Lenovo | NVIDIA

Power of enterprise digital twins

Your business supercharged with data

Better strategic planning with expertly designed enterprise digital twins

An enterprise digital twin is a sophisticated virtual model that mirrors your entire business operation by integrating multiple digital twins—virtual counterparts to physical assets, systems, or processes. While both types of twins reflect the laws of physics and are powered by AI, they use real-time data from sensors and other sources, an enterprise digital twin connects data from various domains across the organization, offering a fully integrated and dynamic representation of your operations.

Digital twins, in general, serve as virtual counterparts to physical assets or processes and can be visualised in virtual reality. These range from simple models that contain data attached to more advanced versions, connected to real-world sensors, that reflect the laws of physics and track real-time performance.

By connecting individual and simpler digital twins from critical domains such as asset management, grid operations, supply chain logistics, and environmental impact monitoring, you can gain a holistic and unified view of your entire energy operation — forming an enterprise digital twin. This comprehensive digital model provides real-time insights into system performance, safety, and sustainability, enabling you to plan strategically and test multiple scenarios at the same time, in a secure environment before implementing changes in the real-world to optimize energy production, reduce operational risks, and meet regulatory requirements.

Lenovo can help you start by developing digital twins for specific assets or pilot projects, gradually scaling up to a complete enterprise digital twin that drives efficiency and supports your goals.

ROI from digital twins is often seen in just 14 months and it's a big reason why 70% of enterprise leaders[1] now use it to improve decision-making and optimize operations by creating digital versions of their physical assets.[2]

[1] Digital twins: From one twin to the enterprise metaverse | McKinsey

[2] How Important Is Digital Technology in Augmenting the Manufacturing Organization? | idc.com

Two key applications of stand-alone digital twins in the Energy industry

Product and Operational digital twins

We can broadly distinguish between two types of digital twins: **product digital twins** (virtual versions of a company's products) and **operational digital twins** (virtual representations of the production process). In both cases, a physically accurate and photorealistic virtual model, powered by AI, is developed and behaves like the real thing. This model provides insight into how the product or production process will perform under different scenarios, allowing valuable information to be quickly identified and shared with all relevant stakeholders. These insights can range from performance optimization and efficiency improvements to predictive maintenance needs and even recycling requirements.

In energy, we see both types of digital twins.
However, we primarily deal with operational digital twins – small and large.

Product Digital Twin	Connected Digital Platform	Operational Digital Twin
Design & Development	NVIDIA Omniverse Enterprise	Design and build of plants and exploration tools
Product Operation & Service	Platform to connect and develop OpenUSD applications	Production Simulation
Marketing		Production Planning
Customer Experience		Supply Chain Midstream

Types of stand-alone digital twins:

- **Product Design & Development:** transform a product, such as a wind turbine, from its initial concept to a fully realized consumable through iterative design improvements, using real-world data and insights in real-time to maximize efficiency while addressing challenges. Empower dispersed teams to collaborate effectively across locations with a virtual replica, enabling everyone to work together from a single source of truth, leading to improved team performance.
- **Optimizing Production:** simulate production processes, pinpointing bottlenecks and inefficiencies. This allows for adjustments to improve overall equipment effectiveness, reduce downtime, and boost production. And, all data captured by the digital twin facilitates the creation of a complete audit trail, simplifying compliance with regulatory requirements.
- **Predictive Maintenance:** monitor equipment performance in real-time, digital twins can predict potential failures before they occur. This enables proactive maintenance, preventing costly disruptions and ensuring smooth operations.
- **Quality Control Enhancement:** continuously monitor various parameters throughout the manufacturing process. This allows for early detection of quality deviations and ensures consistent production that meet your business's strict quality standards.
- **Supply Chain Visibility:** track raw materials, finished products, and equipment across the entire supply chain. This provides real-time insights into inventory levels, potential delays, and areas for improvement, leading to optimized logistics, right-sized production, cutting waste and meeting your sustainability targets.

...and so much more.

Expert guidance and implementation is key to ensuring success

We can help. Our team of experts support you to make the most of digital twin technology, whether you need support with existing digital twins or want to roll out new ones.

Getting the most value from enterprise digital twins comes down to understanding what you want to achieve, giving guidance and implementing it correctly. One way of doing this is by making sure that you and your organization knows exactly what enterprise digital twins are capable of. If everyone involved understands what's possible, and it solves your business challenge, it's easier to put plans into action that will help everyone succeed.

With Lenovo, you will have access to our dedicated experts as well as our ecosystem of partners. With the breadth of our end-to-end solutions, we will help you from consulting and building the infrastructure through to implementation and support services.

We can launch a proof of concept or pilot project, scaling seamlessly as needed. Our results-driven approach leverages AI, including generative AI, to unlock the full potential of your enterprise digital twins. These AI-powered solutions help unify data, and reveal and predict patterns across your value chain, empowering you to make data-driven decisions and optimize operations.

Visualize everything you need, with NVIDIA Omniverse™ Enterprise

To achieve the best results, work with a technology team that understands the manufacturing industry.

The Lenovo and NVIDIA partnership combines the strengths of two market-leading players:

- Lenovo's comprehensive solutions, expertise and breath of infrastructure. From industry-leading ThinkStations, ThinkSystems and ThinkReality devices to flexible TruScale services, we offer everything you need to create and manage a powerful enterprise digital twins solution.
- NVIDIA's powerful GPUs and Omniverse™ Enterprise platform, built for HPC data and visualization projects.

NVIDIA Omniverse™ Enterprise

NVIDIA Omniverse is a platform of APIs and SDKs that enable developers to develop applications for complex 3D and industrial digitalization workflows based on OpenUSD.

Bridge data silos, connect teams in real time, and create physically accurate world-scale simulations. Or, if you're not ready for the platform, try NVIDIA Omniverse™ for your pilot projects.

NVIDIA Omniverse™ lets you visualise physically accurate and perfectly synchronized models in virtual worlds for an immersive 3D experience, so you can create physically accurate, AI-enabled simulations.

NVIDIA pioneered accelerated computing to tackle challenges no one else can solve. Their work in AI and digital twins is transforming the world's largest industries and profoundly impacting society.

With Lenovo and NVIDIA you get the support you need for your Digital Twin project

1

Support with project planning – including helping you build a business case for digital twins

2

Meet your specific requirements – our partner network means that we have ready access to anything typically required in the energy industry

3

Implement your digital twins expertly – complete with tools to maximize visibility, accuracy and visualization

4

Measure results to ensure that your expectation was met, and create a scalable roadmap for any future digital twin project

But don't take our word for it, read on to see how we've helped an energy company like you supercharge production.

NVIDIA case study: empowering nuclear scientists

We enabled the UK's Atomic Energy Authority (UKAEA) and researchers at the University of Manchester to design a full-scale fusion reactor using our digital twin offering. Together we:

Empowered scientists, engineers and designers to work together using the same data, 3D design, engineering and simulation tools so they can collaborate on a single source of truth

Built a digital twin – complete with AI and exascale GPU computing – that accurately represents all reactor components, the plasma and control and maintenance systems

Created visual simulations of neutron transport in the reactor core – which gave scientists a safe and quick way to understand the plasma's state

Watch full case study

Start planning for success today

Get in touch with your Lenovo representative, or **contact us** via our website and get a head start on implementing enterprise digital twins into your business.

www.lenovo.com/digital-twins

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