

A man in a blue uniform and safety glasses is working on a large industrial turbine in a factory. The turbine is the central focus, with its complex internal structure visible. The man is looking up at the turbine, and his hands are near it. The background shows the industrial setting with various pipes and structures.

DELL Technologies

AI and HPC for Manufacturing

Speed design workloads with artificial intelligence
powered by high performance computing systems

FASTER, BETTER DESIGN

Unleashing the power of data will transform the manufacturing industry.

Growing consumer expectations and intense global competition are driving small and medium manufacturers (SMMs) to seek innovative ways to produce more sophisticated products, more quickly and with lower costs.

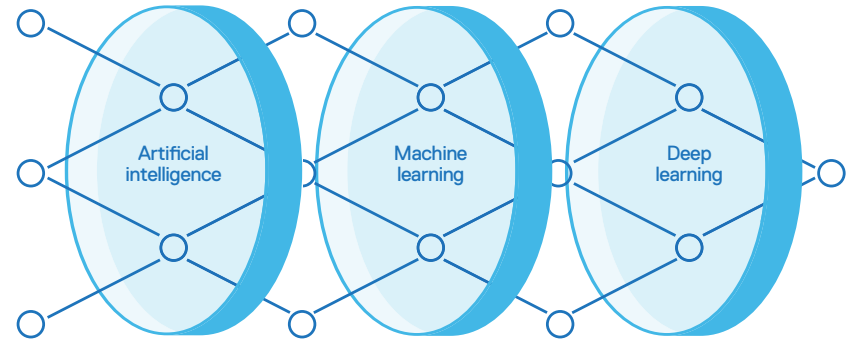
Many SMMs understand the value of using high performance computing (HPC) to run computer aided engineering (CAE) workloads such as structural analysis, computational fluid dynamics and other prototype tests faster and with fewer errors. At the same time, artificial intelligence (AI), fed by massive amounts of data supplied by internet of things (IoT), can provide insights for radical new methods of product design and production methods.

It's clear that advanced computing technologies, such as data analytics and AI, powered by HPC systems, are the key to the next industrial revolution. In particular, HPC-powered analytics and AI will revolutionize engineering design automation (EDA) to help manufacturers speed time to market with more innovative and higher-quality products.

THE INTELLIGENCE BEHIND BETTER PRODUCT DESIGN

AI is a complex set of technologies underpinned by machine learning (ML) and deep learning (DL) algorithms, typically run on powerful HPC systems. Together, they enable manufacturers to harness data to help them design better products and get them to market sooner.

The capabilities of AI, ML and DL can unleash predictive and prescriptive analytics on a massive scale. Like lenses, AI, ML and DL can be used in combination or alone — depending on the use case — to focus in on answers to design challenges.



AI is an umbrella term that describes a machine's ability to act autonomously and/or interact in a human-like way.

ML refers to the ability of a machine to perform a programmed function with the data given to it, getting progressively better at the task over time as it analyzes more data and receives feedback from users or engineers.

DL uses artificial neural networks (ANNs), inspired by the human brain, to process huge volumes of data. ANNs allow the machine to determine on its own if a prediction is accurate so that it can train itself without human intervention.

SMMs can use AI, ML and DL to gain deeper, more accurate and more cost-effective insights across the product design cycle — from initial concept to design to production.



How AI and HPC are being used in manufacturing

Advanced computing is changing how SMMs approach product design, offering new opportunities for improving products while reducing costs and getting to market faster.

1

Structural analysis

Complete more analyses in less time, with fewer errors

AI, running on HPC systems, can be used to collect, organize and encode designers' knowledge and experience into an intelligent decision support system to make analysis-based design faster, decrease error rates and increase computational efficiency.

2

Computational fluid dynamics

Expand capabilities and improve accuracy

AI can be trained to predict fluid behavior and generate simulation algorithms in a matter of days, rather than months, and then query against the simulation to return results in milliseconds, rather than minutes.

3

NVH

Address issues earlier in the design process

AI can be trained to simulate the noise, vibration and harshness (NVH) characteristics of different designs under various conditions prior to expensive and time-consuming prototyping. AI-enhanced NVH can also be embedded in products to help warn of impending operational failure.

4

VDI

Supercharge engineer productivity

Powerful HPC systems can be used to support remote visualization for multiple users on a single, virtualized server running a variety of CAE applications. Virtual desktop infrastructure (VDI) access to simulation and 3D modeling solutions enables greater design freedom and flexibility.

PROVEN EXPERTISE

AI and HPC systems from an industry leader

While AI and HPC might seem like the latest IT trends, Dell Technologies has been a leader in HPC for over a decade.

As an industry leader in AI and HPC, Dell Technologies offers proven products, solutions and expertise that reduce complexity and help you capitalize on the promise of real-time design insights. Working closely with our partner ecosystem and industry providers, we deliver solutions that include infrastructure, applications and services. Plus, Dell solutions are based on open-source architecture, offering access to a wide range of common tools, frameworks and libraries.

Dell Technologies

Dell Technologies helps organizations and individuals build their digital future and transform how they work, live and play. The company provides customers with the industry's broadest and most innovative technology and services portfolio for the data era. Together, we help you explore the possibilities of AI and HPC, introduce it into your organization, and use it to speed and improve product design.

Dell Technologies is committed to a culture of integrating ethics and compliance into daily decision-making. We believe in acting ethically in everything we do. It's good business and important to our customers, suppliers and strategic partners. As a result, critical programs have been developed to address key risks across the enterprise, creating trust with our customers.

DELIVERING VALUE

The AI value chain

Wherever you are on your journey, Dell Technologies delivers AI and HPC systems that fulfill your needs.

With an extensive portfolio, years of experience and an ecosystem of curated technology and service partners, Dell is ready to help you to capitalize on the promises of AI and HPC.

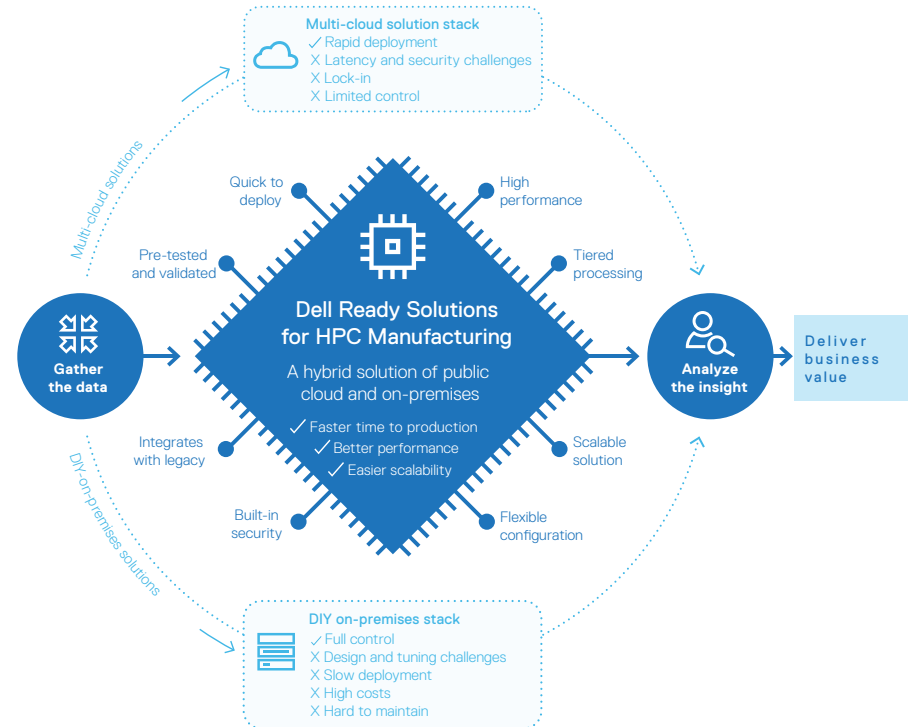
- **Extensive portfolio.** Dell Technologies uniquely provides a portfolio of technologies — spanning workstations, servers, networking, storage, software and services — to create successful AI and HPC implementations. What's more, Dell provides accelerated performance, efficiency and expertise to help you adapt as AI evolves.
- **Years of experience.** AI and HPC are evolving quickly and not many organizations have the skills to design, deploy and manage advanced computing systems. The **Dell Technologies HPC & AI Innovation Lab** team stays on the cutting edge of AI, testing new technologies, and tuning algorithms and applications to help you keep pace with this constantly evolving landscape. Our team of industry and technology experts can help you achieve faster time to results by shortening both design cycle and configuration time. These experts will work with you to create a configuration with the right features at the right price. You can even take a test drive with a proof of concept, in one of the **Customer Solution Centers**.
- **Curated partnerships.** Dell works closely with partners, such as Intel®, AMD®, NVIDIA®, Mellanox® and Bright Computing® to optimize hardware to leverage processing, accelerator advancements, and to access their expertise around software algorithms and their implementation on Dell EMC infrastructure.

SIMPLIFYING THE COMPLEX

Dell EMC Ready Solutions for HPC Manufacturing

Designing and deploying an HPC system for AI and other manufacturing workloads with the performance and scalability required can be complex.

Dell Technologies has invested to create a portfolio of Ready Solutions designed to simplify the configuration, deployment and management of HPC/AI solutions. They provide trusted designs that have been optimized, tuned and tested for a variety of key use cases. They include the servers, storage, networking, software and services that have been proven in our labs and in customer deployments. Plus, the modular building blocks provide a customizable yet validated approach for deploying new clusters or upgrading existing systems.



THE BENEFITS

Dell EMC Ready Solutions for HPC Manufacturing

Ready Solutions for HPC Manufacturing simplify your IT transformation, speeding product design and reducing risk.

FASTER PERFORMANCE

- Industry-specific designs are tuned by Dell Technologies engineers and industry experts for specific manufacturing workloads.
- Engineers from the Dell Technologies HPC & AI Innovation Lab work closely with you to optimize, integrate and test these systems, then spend hours to rigorously tune the systems for your specific applications and workloads, with a focus on efficiency, performance and reliability.

EASIER SCALING

- A flexible building-block approach helps you efficiently design, implement and scale HPC solutions.
- Dell's extensive track record with the HPC computing environment — compute, storage, networking and services — enables us to implement holistic solutions that work from day one, with an eye toward the future.

REDUCED RISK

- Purpose-built HPC building blocks are integrated and tailored for your specific workloads to speed deployment as well as help eliminate potential software and hardware issues.
- A comprehensive source of professional services and support capabilities can help you maximize system productivity and efficiency without compromising on performance.
- Dell HPC and AI solutions deliver fast setup with a wide range of optional services for maximizing HPC investments. With proven success in thousands of implementations worldwide, you can be confident with Dell Technologies as your partner.

THE DELL TECHNOLOGIES DIFFERENCE

Services and financing

Dell partners with you every step of the way, linking people, processes and technology to accelerate innovation and enable optimal business outcomes.

- [Consulting services](#) are delivered by certified experts to help you get the business value of advanced computing. The services include an assessment, workshop, testing, proofs of concept and production implementation. These experts help determine where advanced computing is a good fit for your organization. They also help you build your own internal team of experts through knowledge transfer at each step.
- [Education Services](#) offers courses and certifications in data science and advanced analytics through self paced online labs and instructor led workshops.
- [Deployment](#) experts have the experience, expertise and best practices to enhance your success with data analytics, HPC and AI solutions. With a proven track record of success in thousands of engagements worldwide, you can rely on Dell as your partner.
- [Support](#) experts can provide comprehensive hardware and collaborative software support 24x7 for optimal system performance and minimized downtime. ProSupport includes next-business-day on-site service with four- and eight-hour parts-and-labor response options, and escalation management with customer-defined severity levels. You can also opt for ProSupport Plus to get a Technology Service Manager who serves as a single point of contact for your support needs.
- [Financial Services](#) offers a wealth of leasing and financing options to help you find opportunities when your organization faces decisions regarding capital expenditures, operating expenditures and cash flow.

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