

New Ezhou Huahu Airport Connects China's Air Express to the World

Bentley's iTwin Technology Delivers Asia's First
Professional International Cargo Airport

DEVELOPING AN INTERNATIONAL CARGO HUB

Situated in the East of Ezhou in Hubei province, the new Ezhou Huahu Airport is being developed as an international airport, multimodal cargo hub, and aviation logistics port, and will serve as a gateway for air trade between China and the rest of the world. The airport is China's first professional airport cargo hub, which includes a passenger terminal and one of the world's largest transfer centers. It is expected to function not only as a freight hub, but also as a passenger transport branch line, public platform, and aviation base.

The CNY 30.8 billion project covers 11.89 square kilometers and a total construction area of 900,000 square meters. As one of the largest air cargo hubs in Asia, it provides facilities for widebody aircraft and is designed to handle 2.45 million tons of cargo and 1.5 million passengers per year by 2030, increasing to 9.08 million tons of cargo and 20 million passengers annually by 2050. Connecting with provincial railway, waterway, expressway, and air transportation infrastructure, the completed integral airport will cover five national-level city clusters, benefitting 90% of the country's economic output and 80% of its population. Hubei International Logistics Airport is responsible for overall airport construction and operation management.

COORDINATING MULTIPLE PARTICIPANTS, VOLUMINOUS DATA, AND COMPLEX PROCESSES

The sheer size and scale of the project presented coordination and technical challenges, compounded by complex geological conditions and a tight schedule. The airport's transfer center alone spans a construction area of 750,000 square meters, covering a floor space of 300,000 square meters, and is one of the largest trans-shipment centers in the world. Comprised of three major areas – a flight area,

terminal, and transportation system leading into and out of the airport – the facility includes numerous complex equipment processes, requiring modeling and integration, and involves coordinating civil aviation, municipal administration, and construction works.

With three different industries, 29 disciplines consisting of more than 50 parties across various locations, and over 600 on-site personnel, the project was difficult to manage and coordinate. Therefore, it required a collaborative digital environment to streamline workflows and keep the project on schedule. Hubei wanted to implement a comprehensive BIM methodology and digitalize the planning, design, construction, management, and operations processes. However, faced without an existing civil aviation BIM standards and tens of millions of model components, they realized that they needed an integrated digital technology solution capable of supporting large volumes of multisourced data and intelligent lifecycle operations.

"The Ezhou Huahu Airport has 25 million model components, the largest number of required model components recognized in the domestic BIM field. The project needs a suitable platform to carry large volumes of data and view BIM attributes, while also ensuring the smooth operation of the model," said Zou Xianqiang, chief engineer, Hubei International Logistics Airport.

LEVERAGING BIM AND ITWIN TECHNOLOGY PROVIDES INTEGRATED SOLUTION

Hubei International Logistics Airport deployed several innovative solutions that helped them overcome the challenges that they faced on this project. For example, they selected Bentley's BIM and the Bentley iTwin platform to handle a massive amount of data, coordinate among the multiple

PROJECT SUMMARY

ORGANIZATION

Hubei International Logistics Airport Co., Ltd.;
Shenzhen S.F. Taisen Holdings (Group) Co., Ltd.;
Airport Construction Engineering Co., Ltd.

SOLUTION

Digital Cities

LOCATION

Ezhou, Hubei, China

PROJECT OBJECTIVES

- ◆ To deliver the first professional Asian cargo airport, serving as an aviation logistics port and international hub in China.
- ◆ To develop a digital twin for full model integration, smart construction, and intelligent operations.

PROJECT PLAYBOOK

Bentley Raceway and Cable Management, MicroStation[®], OpenBridge[®] Designer, OpenBuildings[®], OpenRoads Designer[®], ProjectWise[®], ProStructures

FAST FACTS

- ◆ The CNY 30.8 billion Ezhou Huahu airport project required coordinating a massive amount of multisourced data and multiple participants on a tight schedule.
- ◆ Hubei implemented BIM and digital twin solutions for the first time in China's civil aviation industry.

ROI

- ◆ Leveraging Bentley's iTwin applications reduced the construction period by 200 days, saving CNY 300 million.
- ◆ Using the Bentley iTwin platform, Hubei developed a digital twin with 25 million components, resolving 6,000 issues prior to construction.
- ◆ By introducing lifecycle BIM and a digital twin, Hubei has set a benchmark for smart civil aviation practices in China.

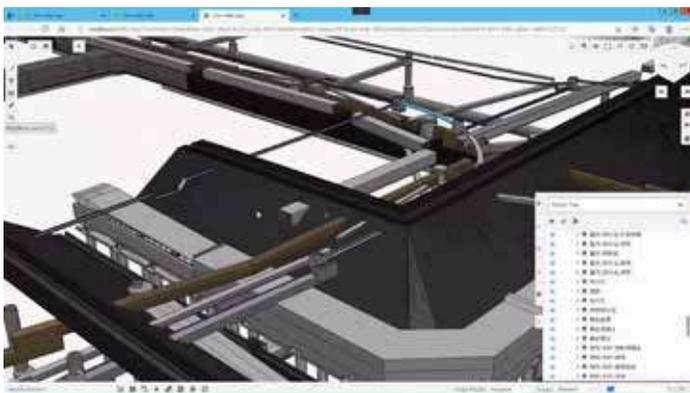


“Bentley iTwin’s super-capacity load technology solved the problem of multidata fusion of the airport’s 25 million components, providing a strong data guarantee for later construction management, operation, and maintenance.”

-Zou Xianqiang, Chief Engineer, Hubei International Logistics Airport Co., Ltd.

project participants, and deliver a high-precision model that could be applied to manage on-site construction and facility operations. Additionally, they used ProjectWise to establish a collaborative digital work environment, which helped streamline workflows among the various disciplines and more than 50 participating units engaged in on-site BIM work.

Using Bentley’s modeling applications, they developed a 3D model of the airport and the first BIM-based, full-lifecycle digital construction management platform in China’s civil aviation industry. Lastly, OpenRoads helped them develop a rapid professional modeling tool containing 11 categories and 40 sub-items, and a database that includes over 30,000 component types. The benefits of using the software enabled the team to build the underground pipeline network and create a pavement compression model for rapid partitioning of concrete pavement in the flight area.



The CNY 30.8 billion Ezhou Huahu airport project required coordinating massive multisourced data and multiple participants on a tight schedule. Image courtesy of Hubei International Logistics Airport Co., Ltd.; Shenzhen S.F. Taisen Holdings (Group) Co., Ltd.; Airport Construction Engineering Co., Ltd.

“250,000 pavement slabs were partitioned in one click, which ensured on-site construction accuracy,” said Xianqiang. Moreover, integrating ProStructures and Navigator helped coordinate structural modeling with the on-site construction team, utilizing mobile devices.

Based on the Bentley iTwin platform, Hubei integrated 25 million model components from the different BIM applications, generating a cloud-based digital twin capable of incorporating the voluminous engineering data and model elements, supporting construction management and lifecycle

operations. “The Ezhou Huahu Airport makes full use of iTwin technology, independently researches and develops an innovative application platform, and combines the BIM model to integrate the airport’s all-discipline model, as well as enable the BIM data management of the airport project,” stated Xianqiang. Using Bentley’s integrated BIM and iTwin technology facilitated construction of the digital airport, enabling the creation of a high-precision 3D model and digital twin to optimize multidiscipline design, construction, and overall project management.

DIGITAL TWIN DRIVES SMART INDUSTRY PRACTICES

Working in an open connected data environment using Bentley’s BIM applications and ProjectWise helped Hubei International Logistics Airport streamline multidiscipline collaboration across all three industries, shortening model delivery time by 90 days and saving CNY 12 million. Compared to traditional construction methods, using Navigator to provide and engage the on-site construction team with the model improved productivity by 25%. Bentley’s iTwin technology provided a cloud-based platform, featuring large modeling capacity to develop a digital twin supporting voluminous, multisourced 3D data, models, attributes, and documents.

By introducing the concept of digital twins, Hubei International Logistics Airport established a comprehensive digital context for the entire project, enabling them to pinpoint design changes in advance and avoid changes during construction, which greatly reduced costs and shortened the construction period. “Through whole-process digital management, the digital quality in design construction was effectively guaranteed and [we saved more than 200 days during] the construction period,” said Xianqiang. The digital twin solution resolved approximately 6,000 issues and realized zero demolition on site, saving CNY 300 million in project costs.

In addition to solving technological and coordination problems, Hubei used Bentley applications to develop China’s first BIM components information table, covering BIM standards for 29 professional systems across three industries of civil aviation, construction, and municipal administration, which gave them a foundation to construct a digital airport. Through the practice and application of iTwin technology and digital twins, they implemented innovative digital management concepts and workflow process to achieve full lifecycle BIM application and intelligent practices for China’s civil aviation industry. “[The project] provides a valuable reference for BIM application in the digital construction of [a] civil aviation airport, accelerating construction of smart civil aviation and building an industrial ecology that promotes the construction of smart civil aviation in China,” said Xianqiang.