system can raise an alert if it detects that personal protective equipment (PPE) is not worn properly, or it can disable systems that become a danger to workers due to human error or equipment malfunction.

Zero defects

AI can track parts coming into and moving through the factory. Computer vision speeds and automates the inspection of work in process throughout the entire production cycle. Defects can be identified, flagged and tracked back to individual processes or components in real time for immediate remediation, as opposed to after a defective product is discovered.



Zero breakdowns

AI-driven predictive maintenance systems use data from sensors and IoT data to pinpoint the exact location of maintenance requirements — saving technicians significant amounts of time in diagnoses and allowing the organization to proactively predict and prevent future equipment failures. Proactively keeping equipment and processes up and running at an optimal level of performance helps you protect workers, avoid disruptions and reduce maintenance costs.

Zero knowledge gaps

Augmented reality (AR)–based AI systems allow off-site specialists to visit the factory virtually, using the AR interface to directly evaluate a situation and guide or train on-site workers. The AI can also understand situational context and load standard processes for recommended action, with each step clearly demonstrated in AR, allowing untrained workers to perform complex tasks in cases where specialists are unavailable.

Challenges abound at the edge.

Overcome roadblocks to running AI outside the data center.

Moving AI to the manufacturing edge promises a lot of tantalizing benefits, but it also poses some unique challenges that need to be overcome for manufacturing edge AI deployments to be successful.

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Speed

Edge data often provides the most value when it can be processed in near real time, enabling action in seconds or less. Real-time insights require capturing, sorting and processing data faster than ever before. But the processes for data collection and consolidation from multiple edge devices can be lengthy and costly. And streaming high volumes of data to the cloud or data center impacts response time, introducing latency that leads to slower time to action and negatively impacts efficiency and productivity.

Scale

Keeping up with data growth at the edge is critical. Smart manufacturing will spark a significant rebalancing, putting more technology closer to users than ever before. New AI systems and additional capacity will be needed for new sites and new use cases. Physical space can be a limiting factor, with devices needing to fit into closets, outdoor enclosures, vehicles and many other space-constrained environments. Systems built to scale easily and without significantly increasing the IT footprint are key.

Challenges abound at the edge (continued).

Focus on four primary areas when addressing challenges at the edge:

1. Speed
2. Scale
3. Security
4. Skills

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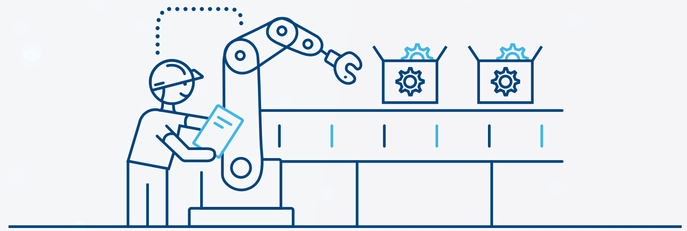
Security

Many edge locations have limited physical security, and edge data represents a large and growing attack surface for cybercriminals. Data governance can also be a challenge outside the corporate firewall. With increasing regulations and vulnerabilities around data, how information is stored, accessed and protected is increasingly important. Decentralized data centers and cloud environments might create challenges that are hard to overcome, so the edge becomes a viable option for consolidating data where it is generated, processed and analyzed.



Skills

Architecting, deploying and managing an AI solution typically requires advanced skills that outpace capabilities and budgets at the edge. According to a recent survey, 93% of U.S. companies say AI is a priority, but over half say they lack in-house IT skills to put AI into action.[3] In addition, gaps between operational technology (OT) and IT infrastructure can inhibit success at the edge; IT teams will need to connect with the OT space to bridge the gap between cloud / data centers and the edge to create a cohesive, consistent environment.

[3] Spiceworks, Is the Skills Gap Putting AI implementations at Risk? Five Ways the Gap Can be Bridged, May 2022.

Use edge AI to generate more value.

A cohesive edge strategy is the answer to overcoming these challenges.

It is time for you to invest in an edge system that will help you increase your efficiency and consistency across OT and IT and unlock actionable insights from all this data you've been generating.

Organizations need to set up a strong foundation of storage, hardware, software and general infrastructure, security and consulting services to fully understand the entire journey from ingesting edge data to getting the desired business outcome from beginning to end.

How to simplify your AI experience.

To further simplify deployment, integration, security and management, configured systems built by manufacturing AI experts can accelerate time to value with solutions designed especially for smart manufacturing use cases. Choosing an engineering-validated solution for AI can help you overcome barriers to adoption, including a lack of on-site AI expertise.

Dell Validated Designs

Manufacturing Edge with Litmus leverages the Dell Streaming Data Platform (SDP) and Dell VxRail, unifying OT with IT and the business to accelerate smart manufacturing.

Manufacturing Edge with PTC runs on Dell VxRail, consolidating applications and powering live insights for operational excellence.

Splunk designs offer a choice of Dell PowerEdge, VxRail and/or PowerFlex, harnessing machine data to enable predictive maintenance.

How to harness streaming data at the edge.

Success with AI at the manufacturing edge requires a platform that can capture, process, store and analyze streaming data while answering speed, scale, security and skills challenges. Solutions provide an easy-to-implement platform for ingesting, storing and analyzing continuously streaming data in real time, including unlimited playback of historical data for AI and ML use cases, with tiered modeling and analytics.

How to activate data at the edge for AI.

The edge can present environmental challenges to implementing AI. Hardened and compact hyperconverged infrastructure (HCI) can be the perfect solution for delivering powerful compute and storage resources along with integrated management for manufacturing edge deployments. Ruggedized HCIs with a smaller form factor are ideal for running AI in space-constrained and network-challenged locations.

Dell Streaming Data Platform

Unified

Consolidates real-time batch and historical analytics

Trusted

Provides technical experts at your fingertips

Modern

Built on open-source components and with future extensibility

Dell VxRail HCI

41%

report improved service and support.[4]

37%

cite increased VM provisioning agility.[4]

39%

experience improved scalability.[4]

[4] Dell Technologies, Modernize IT. Start with VxRail hyper-converged, accessed August 2022.

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Real-world successes with AI at the edge.

See how manufacturers are already benefiting from edge AI.

The Kraft Group

improves user experiences across business units with AI at the edge.

Real-time
alerts via AI computer vision

25–30%
decrease in storage expenditures

60%
decrease in data center footprint

> Our Dell Technologies infrastructure provides data in a real-time scenario that lets our stakeholder group evaluate their businesses on a daily basis and make decisions based on what's really going on.

— Michael Israel, CIO, The Kraft Group

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Real-world successes with AI at the edge.

See how manufacturers are already benefiting from edge AI.

Linde manufacturing

builds a smart factory for intelligent innovation.

27%	30%	28%
increase in output	faster error detection	decrease in energy use

> "I know our business, and Dell knows technology. Together, we create impressive solutions that save time and energy — and help customers do the same.

— Benny Zhang, VP, KION Group IT — APAC Linde (China) Forklift Truck Corp., Ltd.

Read Customer Story

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Real-world successes with AI at the edge.

See how manufacturers are already benefiting from edge AI.

RWTH Aachen University

uses the Streaming Data Platform to deliver real-time data insights at the industrial edge.

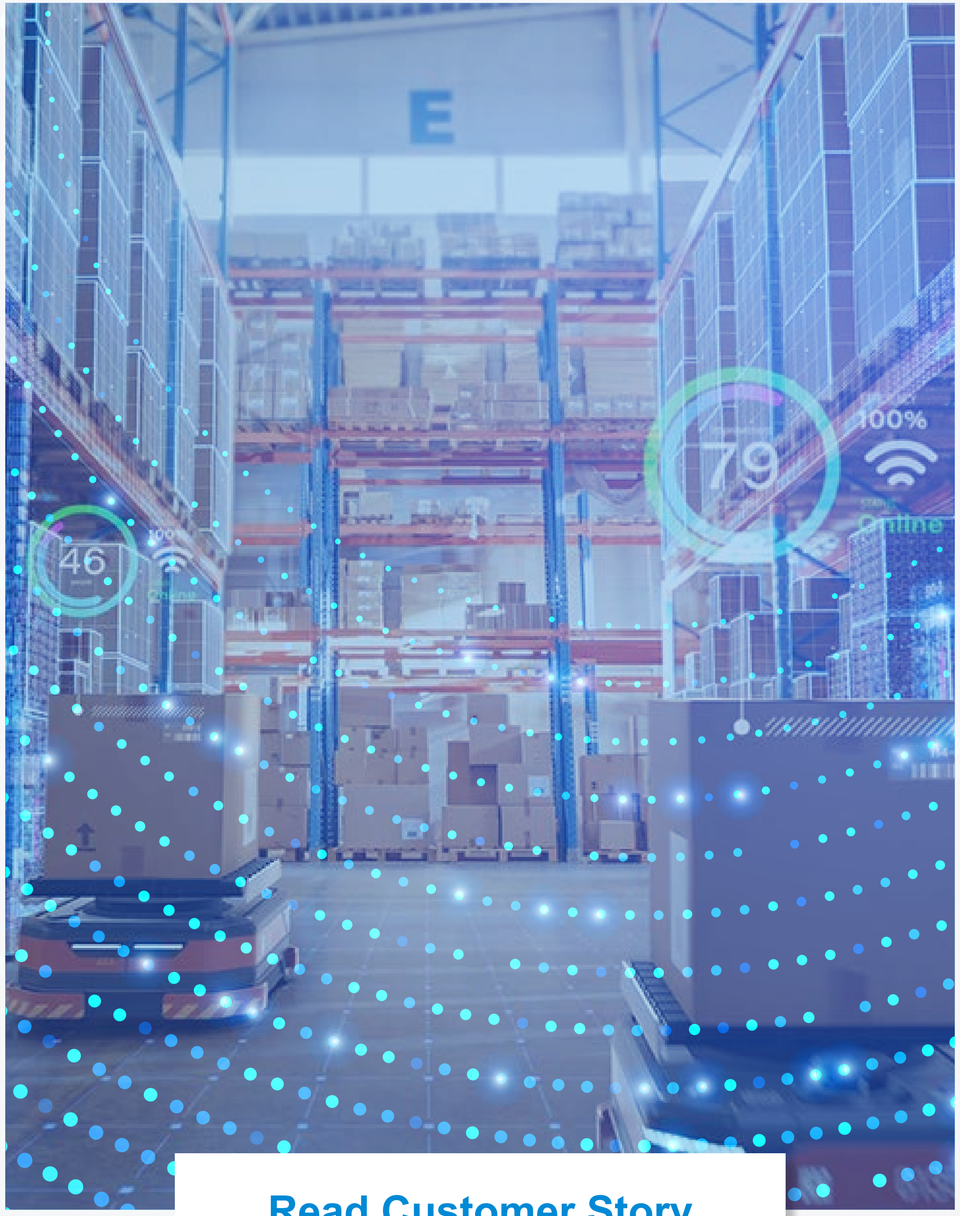
80TB
of data ingested, stored and analyzed per day in near real time.

1,000
characteristic values recorded every 0.4 milliseconds for immediate anomaly detection.

Near infinite
storage and playback for various data types.

> "Processing everything as a stream, the Streaming Data Platform makes it easy for us to use one processing model to create new analytics pipelines.

— Dr. Daniel Trauth, CDO and Director for Digital Transformation, Laboratory for Machine Tools and Production Engineering, RWTH



Read Customer Story

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Why Dell Technologies.

Partner with an industry leader.

Collaborate at worldwide Customer Solution Centers.

Collaborate with Dell Technologies engineering teams at one of our worldwide Customer Solution Centers, tap into the resources of one of our HPC & AI Centers of Excellence or test and tune real-world systems at the HPC & AI Innovation Lab.

Consume AI as-a-Service with Dell APEX.

With simple and consistent cloud experiences delivered as-a-Service (aaS), APEX can help you get the AI-optimized solutions you need to fast-track intelligent outcomes everywhere. APEX can deliver a cloud operating model for AI on-premises, off-premises and at the edge, so you can create measurable value from data at any scale.

Speed success with services.

Dell Technologies Services include consulting, deployment, support and education to help drive the rapid adoption and optimization of AI environments from initial setup and upskilling of resources through to ongoing support. Managed Services and Residency Services can help reduce the cost, complexity and risk of managing IT so you can focus resources on digital innovation and transformation.

Transform your business with OEM Solutions.

If you are developing products for AI at the industrial edge, you can collaborate with the Dell Technologies OEM Solutions team to design your solution and bring it to market faster. OEM Solutions has 20+ years of experience across 40+ verticals — including unique capabilities such as engineering, customization and program management — and a broad portfolio of edge-optimized products.

How will you spark smart manufacturing outcomes at the edge?

Take the simpler, more direct path to edge AI with Dell Technologies.

Drawing on the power of AI at the edge, smart manufacturers are realizing the very tangible and measurable business benefits that come with better, faster insights at the point of need. This intelligent approach to manufacturing gives you the ability to differentiate and compete in a competitive global marketplace.

Dell Technologies makes the power of AI accessible to manufacturing organizations of all sizes, with the solutions and services you need to achieve success with new and emerging use cases at the edge.

Learn more.

Visit Dell.com to learn more about:

- Dell Validated Designs for AI
- Manufacturing edge solutions
- Dell Streaming Data Platform

NVIDIA® LaunchPad, a program that gives enterprises and organizations immediate, short-term access to NVIDIA AI running on Dell accelerated compute infrastructure, speeds the development and deployment of modern, data-driven applications. Launchpad enables quick testing and prototyping across the entire AI workflow on the same complete stack you can purchase and deploy. To learn more about accelerating AI at the edge, visit nvidia.com/edge.