

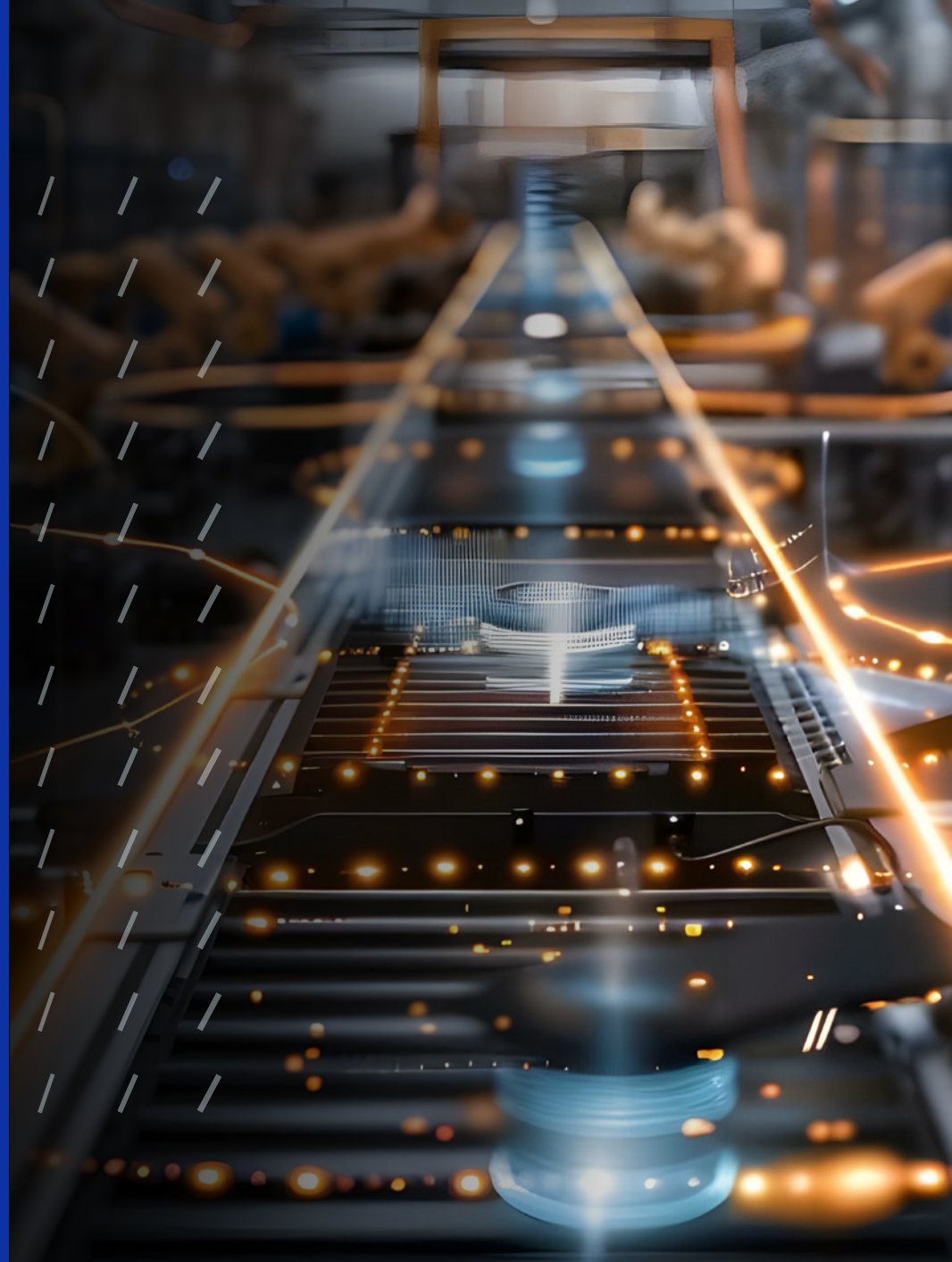
DELLTechnologies



How AI can accelerate product development workflows in manufacturing

The AI landscape is no longer limited to infrastructure like servers and cloud services. Manufacturers can augment their AI capabilities with a hybrid approach that harnesses the power of cloud, on-prem and local workstations. When applied to product development, a high-performance computing platform that runs AI locally can open the door to new levels of design innovation and productivity gains.

In this playbook, we'll explore how manufacturers can leverage the power of generative AI to enhance their workflows, empowering developers, engineers and data scientists to experiment and prototype products with greater ease.



3 Benefits AI Offers Manufacturing

AI-augmented workflows are poised to reshape the manufacturing industry by significantly enhancing cost efficiency, accelerating time to market, and improving quality throughout the product development process and beyond.

However, as AI gained momentum in the manufacturing sector, misconceptions have proliferated. The reality is that the stage had been set for years for AI to reach this moment of mass adoption. As manufacturers begin to explore AI for product development workflows, they should take these three factors into account:





1. AI is Scalable

Much of the messaging around AI references cloud computing, servers and data centers, leading companies to think they must have sizeable or costly infrastructure to start working with AI. However, many options allow organizations to start small on a local device and build from there. This is the future of AI — seamless integration across these three domains, enabling more efficient, secure and powerful AI solutions.

With NVIDIA's accelerated computing platform, manufacturers can start small on local devices, using NVIDIA RTX-powered workstations. These solutions allow manufacturers to experiment and scale quickly from on-prem workstations and data centers to cloud-based resources like NVIDIA DGX Cloud.

2. AI Augments Workers

Consider the ability of generative AI to summarize complex data or quickly transcribe meeting notes and recaps. When AI handles cumbersome or tedious tasks, it allows experienced developers, designers and engineers to focus on higher-level work.

“AI takes it a step further when applied to complex manufacturing data,” explains Himanshu Iyer, principal product marketing manager, manufacturing industry, at NVIDIA. “It enables technical teams to get more done because it helps them reason through complicated engineering and design challenges. These breakthroughs pave the way for bringing new products to market faster, differentiating them among competitors and improving the customer experience.”

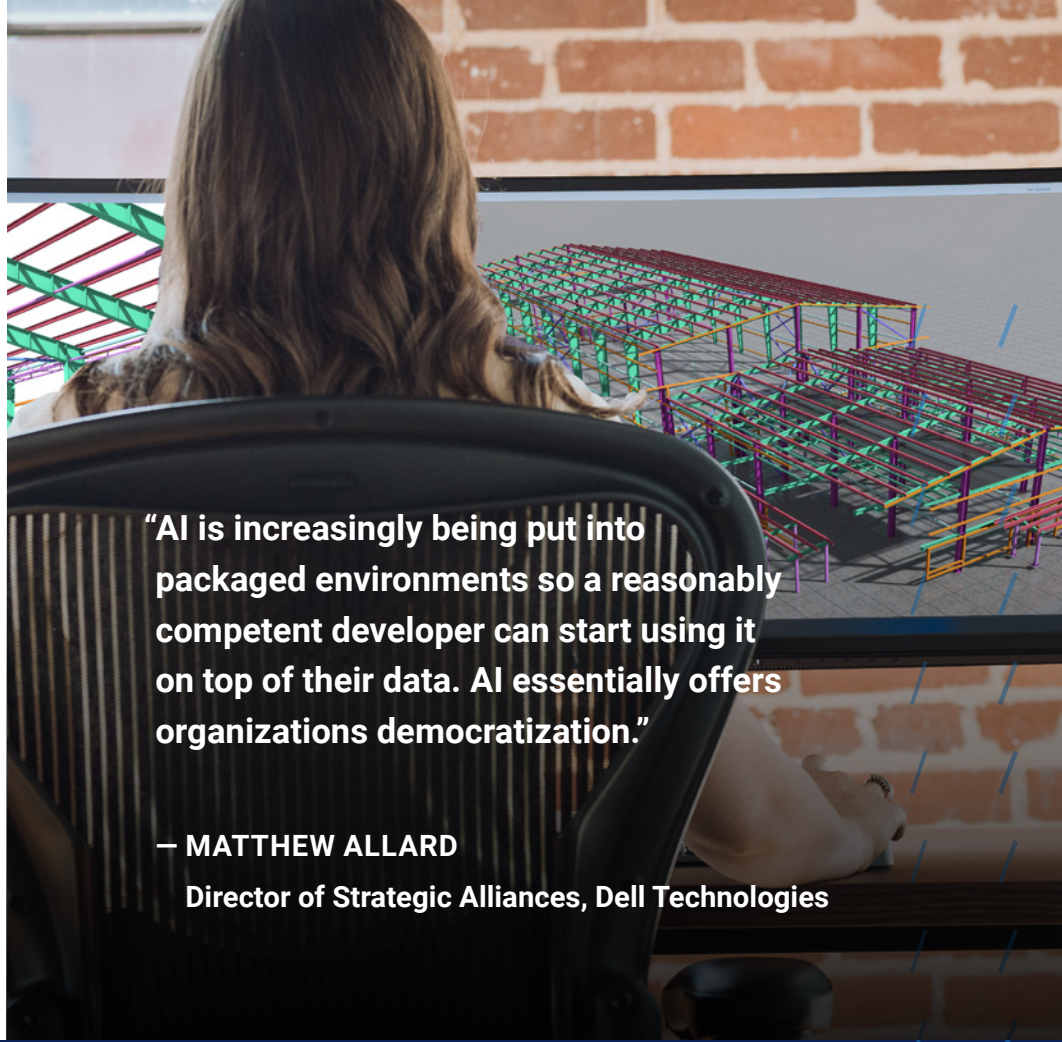
As businesses strive for zero unplanned downtime in manufacturing operations, workers can benefit by incorporating AI to continually diagnose critical systems, order replacement parts, complete programmable maintenance or schedule the recommended service. Technicians also benefit from generative AI in training and assistance with interactive equipment manuals and repair guides, making their service calls more efficient and effective.



3. AI Is Ideal for Mass Data

The nature of today's product design and manufacturing, especially with digital tools, produces a steady stream of fast-moving data. AI can use inference to efficiently and effectively derive insights and productivity from this content.

"AI is increasingly being put into packaged environments so a reasonably competent developer can start using it on top of their data," says Matthew Allard, director of strategic alliances at Dell Technologies. "Not everybody can afford to hire a data scientist, but everybody has developers. AI essentially offers organizations democratization."



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— MATTHEW ALLARD

Director of Strategic Alliances, Dell Technologies

NVIDIA and Dell solutions are designed to handle these large, complex data sets, enabling AI-driven insights and accelerating product development cycles. By harnessing the power of AI inference, manufacturers can extract valuable insights from their data, leading to better decision-making and faster innovation.

The Impact of Running AI Locally

AI is evolving into an ecosystem that spans hardware and software. It can run on the cloud or a local device and even be a tool embedded inside existing software. The nature of the application influences where it's hosted because of the impact on factors like performance and latency. This has even led to [hybrid AI solutions](#). Some models have functionality that can only [operate locally](#) on a machine, just as some applications have features exclusively [based in the cloud](#).

“Businesses need to understand not only when they’re using AI, but how and where it’s being processed so they can build their infrastructure accordingly,” says David Plourde, a business development consultant at Dell Technologies. “While very large models like language or vision are primarily a cloud workload, many other models are far smaller. They can be handled well and cost-efficiently in an on-prem environment, such as your servers or workstations with multiple GPUs.”

The ability to run AI locally has a significant advantage for data privacy. Many manufacturing organizations already have robust precautions for their IP, such as privacy labels, forbidding the use of USB drives, and preventing file copy or duplication. No matter how secure the firewall or VPN is, it doesn’t always stop IP from being pushed to the cloud. However, when AI is confined to an internal environment, it provides a layer of control over their most sensitive data.



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— DAVID PLOURDE

Business Development Consultant, Dell Technologies

“Your designers and engineers are often creating the most valuable IP of your company. This sensitive information is what separates you from the competition,” Iyer stresses. “It’s imperative to have data protection policies that provide full control and visibility over this data so it’s not leaking or spreading. This is particularly relevant for any organization overseen by regulatory bodies or has to safeguard IP against bad actors.”

Running AI locally not only protects IP. It can also be used to leverage this invaluable data in new ways.

“Manufacturers need to start talking about their business strategy for their IP. Not only where that data sits, but what might be possible with it and how they can generate more value from it,” Plourde says. “AI-driven analysis can produce insights that lead to increased productivity, innovation and better products.”

How To Leverage AI for Product Development Workflows



As products become more complex, so does the product development process. Consider how many products include mechanical, electrical and electronic components. This means companies have to take a multidisciplinary approach to product development. Generative AI is reimagining the product design space by optimizing metrics such as strength, speed, sustainability and material usage.

One such efficiency is by addressing a key bottleneck: engineering simulations. These multiphysics tests are necessary but can take hours or days to complete. The extended run times are due to the significant amount of physics required to mimic real-world conditions.

“AI is [reducing or compressing simulation cycles](#) so teams can design, test, and optimize complex systems and products faster,” lyer explains. “It does this by including any number of factors, such as different materials, operational conditions, energy considerations, cooling, strength or weight. [AI can help accelerate design and simulation processes](#) by taking advantage of large amounts of existing simulation data to provide near real-time results for design variations.”

Additionally, most manufacturers sit on a wealth of untapped insights in the form of legacy product information. All historical data from manuals, documentation and past versions can be fed into an in-house AI model and then mined.

“This is an incredible way to preserve and build on your brand’s design language,” Plourde says. “Some manufacturers have a particular look that has to be expressed in every new design. Rather than creating four options in a week, developers can use AI tools trained on their own data to produce thousands of designs in a week and then narrow them down to the top 10 that are most likely to move to the next stage of development.”

Generative AI can even be trained with user sentiment, aggregated trends, shopping patterns or contemporary scientific literature, providing quick and valuable R&D insights to engineers. By suggesting product design alternates, AI can trigger rapid innovation.

[Digital twins](#), while essential to the design process, also require data-intensive operations and maintenance. AI can enrich these models with synthetic and historical performance data, closing input gaps that might be missing or difficult to obtain otherwise. AI can even make it easy to pull in customer feedback and contemporary research.




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– HIMANSHU IYER
Principal Product Marketing Manager,
Manufacturing Industry, NVIDIA

[“Digital twins](#) can also be enhanced by the large amount of data that the physical object generates in its working environment,” Iyer says. “With AI running locally, it is becoming easier to process all that data and then ensure it feeds into the digital twin. With its fast data processing, AI makes updating the digital twin smoother and easier. The more robust the digital twin is, the more easily the design team can use insights to inform the next generation of product design, ultimately improving quality in the long run.”

Similar to when the internet became available to the public, AI is just beginning to transform the world as we know it. The use cases for AI running on local workstations are at an exciting tipping point as we reimagine existing processes.

“Many companies are already doing AI pilots or proof of concepts. Some have gone further and already created a formal AI strategy as an organization,” Allard notes. “Our encouragement is that manufacturers need to be engaged with AI, learning as much as they can and starting to experiment. Only when they start experimenting with AI will they uncover the return on investment.”



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[Read the e-book](#) to learn how your organization can simplify GenAI development with Dell Precision AI workstations and NVIDIA AI Workbench.



The Dell AI Factory with NVIDIA provides organizations with the building blocks for seamless integration of AI models and frameworks into their operations, enabling them to turn their ideas into practical applications. From digital assistants to new code generation and natural language search applications, the AI Factory framework allows organizations greater control over their proprietary data and scales efficiently, providing a more affordable alternative to many public cloud solutions. The Dell AI Factory with NVIDIA is the industry's first end-to-end AI enterprise solution integrating Dell's compute, storage, client device, software and services capabilities with NVIDIA's advanced AI infrastructure and software suite, all underpinned by a high-speed networking fabric.

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