

Customer

PowerChina Kunming Engineering Corporation Limited

Location

Yunnan, China

Related software and solutions

Autodesk® Revit®

Autodesk® Revit® MEP

Autodesk® Navisworks®

Autodesk® 360

Autodesk® BIM 360™

Autodesk® BIM 360™ Glue®

Hydropower Engineering Construction in Cloud Technology Age

— Use of BIM Technology in Construction of Guanyinyan Hydropower Station on Jinsha River — Use of BIM Technology in Construction of Guanyinyan Hydropower Station on Jinsha River

The 3D BIM Construction System equipped with Autodesk BIM software fundamentally improves the effectiveness of quality control and is an innovation in the traditional product delivery method. It provides customers with high-quality design products through instant and fast data sharing.

— **Cao Yinan**

Director of Science and Information Department, Director of 3D Design Supervision Department
PowerChina Kunming Engineering Corporation Limited



Fig. 1 Layout of Guanyinyan Hydropower Control Project

PowerChina Kunming Engineering Corporation Limited (hereinafter referred to as KHIDI) is a large-scale, comprehensive state-owned class A unit for investigation, design and scientific research. KHIDI is mainly involved in the planning, research, consultation and assessment of domestic and foreign hydropower, water conservation and wind power projects, as well as investigation, design, scientific research tests, general contracting, management and supervision of engineering projects; investment and operation of hydropower and wind power projects; design of environment protection, design of water and soil conservation,

design of roads and bridges, design of industrial and civil buildings, design and construction of geotechnical engineering, budget estimates and budgeting of project, water resource evaluation, security evaluation, geological disaster evaluation, investigation delimitation, and engineering monitoring, etc.

Since 1992, KHIDI has been among China's Top 100 Designers and holds a leading position among hydropower designers. It also ranks first out of the Top 50 Designers in Yunnan Province. In the last 57 years, KHIDI has surveyed and designed more

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graph LR
    BIM[BIM] --> Integration[Integration]
    BIM --> Networking[Networking]
    Integration --> Data[Data sharing, performing comprehensive management]
    Networking --> Publish[Timely publishing, improving efficiency]
    Data --> System[3D BIM Construction System]
    Publish --> System
  
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The screenshot displays the HAZOP software interface. On the left, a 3D model of a chemical process is shown, featuring a blue cylindrical tank on a cart, a white vertical vessel, and a network of red and blue pipes. A person in a yellow safety vest and white helmet is visible in the foreground. On the right, a panel titled 'Hazop' contains a list of deviations. The list includes:

- Flow: Deviation 10
- Control: Deviation 11
- Control: Deviation 12
- Control: Deviation 13
- Control: Deviation 14
- Control: Deviation 15
- Control: Deviation 16
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- Control: Deviation 99
- Control: Deviation 100



Service Platform for Engineering Information Presentation - Secondary Development of Navisworks, Supporting IPAD

Autodesk Navisworks provides the owners of construction projects with comprehensive visualized browsing services for engineering information. With an orientation towards project management by the owner, it provides a 3D simulation of BIM engineering models, simulation of construction plans of electromechanical equipment, simulation of actual installation progress of equipment, as well as comparison and analysis between plans and actual progress, in order for the owners of the projects to completely view the results, plans and implementation of engineering construction, as well as help them monitor engineering construction and make decisions in the future.

It provides technical support to carry out overall monitoring during engineering construction, solves the drawbacks of traditional engineering construction where the construction effect can only be imagined according to the drawings and the real effect can only be seen after completion of engineering construction, and greatly improves the level of comprehensive visualized management of engineering construction. The service modules in this platform mainly include a module for 3D model simulation and query, a module for installation planning of electromechanical equipment, and a module for 3D simulation and data analysis and comparison of actual installation progress.

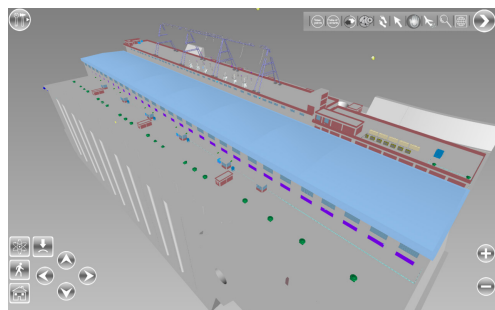


Fig. 6 Visualized Browsing

3D Browsing Solution for iPad - Autodesk BIM 360 Glue

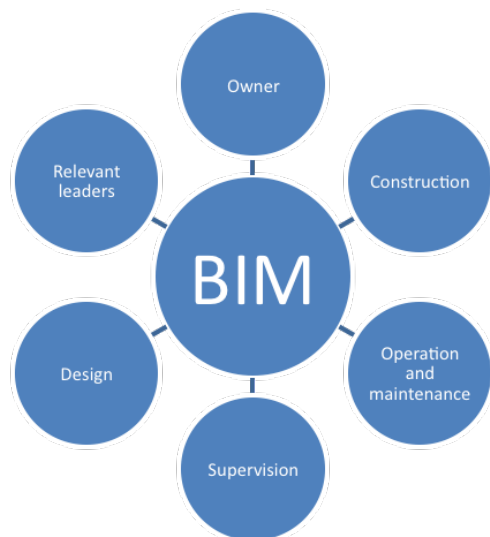
iPad clients are provided with a simulation solution for 3D construction. 3D BIM models can be browsed through the Glue clients on iPad. The browsing interface is simple, and has a game-like interface which is easy to operate. iPad's excellent operating environment provides a smooth roaming experience for BIM models.



Fig. 7 Browse 3D BIM Model on the Client

Seamless Integration with Autodesk Software

For the construction of the Guanyinyan Hydropower Station, the 3D BIM Construction System equipped with Autodesk BIM software allows each party involved in the construction of the hydropower station, including the owner, designer, construction operators, supervisors, operation and maintenance personnel, and leaders who are concerned with the construction of the hydropower station to perform continuous elaborate real-time management and control for the construction of the power houses.



Through system terminal devices (iPad, iPhone, surface, etc.), the system users can: (1) view, rotate and section 3D models; (2) view and mark construction plans and system schematics; (3) roam the power houses to view surrounding buildings and equipment pipelines; (4) examine the components of buildings and attributes of electromechanical equipment; (5) examine design notices and contract documents, etc.; (6) view site pictures to understand the latest construction progress of the hydropower station.

The 3D BIM Construction System equipped with Autodesk BIM software instantly updates design drawings and documents and enhances the communication between each engineering construction party, all on a single data platform.

—Zhu Zhigang

Assistant Chief Design Engineer of
Guanyinyan Hydropower Station
PowerChina Kunming Engineering
Corporation Limited

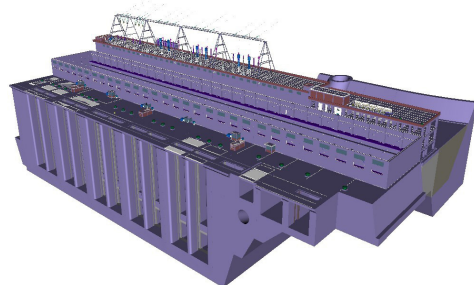


Fig. 9 BIM Model of Power Houses of Guanyinyan Hydropower Station

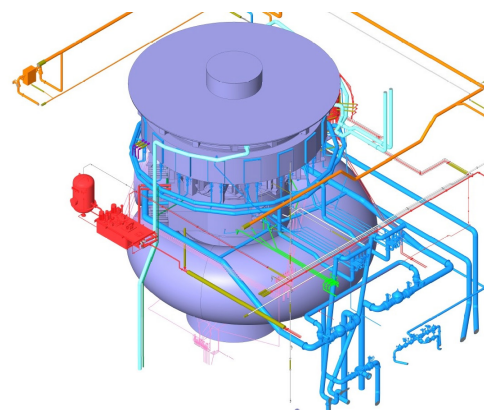


Fig. 10 3D Model of Pipelines of Generating Set

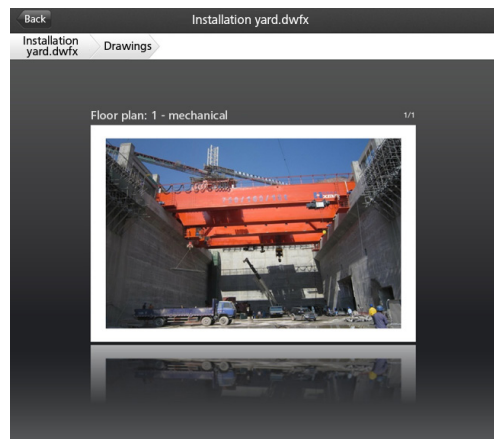


Fig. 11 Picture of the Latest Field Construction

Implementation Results and Evaluation

1) The engineering design results are "informationized". Traditional engineering design results are delivered to the owners in the form of paper drawings, documents, and the like. Construction and supervision personnel also use paper documents on site. The 3D BIM Construction System equipped with Autodesk BIM software fundamentally changes the traditional approach. By using handheld system terminals - mobile electronic devices such as iPad, iPhone, Surface, etc. - users such as owners, constructors, supervisors, field design representatives, etc. can construct with precision, rapidly search for drawings and relevant information, and check the status of equipment installations, etc.

2) The cloud server is updated in real time. Traditionally, changes made to design documents are performed by sending a notice of the change by fax, etc. and then notifying the other party by phone or email, resulting in a certain delay in the transmission of the information. The 3D BIM Construction System equipped with Autodesk BIM software fundamentally resolves this problem. The BIM Construction System is a dynamically updating system. Clients can connect to a wireless network, such as Wi-Fi, to obtain the latest real-time design results from the iCloud cloud server. The models and drawings of the equipment on site are always the latest versions.

3D BIM Construction System equipped with Autodesk BIM software plays an active role for all parties involved in engineering construction.

Using this system, designers can express their design intent accurately, promptly and effectively, allowing them to provide high-quality design results to the owners and construction and supervisory parties.

As for construction and supervision parties, past engineering experience shows that during the construction of a power station, ambiguous design information and untimely transmission of design modifications result in construction operators misunderstanding the design information. Frequent errors, omissions and risk at the construction site likewise surface. All this has a major impact on construction progress and quality. 3D BIM Construction System equipped with Autodesk BIM software, allows construction operators to view the 3D models on their mobile devices and clearly understand the layout of equipment, pipelines, etc., as well as view the design change notices, and the parameters and attributes of each equipment component. This greatly reduces errors, omissions and risk, while decreasing rework and waste. In all, the following objectives are met: investment savings, on-time completion and quality engineering.

Owners using the 3D BIM Construction System equipped with Autodesk BIM software can effectively control key procedures in construction, get a prompt understanding of the engineering construction progress and improve the level of construction management.



Fig. 12 Dynamic Update of 3D BIM Construction System

The 3D BIM Construction System equipped with Autodesk BIM software takes huge advantage of 3D design. The design intent of engineers can be expressed more explicitly, visually and quickly, and conflicts among different professionals in the field construction greatly reduced.

—Liu zhipeng

BIM Designer and Senior Engineer
PowerChina Kunming Engineering
Corporation Limited

Summary

By adopting a series of Autodesk software products (including the Revit series, Autodesk Navisworks series, Autodesk 360 series, etc.) and using state-of-the-art cloud service technology, the Guanyinyan 3D BIM Construction System carries out standardization, integration, networking and virtualization of engineering construction management.

Based on the successful implementation in the Guanyinyan Hydropower Station, this system can be promoted and used in other hydropower construction projects. Moreover, through further research and development, the system can also be applied in the operation and maintenance phases of hydropower stations, in order to realize the total lifecycle management of hydropower projects and build modern digital hydropower stations.