

Project summary

Organization:
MMI Planning & Engineering Institute

Solution:
Cities, campuses, and facilities

Location:
Changchun, Jilin, China

Project playbook:
Bentley LumenRT™, MicroStation®,
OpenBuildings®, ProjectWise®

MMI Planning & Engineering Institute sets new standard for 3D design of automotive factories

OpenBuildings Designer helped create a digital twin to save 650 process planning hours

Project objectives

The factory's stamping workshop features a pioneering, fully automatic layout plan, and represents an investment of CNY 1.3 billion.

MMI Planning & Engineering Institute customized Bentley's OpenBuildings Designer with plugins to design the workshop layout, including detailed equipment used in FAW factories.

The workshop is equipped with sensors and monitoring equipment that provide constant operational feedback to a digital twin.

ROI

Using OpenBuildings Designer saved 650 process planning hours and reduced designers' working time by 25%.

Employing ProjectWise for collaborative design management streamlined the design process, ultimately reducing the design schedule by 20 days.

Pioneering plans for automation

Since the 1950s, Changchun City has been the cradle of China's automotive industry. The largest city in China's Jilin province, Changchun is home to FAW, the country's largest automotive producer. FAW's Prosperity Intelligent Manufacturing Industrial Park, completed in 2023, has become a key driver of economic development in the region, promoting growth of the Hongqi/Red Flag luxury car brand.

MMI Planning & Engineering Institute, a Chinese company with nearly seven decades of experience planning and constructing automotive plants, took point on this new "prosperity factory." A particularly ambitious element of the project was the factory's stamping workshop, where the structural elements of cars are given shape. The workshop features a first-of-its-kind fully automatic layout plan, including a steel-aluminum hybrid mechanical stamping line, an automatic overhead crane, automatic loading and transfer, and automatic quality inspection for stamped parts.

With several pioneering technologies in play, the automated stamping workshop placed high demands on the design phase of the project. Designers needed to ensure strict standards for spatial occupancy, operating trajectory, and safety while also considering the design of a dense number of structural components for the workshop.

Preventing design oversights

The MMI team knew traditional design tools would struggle to meet the high-density collaborative demands of the stamping workshop project, potentially leading to design oversights and missed deadlines.

They planned instead to create a virtual 3D model of the workshop that would not only serve to streamline the design process, but also allow the client to easily monitor production dynamics when the factory became operational. They planned to outfit cranes and other automatic equipment with sensors and monitoring devices that would feed real-time data to a digital twin, where workshop dynamics would be simulated, recorded, and analyzed.

A comprehensive digital twin

MMI had experience working with Bentley software and customizing it for use in automotive factory design. For the stamping workshop project, the team began by using OpenBuildings Designer to execute the 3D layout planning and design process. Bentley's ProjectWise was also employed as a collaborative management platform during the civil engineering design process, which promoted high-quality, BIM-forward design while reducing errors and oversights. This minimized the need for modifications in later stages of the project.

The team also used OpenBuildings Designer to consolidate models of all the equipment in the workshop, create 3D markings of any barriers on the floor, and develop models of storage spaces and parts that would be kept in storage. This work was accelerated by the previous development of a customized model library with standardized equipment used in the client's factories.

The foundation for an intelligent factory

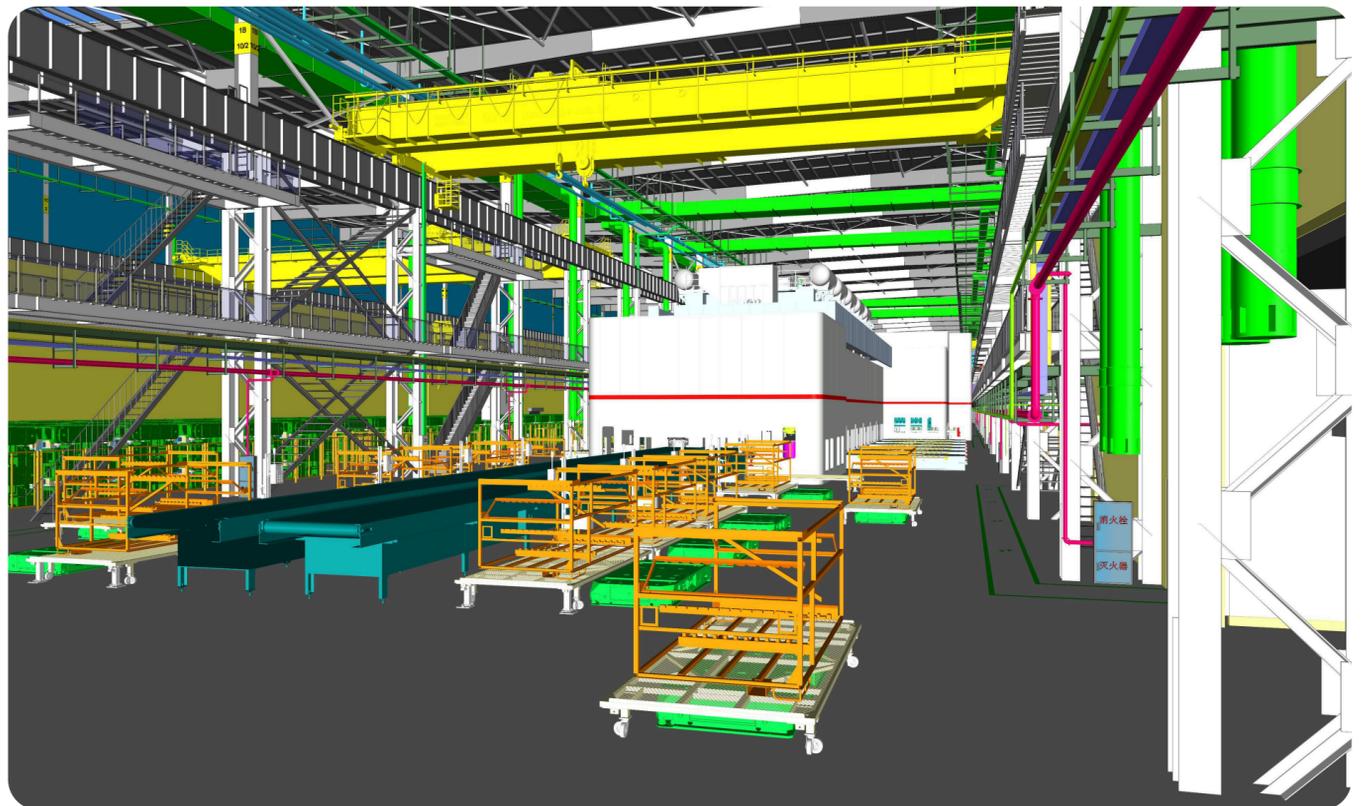
By leveraging Bentley applications to execute a fully digital design planning process, MMI shortened the design schedule for the stamping workshop by 20 days. During the process, 3D modeling analysis helped to identify 2,460 potential interference points, and the team adjusted drawings accordingly. Compared to similar projects, this forward-thinking approach reduced construction changes during later stages of the project by more than 80%, an estimated CNY 5 million in savings.

The shift toward a fully digital process not only created a more efficient design phase, but also laid a practical foundation for the development of a state-of-the-art, fully automated and self-operating factory workshop. Furthermore, the intelligent design choices employed by MMI—including the use of sensors and monitoring devices on automated equipment—continue to pay dividends to the client by feeding back real-time operational data to the digital twin and generating a plan for any maintenance and repair needs that might be brewing.

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OpenBuildings Designer is the most widely used and most helpful digital software in our company's digital process planning work. It has provided the most solid and reliable technical support for the MMI Institute IX's transition towards digital and intelligent process design.

— Lu Pengwei, Stamping Process Engineer,
MMI Planning & Engineering Institute



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