

NORTHWEST ENGINEERING CORPORATION

Case Study



Photo courtesy of Northwest Engineering Corporation

Challenge

China-based design and engineering energy firm Northwest Engineering Corporation wanted to expand its global activities and diversify its service offering. To do that, it needed to improve its project management capabilities, enhance its survey and design techniques and focus on business innovation.

Solution

Northwest Engineering Corporation adopted the 3DEXPERIENCE platform to ensure digital continuity across its entire engineering project lifecycle to speed up its design processes, streamline collaboration and enable design reuse.

Benefits

With a centralized database, the company is better placed to compete on the global stage. Engineers perform their jobs more effectively and efficiently, work more collaboratively and capture and share knowledge to improve product design and quality and make more informed decisions.



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— Dangfeng Yang
Director of Digital & Smart Engineering
Center, NWE

A NEW ENERGY OUTLOOK

Data from the International Energy Agency (IEA) found that hydropower is the world's largest source of renewable electricity, and China is its biggest producer. Since the turn of the century, China has accounted for over half of worldwide hydropower growth, said IEA in its *Renewables 2018* report. But change is on the horizon.

As China now focuses its attention on developing a services-based economy and cleaner energy, its energy future promises to be quite different from its energy past. The IEA expects the pace of growth in China's energy demand to slow to around 1% per year. Plus, a downward trend in hydropower production, in line with less large-project development over social and environmental concerns, is causing leading businesses in the sector to explore new revenue avenues.

Northwest Engineering Corporation (NWE), a globally renowned design and engineering consultancy firm based in China, has anticipated these changes and adapted its business to suit today's global energy needs. It has transformed itself from a traditional water conservation and hydroelectric survey and design company to a technology-driven engineering enterprise focused on the holistic use and development of various renewable energies including hydro, wind, photovoltaic and geothermal power, as well as water treatment and urban infrastructure construction services.

"Today, the need for new developments surrounding water conservation and hydroelectric power in China is slowing and we're seeing a decline in engineering construction," Dangfeng Yang, director of Digital & Smart Engineering Center at NWE, said. "This forces us to transform ourselves and seek opportunities in other leading civil sectors as well as the international market."

COMPETITIVE BY DESIGN

In many ways, NWE's plans align with the Chinese government's 'Made in China 2025' initiative which seeks to raise the country's profile as a global high-tech manufacturing leader. As NWE competes in the global arena in new energy construction projects, then, it finds itself under pressure from strong market

competition and increasing industry expectations as more companies turn to digital and 3D design to become more innovative and profitable, better manage complexity and risk, and adapt quickly to ongoing market changes.

"To address these challenges, we had to improve our project management, survey and design techniques and business innovation capabilities," Dangfeng Yang said.

In 2010, the company partnered with Dassault Systèmes to embrace 3D technologies for better design efficiency and product quality as well as stronger market competitiveness. Using Dassault Systèmes design application CATIA, NWE successfully enabled 3D collaborative design for complex projects in power plants, dams, electromechanics and hydroelectric engineering, helping it to grow its market share and competitive advantage.

Based on this success, the company decided in 2016 that it wanted to build a data-based digital workflow across its entire engineering project lifecycle, from survey and design through to engineering, construction, delivery and operation using Dassault Systèmes' **3DEXPERIENCE**® platform.

DIGITAL CONTINUITY

Today, the **3DEXPERIENCE** platform allows NWE to centrally manage all its data in one place. With digital continuity across the entire business, every stakeholder is now able to efficiently and accurately gain a complete view of every project they're working on to support informed decision-making and improve productivity.



"With the 3DEXPERIENCE platform we can minimize the time spent on building complex spatial structures. By designing in 3D, we can reduce the development time by two months."

— Wen Chen
Chief Engineer of Qingshui River Project,
City Construction and Traffic Engineering
Department, Aquatic Environment
Engineering Academy, NWE

"Dassault Systèmes solutions integrate multiple design modules to avoid switching between different software and translating different data formats," Dangfeng Yang, director of Digital & Smart Engineering Center at NWE said. "The **3DEXPERIENCE** platform also offers some very helpful capabilities, such as skeleton-driven, full process management, parametric design and access to templates and third-party libraries. We're using these capabilities to improve our design efficiency and quality."

Having a centralized data platform is also improving the company's decision-making capabilities.

"We now have many renewable energy and related projects under development, such as hydropower, new energy, wind power, photovoltaic and biomass gas," Xiaodong Ma, deputy leader of the Data Integration and R&D Department in the Digital & Smart Engineering Center at NWE, said. "A hydroelectric power plant might involve a wide range of disciplines, roughly 40 to 50, and management will not have expertise in every discipline. So to help them gain a complete view of each project, especially our engineering, procurement and construction general contracting projects, we needed visualization and 3D technologies to identify work breakdown structure risks, quickly and easily show design progress and share an overview of the complete lifecycle."

"By integrating 3D design, project management, simulation analytics and other systems under one platform, management now have a better view of the company's engineering projects and can make informed decisions," Xiaodong Ma added.

3D IMPROVES EFFICIENCY

3D visualization and simulation is helping NWE to enhance its engineering processes while increasing design efficiency and integrity. The company's Bridge Department is seeing these benefits first hand.

"With the platform we can minimize the time spent on building complex spatial structures, essentially helping our designers develop 3D and 2D construction drawings," Wen Chen, chief engineer of the Qingshui River Project, City Construction and Traffic Engineering Department, Aquatic Environment Engineering Academy at NWE said. "For some unconventional structures that are usually beyond our imagination, the **3DEXPERIENCE** platform helps us to come up with the design and understand the complex structure in the shortest possible timeframe."

Even though NWE now designs in 3D, in China, 2D drawings are still required as standard for getting project owner and government approval. Using the **3DEXPERIENCE** platform, designers can handle this task with ease.

"Before, it was challenging to accurately represent complex structures in 2D drawings," Wen Chen said. "Now, we're able to perfectly transform 3D designs into 2D drawings, significantly simplifying the drawing production stage for our designers."

Now, the Bridge Department only needs one designer to create a complex structure and translate it into 2D drawings, compared to an entire team that was required before.

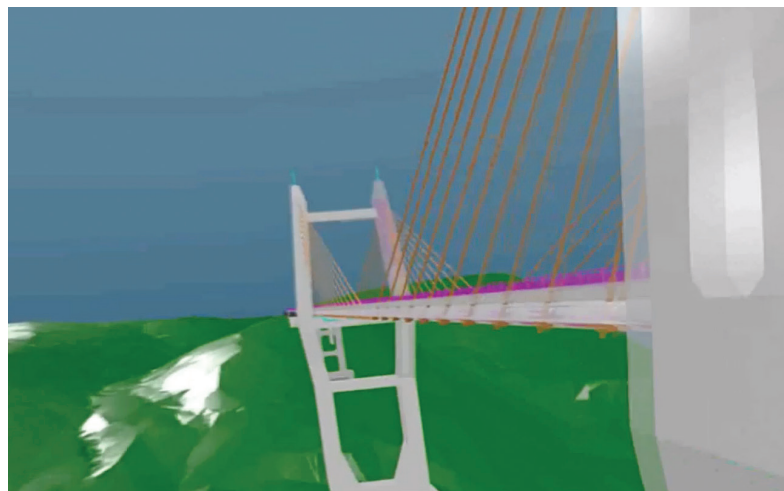
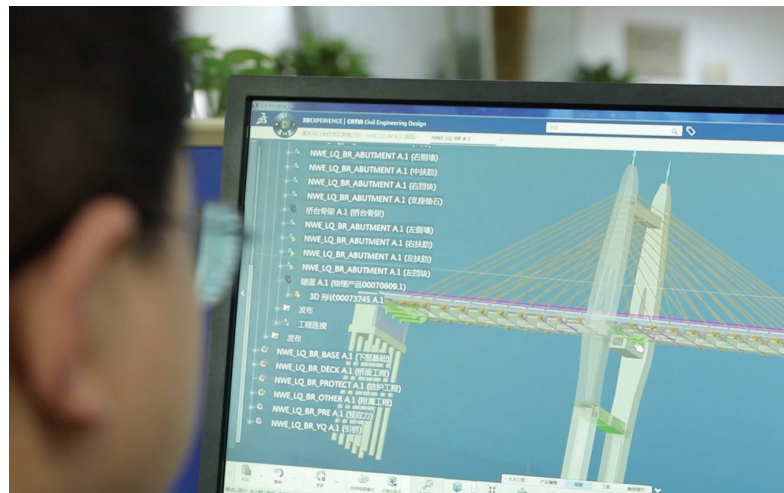
By transforming its design processes, NWE has succeeded in significantly reducing its design cycle and labor costs.

"If we develop a highly complex bridge in 2D, it may take six months," Wen Chen said. Using the **3DEXPERIENCE** platform and designing in 3D we can reduce this process by two months."

BUILDING A GLOBAL TEAM OF EXPERTS

NWE's employee experience is now more collaborative, more able to capture and share knowledge, and more engaging.

"Because the **3DEXPERIENCE** platform can be accessed via the web, it's easy for our users to open designs and examine and review them from wherever they are based," Dangfeng



Top image: Bridge design with CATIA.
Bottom image: The virtual reality capability of the 3DEXPERIENCE platform brings immersive experience when presenting a project to the project owner.

Yang said. "The software is user friendly, which is especially important for our senior employees. And it is much more convenient and effective for us when sharing designs with our on-site construction teams worldwide."

Through collaborative design, the company is able to take advantage of its geographically dispersed experts to create the best possible end results. "The **3DEXPERIENCE** platform gathers all professionals on a single platform to develop each project framework and break it down into work packages," Wen Chen said. "This way, designers based in different locations with different areas of expertise can work together to improve each project's structural design and finalize everything much quicker. It helps us greatly by reducing our communication costs and improving work efficiency."

Crucially, engineers can now take advantage of existing designs produced across the company to speed up new developments. For example, if the company has designed a bridge in one city and is now building another elsewhere, engineers can take the designs, data and related information from the first project and reuse what they need for the second without having to revalidate every step.

Focus on Northwest Engineering Corporation

Founded in 1956, Northwest Engineering Corporation, a subsidiary of China Power Construction Corporation, is an internationally renowned technical engineering consultancy firm specializing in survey & design, EPC (Engineering, Procurement, Construction) and investment operation.

Products: Clean energy development, aquatic ecological environment management, infrastructure construction

Revenue: RMB 10 Billion

Employees: 4,000 employees

Headquarters: Xi'an, China

For more information: <http://www.nwh.cn>

"The **3DEXPERIENCE** platform's flexibility enables us to re-engineer like building with blocks," Xiaodong Ma said. "It integrates 3D design, project management, simulation calculation and other computations into a complete module that benefits our development as well as our full lifecycle services."

VISUALIZING THE FUTURE

As NWE looks to the future, it is exploring the use of new technologies such as virtual reality (VR) to test and demonstrate new engineering projects to its clients. This modern way of working is helping to strengthen the company's reputation and enhance customer satisfaction.

"In the old days, our designers took paper drawings to project owners to share and explain new concepts," Wen Chen said. "Then they moved to PowerPoint presentations. Today, we're showing them our design in a VR environment via the **3DEXPERIENCE** platform, with impressive results. Recently, we finished the design of a project in Yunnan and demonstrated it to the client using VR. The owner said that he could really experience what the end result would be like and truly visualize it. More importantly, it helped to ease any doubts he had about the bridge's effect on the landscape."

The company also has plans to invest more development resources into 3D design project management, simulation analysis and data analytics, all supported by the **3DEXPERIENCE** platform.

"In the future, we will further extend our project full lifecycle flow into design project management and simulation analysis," Xiaodong Ma said. "The ultimate goal of our digitalized system is to further improve our decision-making capabilities."

Dangfeng Yang added: "With Dassault Systèmes' platform, we can digitalize our design process to meet the full lifecycle requirements of our constructions. This will create a robust foundation for digitalized construction as well as ongoing intelligent operation and maintenance."

Our **3DEXPERIENCE**® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.

