Bentley
Advancing Infrastructure

CASE STUDY

China First Metallurgical Delivers Water Conservancy Project Supporting Sustainable Development of Changjiang New Town

iTwin® Capture Optimizes Design and Construction, Saving a Total of CNY 1.33 Million in Costs and Minimizing Carbon Emissions

IMPROVING FLOOD CONTROL AND WATER ECOLOGY

Situated on the north bank of the Yangtze River, Changjiang New Town is a planned area focused on modern industries, international collaboration, and ecological initiatives aimed at optimizing the spatial pattern of Wuhan and developing a sustainable smart city. Fuhuan River is a tributary of the Yangtze River in Wuhan, contributing to the overall ecological health of the region. As such, the Wuhan Changjiang New Town Construction and Investment Group initiated a comprehensive improvement project, including a dike, for the outlet reach of the Fuhuan River. The goal of the CNY 1.66 billion project is to improve flood control capacity of Changjiang New Town and optimize the water ecological environment.

China First Metallurgical Group is part of the design and construction team. To optimize design, they created a BIM model of the dike construction based on the terrain. During construction, they used BIM technology to assist in the site selection and precise location for large temporary buildings, the construction area, and the spoil ground, analyzing the excavation and fill to improve the engineering efficiency. "It is expected that through comprehensive governance, the flood carrying capacity of the river will be improved, the dike project will be stable, and the water ecological environment will be improved," explained Wu Xu, BIM manager at China First Metallurgical Group.

TECHNICAL, ENVIRONMENTAL, AND COORDINATION CHALLENGES

"During the implementation of the project, we were faced with technical challenges, such as complex terrain and large amounts of data, so we must ensure the accuracy of BIM model," said Wu. At the same time, China First Metallurgical Group needed to meet strict environmental and sustainability requirements, minimizing the impact of construction on the ecological environment. Compounding these technical and environmental difficulties was the management and coordination of the multiple stakeholders.

China First Metallurgical Group tried several applications to process and model the terrain data; however, they lacked the features and interoperability to meet model accuracy and workflow efficiencies. "When dealing with complex terrain and [a] large amount of data, such software often had problems, such as low processing speed and insufficient precision, which could not meet the needs of high efficiency and accuracy of the project," said Wu. To address the technical, environmental, and coordination challenges, accelerate data processing, and streamline workflows, the engineering firm needed a comprehensive data capture and modeling solution that supported collaboration, design, and construction.

ITWIN CAPTURE PROVIDES A CONNECTED REALITY DATA ENVIRONMENT

After in-depth research and comparison, China First Metallurgical Group chose Bentley's iTwin Capture. "This software has significant professional advantages in water conservancy engineering, and can quickly obtain terrain data and generate high-precision 3D models by combining with unmanned aerial vehicle tilt photography technology," explained Wu. By processing aerial images of the existing site, China First Metallurgical Group successfully created an accurate and refined 3D terrain model that provided intuitive and comprehensive terrain information to visualize the project site and determine the best location for large temporary buildings and the most optimal construction area for the dikes. Through digital simulation

PROJECT SUMMARY

ORGANIZATION
China First Metallurgical Group Co., Ltd.

SOLUTION
Survey and Monitoring

LOCATION
Wuhan, Hubei, China

PROJECT OBJECTIVES
- To improve Changjiang New Town's flood control capacity and water ecology.
- To create a safer, more livable, and sustainable environment for local communities.

PROJECT PLAYBOOK
iTwin Capture

FAST FACTS
- The Fuhuan River water conservancy initiative will improve flood control capacity and water ecology for Changjiang New Town in Wuhan.
- China First Metallurgical Group wanted to create a 3D terrain and BIM model to streamline workflows and optimize project delivery.
- iTwin Capture ensured the interoperability and model accuracy needed to address the technical, environmental, and coordination challenges.

ROI
- iTwin Capture provided a connected reality data environment, shortening the design cycle by 15 days.
- Through digital simulations and analysis, China First Metallurgical Group reduced the construction period by 25 days to save CNY 550,000.
- The collaborative digital solution reduced earthworks by 10%, minimizing carbon emissions.

> "In the Fuhuan River project, we deeply participated in the design and construction work, made full use of the powerful functions of Bentley software, and provided strong support for the smooth progress of the project."
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> *– Wu Xu, BIM Manager, China First Metallurgical Group Co., Ltd.*

and analysis of the BIM model, they analyzed excavation and construction works, predicting the influence of different site selection schemes on construction progress and cost to ultimately choose the most optimal scheme.

Working in Bentley's connected data environment enabled the multiple stakeholders to share and sync reality data in real time, accelerating and improving decision-making. "We used the centralized information platform created by Bentley software to realize information sharing and real-time updating among different disciplines and project participants," said Wu. The comprehensive reality capture solution supported parametric design and multidiscipline collaborative work, facilitating digital clash detection to identify potential risks and optimize design and construction.

DIGITALIZATION DRIVES SAVINGS AND SUSTAINABILITY

Bentley's iTwin Capture delivered accurate modeling results, significantly improved project efficiencies, and reduced project costs. Working in a collaborative reality capture platform facilitated real-time information sharing, facilitating coordinated, visual workflow processes that helped shorten the design cycle by 15 days while reducing unnecessary on-site construction changes. "Bentley software helped us identify and deal with potential risks in advance through 3D modeling and data analysis capabilities," said Wu. "[The] multi-professional collaborative design function ensured smooth flow of information and reduced communication risks," he added.

Through automated calculations and real-time updates, the application reduced excavation time by 50% and manual workloads by 40%, contributing to saving 25 days and CNY 550,000 during the construction period. The digital solution not only delivered time and cost benefits, but also enhanced the project value from an environmental and sustainability perspective. By performing coordinated and precise 3D modeling, simulation, and data analysis, China First Metallurgical Group reduced earthworks by 10%—minimizing carbon emissions, energy consumption, and the impact on natural habitats—and optimized resource utilization.

Using Bentley software throughout design and construction of the Fuhuan River project also helped China First Metallurgical Group better understand the application process and best practices of BIM and reality modeling, providing strong technical support for future use on water conservancy projects. "By using Bentley applications, we have optimized the design and greatly improved the construction efficiency, laying a solid foundation for the sustainable development of the project," concluded Jun Mei, director of the BIM Center at China First Metallurgical Group.

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