ADVANCING PRODUCT DESIGN WORKFLOWS IN MANUFACTURING


Image courtesy of Zerone.
ADVANCED TECHNOLOGIES KEEP INDUSTRY PLAYERS COMPETITIVE

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 augmented reality (AR) and virtual reality (VR), photorealistic rendering and visualization, real-time design collaboration and engineering simulation, graphics virtualization, and applied artificial intelligence (AI). Together, they contribute to an advanced product design workflow that enables manufacturers to create innovative, highly differentiated products and remain competitive.

A REVOLUTIONARY APPROACH TO DESIGN

Powered by the greatest leap in graphics computing since the invention of the NVIDIA CUDA® GPU, NVIDIA RTX™ with the NVIDIA Ampere and Turing™ architectures fuse AI, real-time ray tracing, and programmable shading to fundamentally transform the traditional product design process. RTX is the foundation of an advanced ecosystem of hardware and software accelerating new design workflows and improving how teams collaborate. With powerful work-from-anywhere capabilities, teams today can tackle complex 3D computer-aided design (CAD) workflows or iterate on models in real time across regions on an NVIDIA RTX visual computing platform that is flexible and scalable.

> Learn more about NVIDIA RTX
NVIDIA RTX VISUAL COMPUTING PLATFORM

The world’s most widely used hardware and software companies partner with NVIDIA to bring the power of NVIDIA RTX to manufacturing.

NVIDIA RTX ADVANTAGES FOR MANUFACTURERS

> More effective collaboration among extended product design 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
> AI-enabled functionality to improve product design tools
> Enhanced ability to meet tight product time-to-market dates
> Accelerated creation of photorealistic marketing and sales collateral
> Improved customer purchase experiences through immersive interactions with products
CREATING NEW WORKFLOW OPPORTUNITIES

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

**MANUFACTURING**

**CONCEPTUAL DESIGN**

**DESIGN**

**DESIGN REVIEW**

**CAE**

**MARKETING & SALES**

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**NVIDIA® RTX VISUAL COMPUTING PLATFORM**

**GPU RENDERING**
- Physically based rendering for real-time photorealistic design visualization
- Interactivity with physically based materials and lighting for predictable model visualization
- Faster iteration to explore more options
- Quick creation of cinema-quality marketing collateral

**AI**
- Generative design software
- AI-powered rendering denoising
- Collaborative robots for product manufacturing
- Deep learning-enabled, production-line quality control

**AR/VR**
- Immersive design workflows for better decision making
- Enhanced design reviews
- Intuitive evaluation of product ergonomics
- Earlier identification of costly design flaws
- Production/assembly training

**SIMULATION**
- Real-time engineering simulation for early evaluation of models
- Fast testing of viable design modifications
- More iteration on designs prior to final validation
- Complex CAE accelerated with double-precision NVIDIA GPUs

**VIRTUALIZATION**
- Enhanced mobility to boost productivity and enable global collaboration
- Data-version control to minimize errors with multiple contributors
- 3D graphics for huge models and datasets
- Data and Internet Protocol (IP) security to ensure business continuity and disaster recovery

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NVIDIA desktop GPU

NVIDIA mobile GPU

NVIDIA RTX Virtual Workstation (vWS)
Physically based rendering lets designers take advantage of predictable model visualizations in CAD applications. NVIDIA RTX, based on NVIDIA Ampere and Turing™ architectures, 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. NVIDIA GPU-powered server solutions scale from small installations to the largest data centers, at one quarter of the cost of CPU-only render farms.

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

High-performance NVIDIA VR Ready GPUs drive immersive VR experiences that accelerate design workflows and decision making. With NVIDIA CloudXR™, designers can stream high-fidelity 3D models rendered by GPUs in the cloud to tetherless VR headsets. It can also enhance the customer purchase experience and enable realistic training for product assembly, maintenance, and safety. And platforms such as NVIDIA Omniverse™ enable real-time simulation and collaboration for 3D production pipelines using NVIDIA GPUs.
GPU-ACCELERATED, REAL-TIME ENGINEERING SIMULATION

GPU-accelerated simulation software like ANSYS Discovery Live and Creo Simulation Live enable real-time simulation and analysis for earlier and more frequent design evaluation. This transforms simulation from just a research tool to a design tool for engineers, resulting in accelerated workflows and optimized products.

RTX PERFORMANCE FROM THE DATA CENTER OR CLOUD

NVIDIA RTX Virtual Workstation (vWS) software delivers the most powerful virtual workstation imaginable. Engineers and designers get the same graphics and compute performance in a virtualized environment as they would from desktop workstations. And manufacturers benefit from improved productivity and collaboration, increased security of their intellectual property, and work-from-anywhere access for their employees.
TESTED AND CERTIFIED FOR ENTERPRISE-CLASS RELIABILITY

To ensure the best possible experience for your IT investment, NVIDIA RTX professional graphics solutions are tested and certified by leading workstation and server OEMs. They’ve also received independent software vendor (ISV) certifications for more than 100 professional applications.

KEY OEM PARTNERS

![OEM Partner Logos]

KEY ISV PARTNERS

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ACCELERATED WORKFLOWS FOR MANUFACTURING

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<th>USERS</th>
<th>DESIGNER, ENGINEERS</th>
<th>DESIGNER, MARKETING DEPARTMENTS</th>
<th>PRODUCT DESIGNERS, ENGINEERS, EXECUTIVE DECISION MAKERS, ASSEMBLY LINE WORKERS</th>
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<td>WORKFLOW USE CASES</td>
<td>For a smooth design experience with leading CAD/CAE software tools, even when working with massive, complex 3D models on 4K displays</td>
<td>For using interactive, physically based rendering to remain in the creative flow while iterating on concepts; for quickly creating compelling visualizations of products for presentations and marketing collateral</td>
<td>For virtual reality design workflows, VR retail showrooms, and assembly, maintenance, and safety training</td>
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WHAT OUR CUSTOMERS ARE SAYING

“The NVIDIA Quadro P6000 provides fantastic realism with virtually no latency. The result is that the dealer profits by reducing the time required for each sale and being able to attend to more customers.”

Thomas Zuchtriegel
Head of AR/VR Process & Technology, Audi Business Innovation

“One of my projects saw the Redshift render time per frame drop from eighteen minutes to seven and a half minutes with the GP100s.”

Matthias Zabiegly
Lead 3D and VFX Supervisor, Aixsponza

“NVIDIA vWS made it so that 98–99% of our users could use the virtual environment just like a physical machine sitting in front of them. Users are actually reporting back that it performs exactly the same as a physical machine.”

Wesley Struble
CAD System Administrator, North American Information Technology Services, DENSO International America

NVIDIA RTX SOLUTIONS IN ACTION

> Discover manufacturing customer success stories in design and visualization
> Check out our on-demand webinars to learn more about manufacturing workflows

For more information, visit www.nvidia.com/manufacturing

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