Yachiyo Engineering Company, Ltd.
Nagoya Branch

Customer Success Story

Autodesk Infrastructure Solutions
Autodesk® Civil 3D®

Firm Improves Bridge Design

Engineers use Autodesk Civil 3D software to cut costs and reduce design time by 40 percent

"Autodesk Civil 3D is easily adapted to our workflows and provides immediate benefits. Design tasks previously completed in one week now takes only three days."

Toshi Aiba,
Engineer,
Yachiyo Engineering Co. Ltd.,
Nagoya branch

Project Summary

The Yachiyo Engineering Co., Ltd. (Yachiyo), a general construction consulting company in Japan, is reaching its goal to lead the industry in 3D design. Founded in 1963, the company is now one of the largest firms of its kind in Japan. Yachiyo's staff includes nearly nine hundred industry professionals, including consulting engineers, planners, and architects.

Yachiyo's Nagoya branch used Autodesk's civil engineering software in three bridge design projects. Using Autodesk Civil 3D, the Nagoya branch was able to:

- Reduce schedules for highway design br 40 percent, from one week to three days
- Streamline work and reduce costs by performing more design and drafting tasks in house
- Use advanced design capabilities to produce creative solutions for capturing missing data

The Challenge

Balancing safety concerns with budget demands to build strong yet cost-effective infrastructure is a primary challenge for any civil engineering firm. The government tasked Yachiyo to design a highway expansion bridge over an existing multilane road. The project called for the construction of more than 60 base columns to support the bridge's weight. Because taller columns increase building costs, Yachiyo designers needed to find the optimal balance between a cost-effective bridge column height and a safe distance from the roads and traffic beneath.

Before turning to Autodesk software, designers drew cross-section diagrams of bridge columns by hand—a tedious and time-consuming process that led to unnecessary errors.

The Solution

After starting the designs using traditional methods and tools, Yachiyo engineers turned to Autodesk Civil 3D to streamline workflow through model-based design. By using Civil 3D, the firm easily extracted the various longitudinal

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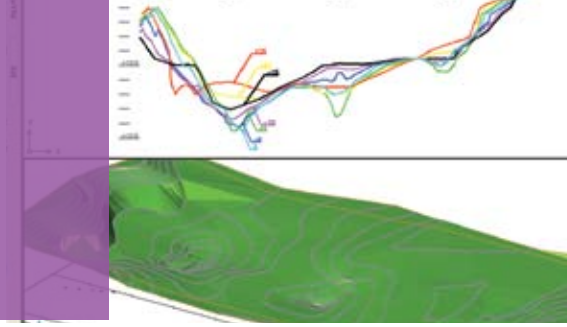

"The ability to model the external shape of a structure's frame in Civil 3D makes it an important tool across the entire value chain, from design to maintenance to management. Civil 3D can be used as a 3D database to support processes throughout the design cycle."

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and transverse section diagrams from the horizontal alignments.

Designing a slanted bridge column is rarely an easy task, but Yachiyo designers faced a more difficult challenge in determining the dissection of soil layers from limited boring data. Although lacking all the necessary information, the engineers had to draw a longitudinal section diagram while selecting the appropriate column depth. To do this, Yachiyo used Autodesk Civil 3D to create a cross section of the surface displaying subsoil levels. Designers moved forward with the design by clipping the longitudinal section diagram and accumulating these soil levels.

Any soil borings must align perfectly with the bridge's midsection. Any miscalculation can delay the project and increase costs. Despite the missing information, engineers quickly produced an effective design for bridge column bases while taking the gradient and soil layer flow into consideration.

Combating Erosion

To strengthen the earth around bridge columns submerged in a river, Yachiyo again turned to Autodesk Civil 3D software. Years of exposure to steady water flow and seasonally swift currents eroded the areas surrounding the columns, making the bridge less stable.

With only a ten-year-old, 2D contour-based diagram, designers used Autodesk Civil 3D to create a topographic representation. They extracted the longitudinal and horizontal sections directly from the original diagram to create an accurate frame of reference.

"Because workflow data from the creation of surface models and cross-sectional clippings are stored in the database, we can go back and review the information whenever needed," says Toshi Aiba, an engineer with Yachiyo. "Any Civil 3D work completed to date is not wasted. Even if the task was delayed, the resulting information instantly becomes invaluable."

To complete similar projects in the past, Yachiyo outsourced much of the measurement, design, and drafting to third-party subcontractors and CAD (computer-aided design) operators. Using Autodesk Civil 3D, Yachiyo designers now control the project from start to finish—saving money not only by eliminating the need to outsource work, but also by enabling their team to generate and visualize designs at every stage of the process quickly and accurately.

The Result

Autodesk Civil 3D significantly enhanced and accelerated Yachiyo's bridge design processes. "Autodesk Civil 3D is easily adapted to our workflows and provides immediate benefits," says Aiba. "Design tasks previously completed in one week now take only three days."

Beyond time and budget savings, Yachiyo recognizes the benefit of model-based design across the entire project. "The ability to model the external shape of a structure's frame in Civil 3D makes it an important tool across the entire value chain, from design to maintenance to management," says Aiba. "Civil 3D can be used as a 3D database to support processes throughout the design cycle."

To learn more about how Autodesk Civil 3D is helping organizations around the world complete projects faster and more cost effectively, visit us on the web at www.autodesk.com/civil3D.

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