ADVANCING PRODUCT DESIGN WORKFLOWS IN MANUFACTURING

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

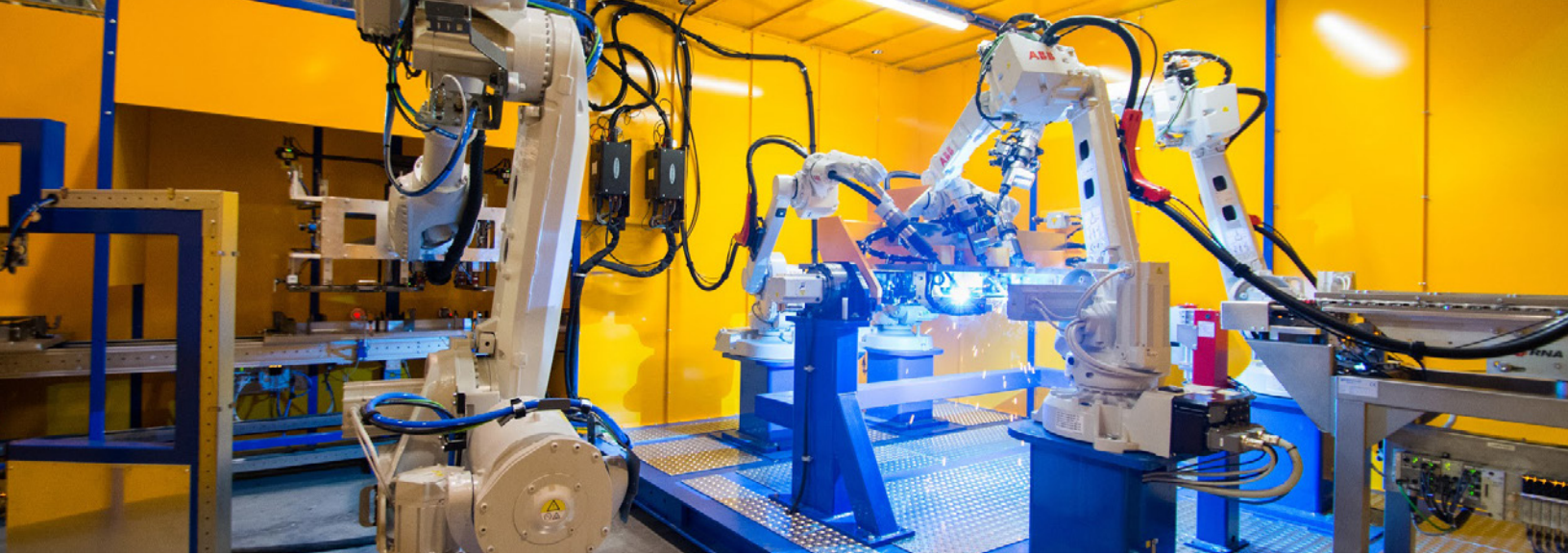Image courtesy of Zerone.

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 virtual reality (VR), photorealistic rendering, real-time engineering simulation, graphics virtualization, and 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 NVIDIA CUDA GPU in 2006, Quadro RTX with NVIDIA Turing™ architecture fuses AI, real-time ray tracing, and programmable shading to fundamentally transform the traditional product design process. Quadro 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 CAD workflows or iterate on models in real time across regions on a Quadro visual computing platform that is flexible and scalable.

> Learn more about NVIDIA Quadro

NVIDIA QUADRO VISUAL COMPUTING PLATFORM

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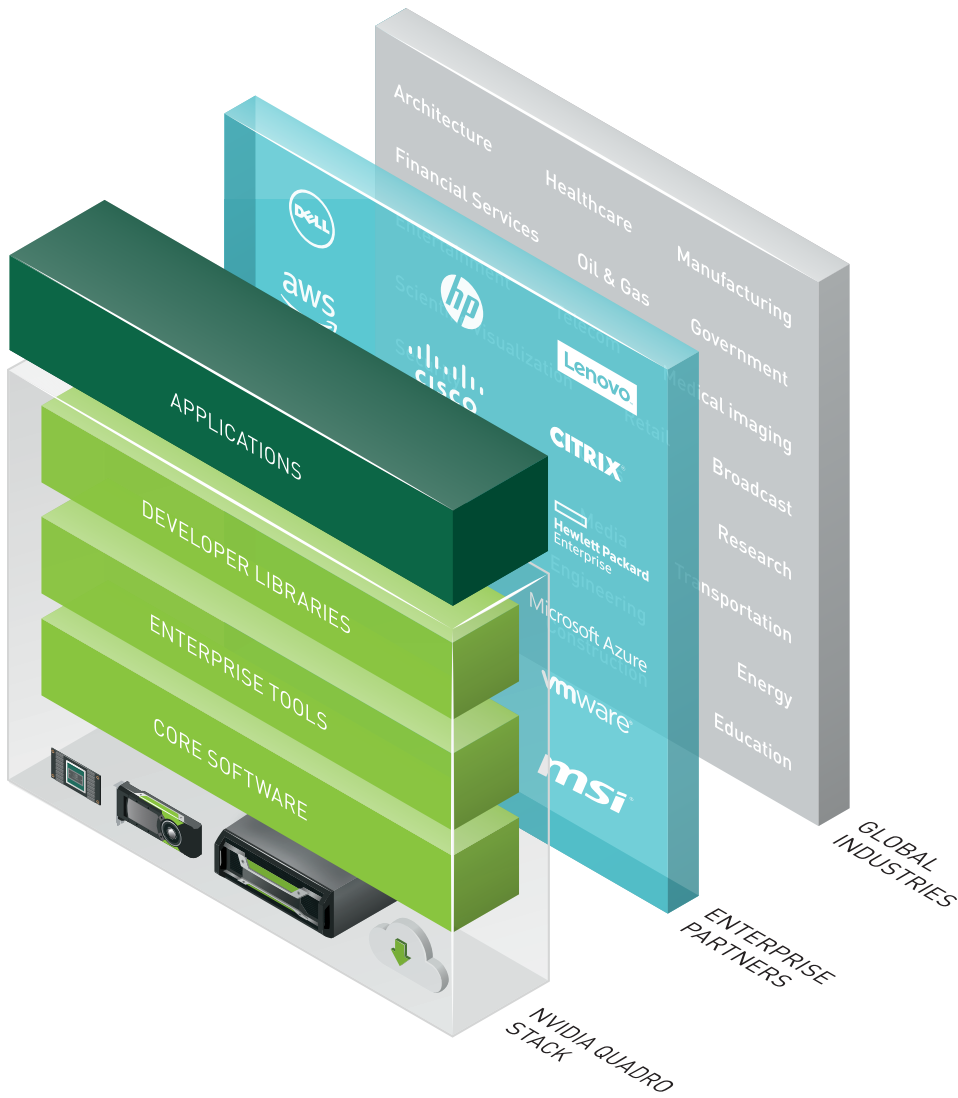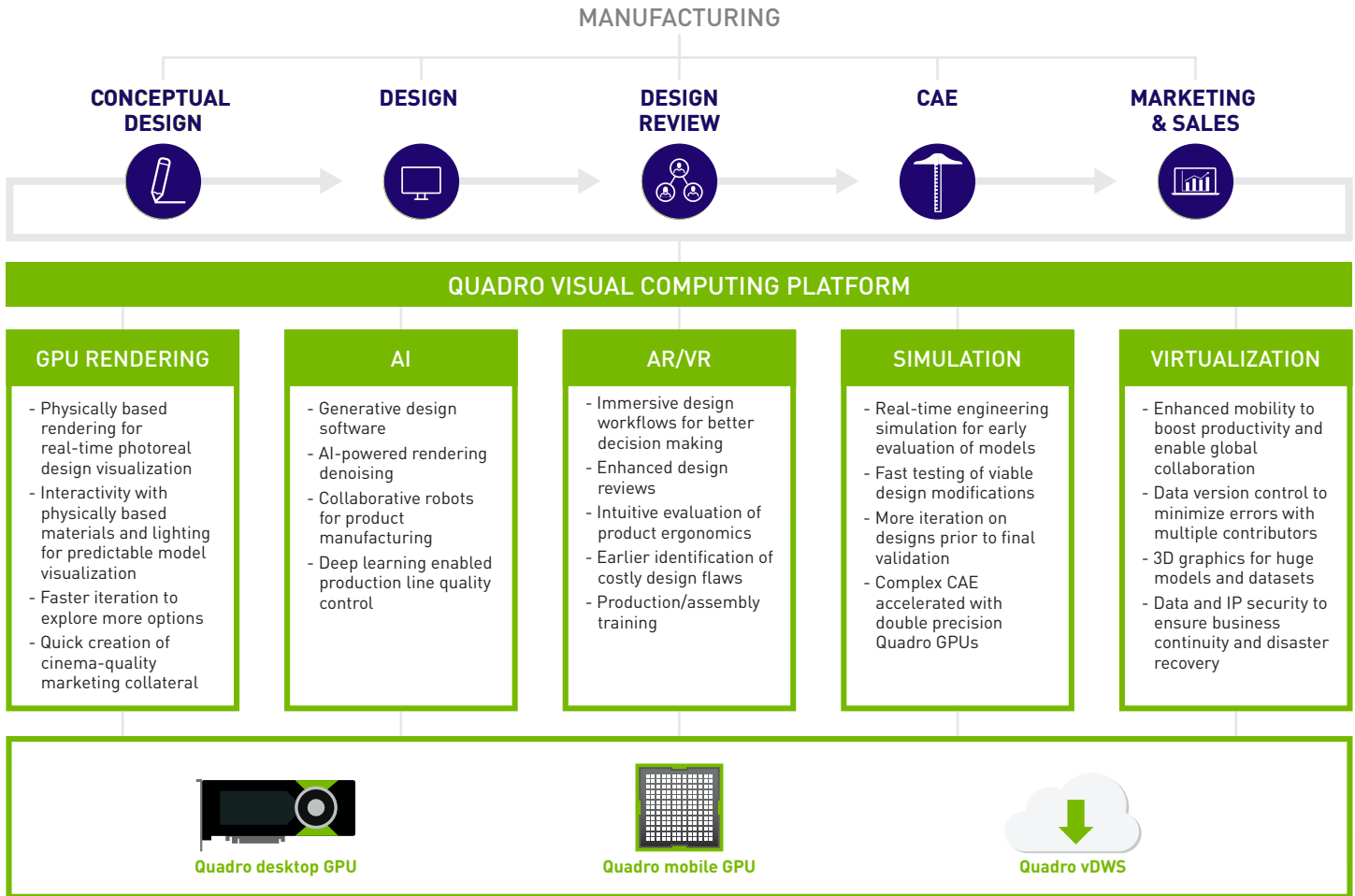

NVIDIA QUADRO ADVANTAGES FOR MANUFACTURERS

> 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

QUADRO VISUAL COMPUTING PLATFORM

GPU RENDERING

- Physically based rendering for real-time photoreal 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 Quadro 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 IP security to ensure business continuity and disaster recovery

Quadro desktop GPU

Quadro mobile GPU

Quadro vDWS

NVIDIA Quadro 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 Quadro RTX™, based on NVIDIA Turing™ 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. Quadro-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 Quadro speeds up noiseless visualization of photorealistic renders. And the new Quadro RTX GPUs are built for AI inferencing to power the next generation of visual computing for manufacturing applications.

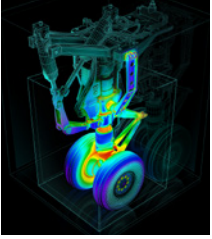> Learn more about AI for content creation

Virtual Reality

Enhancing product development workflows with VR and augmented reality

High-performance Quadro VR Ready GPUs drive immersive VR experiences that accelerate design workflows and decision making. VR speeds development by making it easier to evaluate decisions and identify flaws earlier in the design process. It can also enhance the customer purchase experience and enable realistic training for product assembly, maintenance, and safety. And mobile workstations with Quadro VR Ready GPUs let users take VR experiences on the road.

> Learn more about Quadro VR

GPU-Accelerated Real-Time Engineering Simulation

New 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.

Enabling early design evaluation with real-time simulation

Quadro Performance from the Data Center

NVIDIA Quadro Virtual Data Center Workstation (Quadro vDWS) 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.

Virtualized graphics for all users from the data center

TESTED AND CERTIFIED FOR ENTERPRISE-CLASS RELIABILITY

To ensure the best possible experience for your IT investment, Quadro 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

CISCO | DELL | FUJITSU | hp | Hewlett Packard Enterprise | Lenovo | msi

Key ISV Partners

Altair HyperWorks	allegorithmic	ANSYS	AUTODESK	DASSAULT SYSTEMES
Acusolve	Substance	Discovery Live	3ds Max	3DEXCITE
FEKO	Designer/Paint	Fluent	AutoCAD	3DEXPERIENCE
FluiDyna		Mechanical	Fusion360	3DVIA
HyperWorks		Optis	Generative	CATIA
OptiStruct			Design	SIMULIA
			Inventor	SOLIDWORKS
			VRED	

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

QUADRO-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 ABOUT QUADRO

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 Quadro vDWS 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

QUADRO 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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