

Advancing Product Development Workflows in Manufacturing

Radically improve design, simulation, collaboration, and time to market with the world's most advanced visual computing platform.



Advanced Technologies Provide a Competitive Edge

With the advent of Industry 4.0—the transformation of manufacturing by automation and big data—forward-thinking product manufacturers are engaging with a broad spectrum of pioneering technologies to reduce costs, optimize products, speed development cycles, and improve project team efficiency. These technologies include extended reality (XR), photorealistic rendering, real-time engineering simulation, graphics virtualization, and artificial intelligence (AI). Together, they contribute to an advanced product development workflow that enables manufacturers to create innovative, highly differentiated products and gain a competitive advantage.

While these technologies are becoming mainstream, projects are becoming more complex and team members are increasingly working remotely, complicating workflows, communication, and collaboration. Enabling efficient and cost-effective work in teams across regions is vital to an organization's success. But when designers or engineers have to wait hours or even days for a rendering or a simulation to finish, and remote team members need to work together on a large assembly model, version control is lost. Furthermore, when downloading massive datasets from the cloud stalls, productivity and employee morale falls.

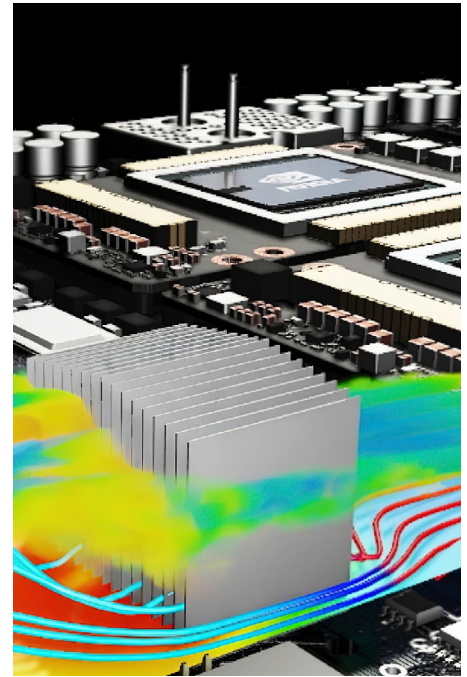
A new, streamlined way of tackling these challenges is needed to boost productivity, team collaboration, design review efficiency, and customer engagement.

A Revolutionary Approach to Design

As a trusted technology partner for product development professionals worldwide, NVIDIA continually enhances solutions to tackle these complexities and streamline workflows.

The latest NVIDIA RTX™ professional GPUs, based on NVIDIA's industry-leading **GPU architecture**, fuse AI, real-time ray tracing, simulation, and programmable shading to speed up and optimize the product development process. As part of an advanced ecosystem of hardware, software, and tools, RTX accelerates new design workflows—such as 3D graphics virtualization, engineering simulations, XR, interactive physically based rendering, and AI-enabled applications—and improves how teams collaborate by enabling effective work-from-anywhere capabilities. This allows teams to tackle complex 3D CAD and CAE workflows or iterate on models in real time across regions on a visual computing platform that is flexible and scalable—NVIDIA RTX.

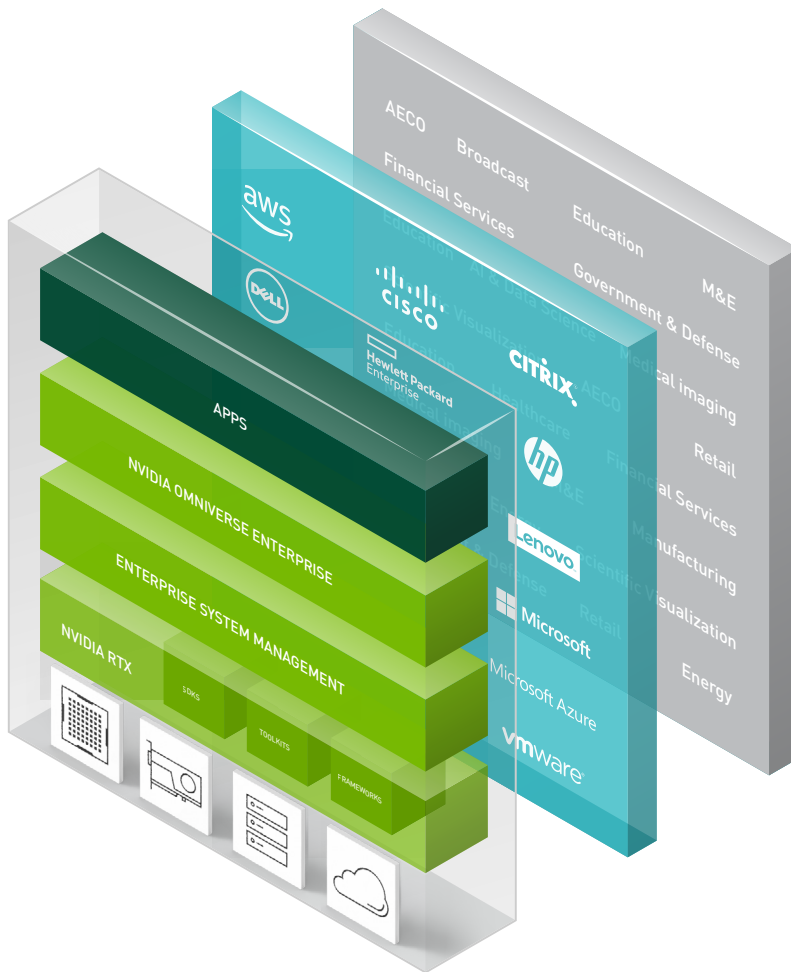
[> Learn More About NVIDIA RTX](#)



NVIDIA AI-accelerated simulation toolkit.

NVIDIA RTX Visual Computing Platform

The world's leading hardware and software companies partner with NVIDIA to bring the power of RTX to the manufacturing industry.

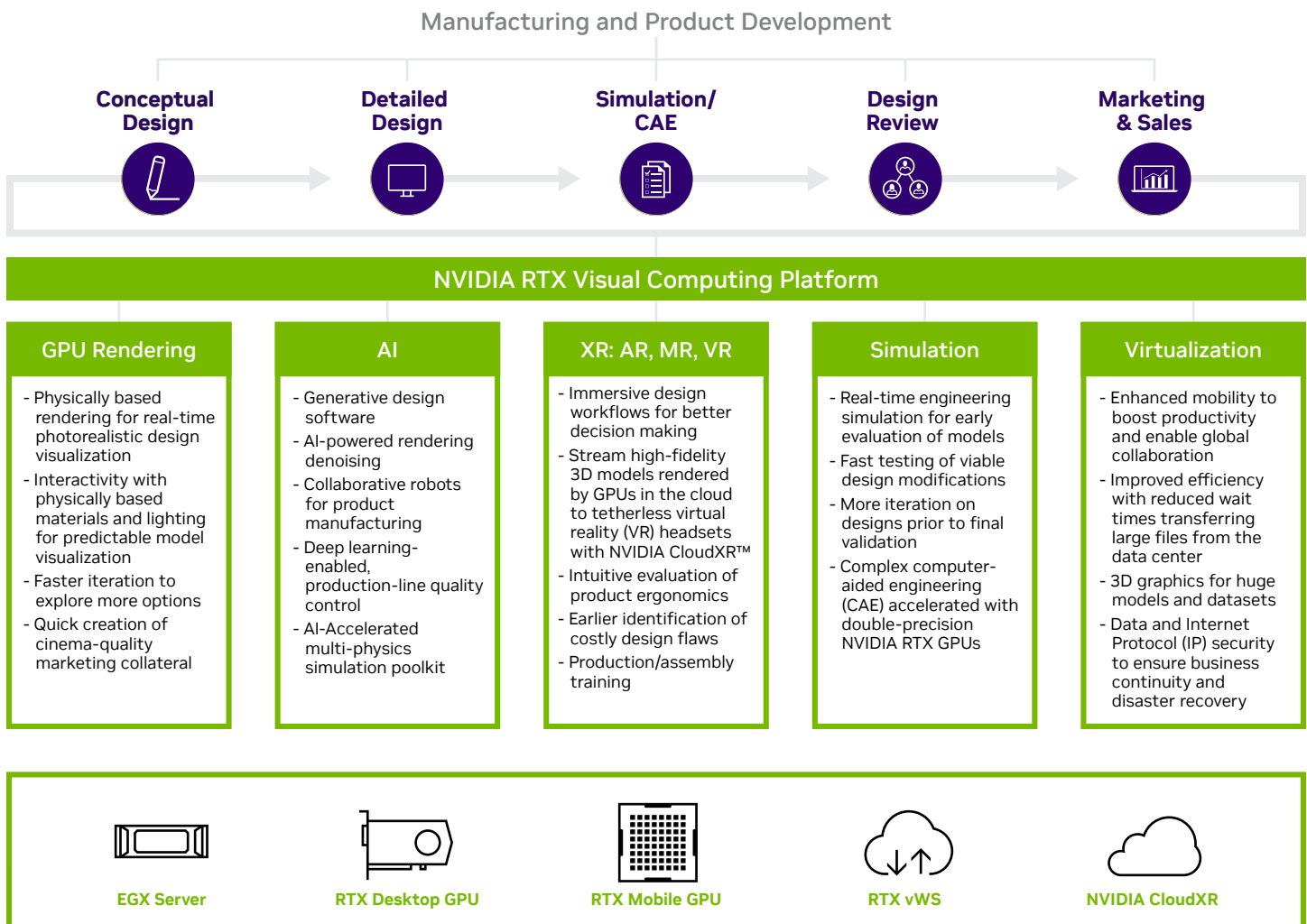


NVIDIA RTX Advantages for Manufacturing Industry

- > More effective collaboration among extended product development teams
- > Rapid design iteration, evaluation, and optimization for better products
- > Real-time engineering simulation earlier in the design workflow for faster, more frequent evaluation of design options
- > Fluid interactivity with massive CAD/CAE datasets at full-model fidelity for smooth design workflows
- > AI-enabled functionality through generative design software and interactive physically based rendering
- > Accelerated creation of photorealistic marketing and sales collateral
- > Immersive XR experiences to enhance design reviews, collaboration, training, and product presentation

Enabling and Accelerating Workflows

Manufacturers know they must take advantage of the latest technological innovations to stay ahead of the competition.



NVIDIA RTX solutions can assist in six key categories:

GPU-Accelerated, Interactive, Physically Based Rendering



Physically based rendering for accurate, predictable visualization of models. Image courtesy of Luxion KeyShot.

Physically based rendering lets designers take advantage of predictable model visualizations in CAD applications. NVIDIA RTX, powered by the latest NVIDIA GPU architecture, brings these capabilities to life by enabling the instant creation of cinematic-quality renders. Teams can quickly iterate on designs, even when working with massive 3D models. And marketing teams can easily create professional collateral before products are manufactured. RTX-powered server solutions scale from small installations to the largest data centers, at one quarter of the cost of CPU-only render farms.

[> Learn More About GPU Rendering](#)

AI/Deep Learning for Advanced Product Development

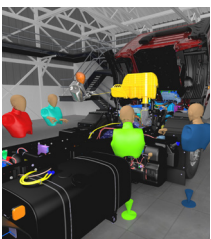


AI-powered Denoiser for fast and accurate photorealistic rendering. Image courtesy of Dassault Systèmes SOLIDWORKS.

Product designers and engineers are beginning to take advantage of deep learning-enabled generative design software trained on NVIDIA GPUs. This promises to drive productivity and innovation. AI-powered rendering denoising running on RTX GPUs or RTX Virtual Workstation (vWS) software speeds up noiseless visualization of photorealistic renders. And the new RTX GPUs are built for AI inferencing to power the next generation of visual computing for manufacturing applications.

[> Learn More About AI for Product Design](#)

Extended Reality

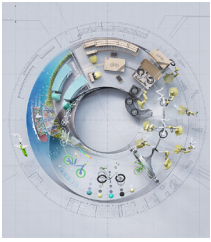


Immersive design reviews in virtual reality offer real-time collaboration and feedback. Image courtesy of ESI Group.

Extended reality (XR) will change how we train our employees and get our jobs done. From product design to immersive collaboration, NVIDIA delivers groundbreaking solutions for AR and VR—including leading GPUs, drivers, and SDKs. Now with **NVIDIA CloudXR**, an XR streaming technology, you can stream immersive manufacturing applications to anyone, anywhere, from the latest NVIDIA RTX professional GPUs.

[> Learn More About Extended Reality](#)

Full-Fidelity Visualization and Simulation With NVIDIA Omniverse

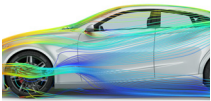


Transforming remote team collaboration with Omniverse.

NVIDIA RTX professional GPUs deliver the performance needed to take full advantage of NVIDIA Omniverse Enterprise for manufacturing and transforms 3D design collaboration for product development teams. Desktop and mobile RTX GPUs enable individual users to harness the RTX Renderer in Omniverse, while NVIDIA RTX vWS software provides the ultimate visual computing power for transforming the way remote teams work.

[> Learn More About Omniverse for Manufacturing](#)

GPU-Accelerated Real-Time Engineering Simulation

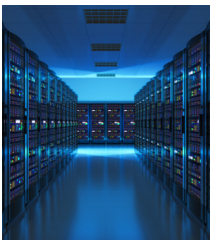


GPU-accelerated fast external aerodynamics simulations. Image courtesy of Altair.

NVIDIA CUDA™-based GPU-accelerated simulation software empowers designers and engineers to perform real-time simulation and analysis throughout the product development phase. This transforms simulation from a research tool to a design tool for engineers, resulting in accelerated workflows and optimized products. GPU acceleration in structural and fluid dynamics, heat transfer, electromagnetics, optics, particle and bulk material, and noise, vibration, and harshness simulations allows teams to perform complex simulations and solve the most challenging engineering problems faster than ever.

[> Learn More About Real-Time Engineering Simulation](#)

GPU-Accelerated Virtual Workstations



Virtualized 3D graphics for all users.

Global firms often have widely dispersed teams that touch all parts of a project cycle, from design to manufacturing. Virtualized solutions powered by the NVIDIA RTX vWS software enable more productive workflows to help teams meet demanding deadlines. In addition to simplifying IT management and helping protect intellectual property by maintaining data in the data center, NVIDIA vGPU solutions can facilitate designers' creativity by allowing anytime, anywhere access to visual computing power whenever inspiration strikes.

[> Learn More About RTX vWS](#)

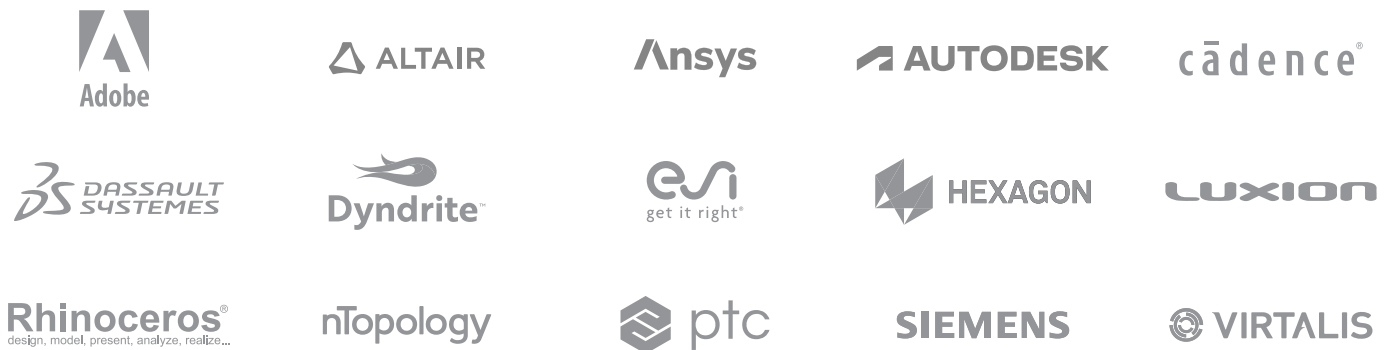
Tested and Certified for Enterprise-Class Reliability

To ensure the best possible experience for IT investments, NVIDIA RTX professional graphics solutions are tested and certified by leading workstation and server manufacturers. They've also received independent software vendor certifications for more than 100 professional applications.

Key OEM Partners



Key ISV Partners



RTX-Accelerated Workflows for Manufacturing

Users	Product designers, engineers	Designers, marketing departments	Product designers, engineers, executive decision makers, assembly line workers
Workflow Use Cases	<ul style="list-style-type: none"> > Smooth design experience with all leading CAD/CAE and visualization software tools, even when working with massive complex 3D models on 4K displays or in VR > Real-time engineering simulation for quick evaluation of design options/modifications early in the process > Deep learning for generative design 	<ul style="list-style-type: none"> > Interactive, physically based rendering to remain in the creative flow while iterating on concepts > Quick creation of compelling product visualizations for presentations and collateral 	<ul style="list-style-type: none"> > VR design workflows > VR retail showrooms > VR-based assembly, maintenance, and safety training

What Customers Are Saying About RTX



“With NVIDIA graphics solutions, we are able to achieve impressive results with low effort.”

Sven Sia

Client Architect at KSB SE & Co. KGaA



“Using Altair EDEM with NVIDIA RTX GPUs, ASTEC has been able to optimize the design of our aggregate dryer to increase efficiency. This provides ASTEC and our customers a competitive advantage with lower running costs and reduced emissions.”

Andrew Hobbs

Head of Simulation and Modeling,
ASTEC Industries, Inc.



“The NVIDIA RTX A6000 GPU and ThinkStation P620 deliver cutting-edge performance and speed to accelerate design processes and production times. We’re able to do complex wind drag simulations, mechanical and structural testing, and topology optimizations with AI in near real time—enabling us to show customers design changes with minimal delay.”

Aram Goganian

Co-founder and CEO of
Predator Cycling

RTX Solutions in Action

- > **Discover How NVIDIA Technologies Are Transforming Manufacturing and Product Development**
- > **Explore Manufacturing and Product Development Customer Success Stories, Webinars, and More**

Learn More

For more information visit www.nvidia.com/manufacturing

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