ADVANCING PRODUCT DESIGN WORKFLOWS IN MANUFACTURING

Radically Improve Design, Collaboration, and Time to Market with the World's Most Advanced Visual Computing Platform

Image courtesy of Zerone.

NVIDIA

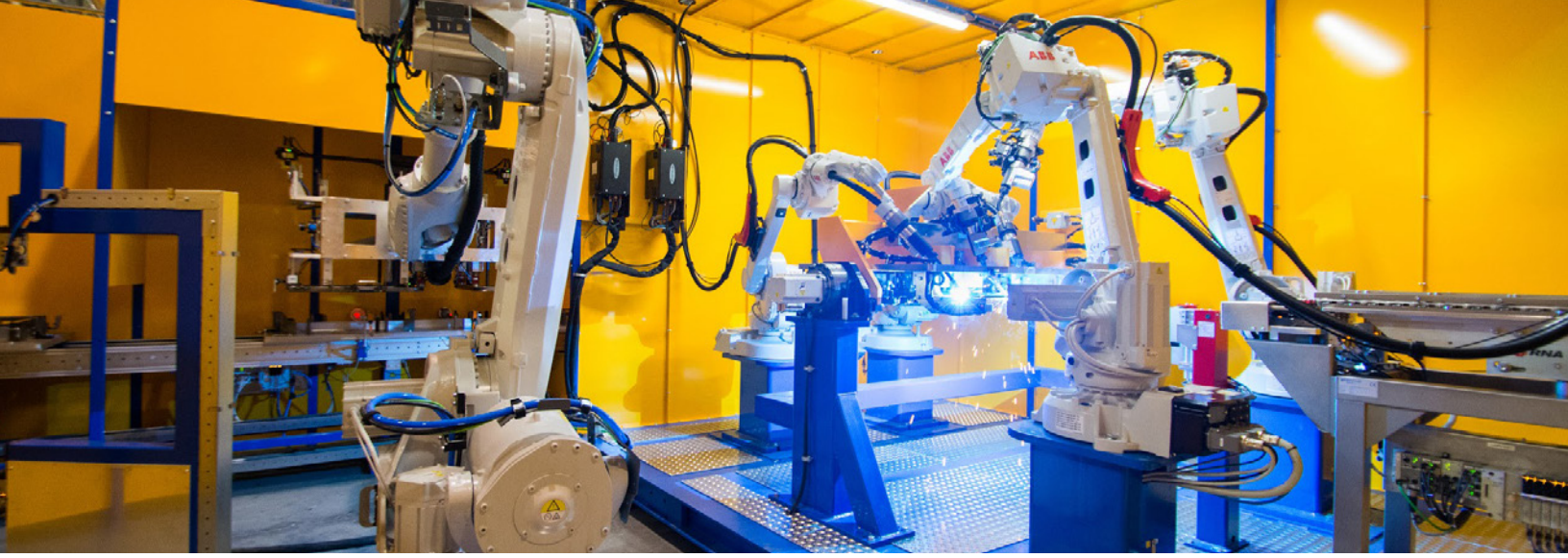


Image courtesy of AWL.

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.

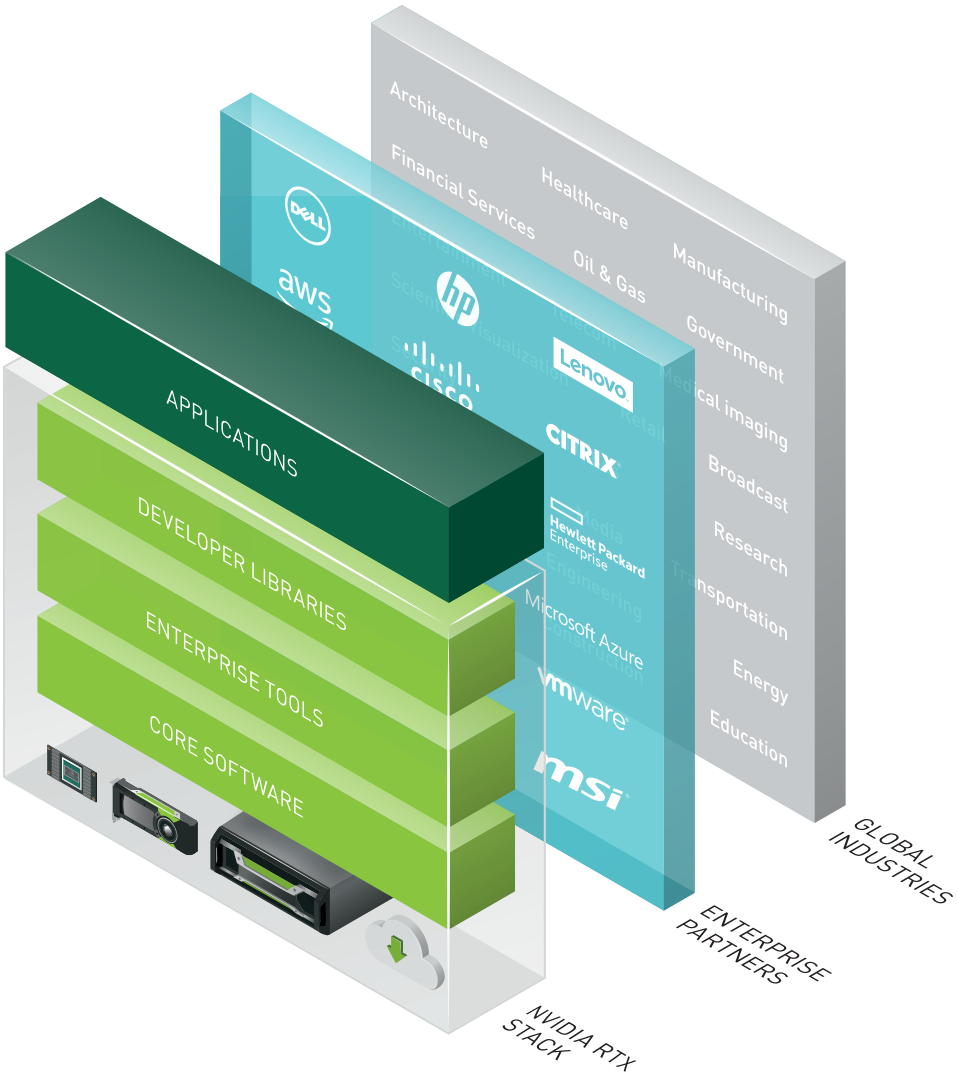
A REVOLUTIONARY APPROACH TO DESIGN

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.

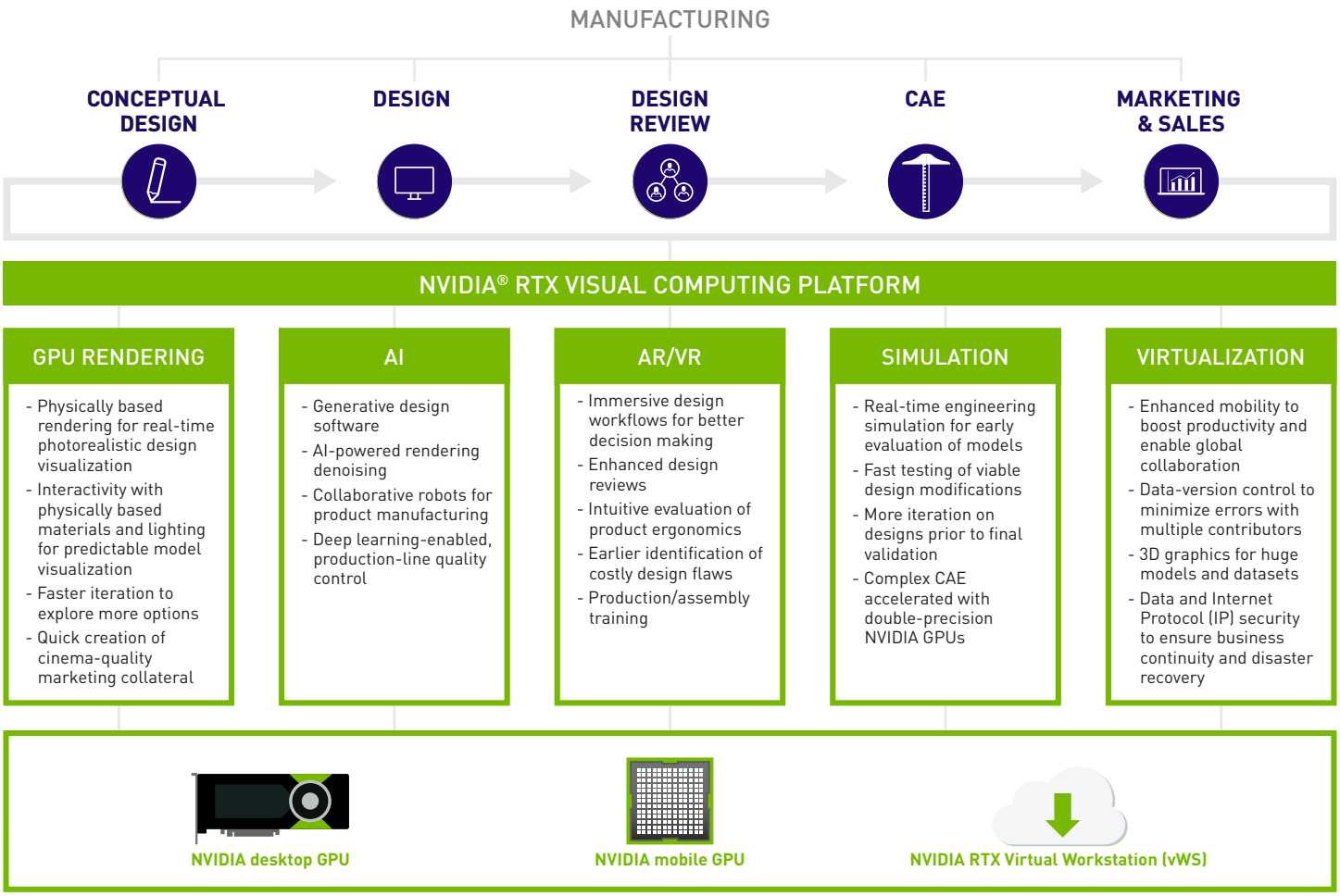


NVIDIA RTX ADVANTAGES FOR MANUFACTURERS

- 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.



NVIDIA RTX solutions can assist in five key categories:

GPU-ACCELERATED, INTERACTIVE, PHYSICALLY BASED RENDERING

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

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.

> **Learn more about GPU rendering**

AI/DEEP LEARNING FOR ADVANCED PRODUCT DESIGN

Driving design innovation with AI and deep learning.

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.

> **Learn more about AI for content creation**

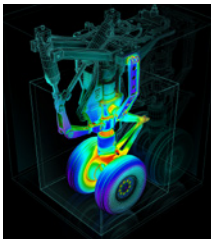
VIRTUAL REALITY

Enhancing product development workflows with VR and AR.

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.

> **Learn more about NVIDIA Omniverse**

GPU-ACCELERATED, REAL-TIME ENGINEERING SIMULATION

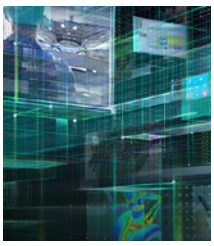


Enabling early design evaluation with real-time simulation.

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.

> **Learn more about real-time simulation**

RTX PERFORMANCE FROM THE DATA CENTER OR CLOUD



Virtualized graphics for all users from the data center.

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.

> **Learn more about NVIDIA vWS**

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

KEY ISV PARTNERS

Altair HyperWorks	allegorithmic	ANSYS	AUTODESK	DASSAULT SYSTEMES
AcuSolve Feko FluiDyna HyperWorks OptiStruct	Substance Designer/Paint	Discovery Live Fluent Mechanical Optis	3ds Max AutoCAD Fusion 360 Generative Design Inventor VRED	3DEXCITE 3DEXPERIENCE 3DVIA CATIA SIMULIA SOLIDWORKS

esi get it right	McNeel North America	ptc	SIEMENS	VIRTALIS
IC.IDO VRify	Rhino	Creo Parametric	NX Solid Edge	VR4CAD

ACCELERATED WORKFLOWS FOR MANUFACTURING

USERS	Product designers, engineers	Designers, marketing departments	Product designers, engineers, executive decision makers, assembly line workers
WORKFLOW USE CASES	For a smooth design experience with leading CAD/CAE software tools, even when working with massive, complex 3D models on 4K displays	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	For virtual reality design workflows, VR retail showrooms, and assembly, maintenance, and safety training

WHAT OUR CUSTOMERS ARE SAYING

Audi

"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

AIXSPONZA

"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

DENSO

"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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