



Hyundai Engineering automates development of steel structures

Bentley STAAD® helps assign and adjust steel components based on individual project needs

Supporting massive equipment

Hyundai Engineering is a private company that provides an array of global engineering solutions for chemical engineering plants, power generation facilities, infrastructure, green energy, and asset management. Since the company's creation in 1974, Hyundai Engineering has continually worked to improve technology and processes to meet its customers' needs.

Steel forms the backbone of nearly all physical plants. These facilities require reliable and economical steel support systems to handle the weight and spatial needs of massive machinery. Hyundai Engineering aimed to discover efficiencies in the plant design process to further improve their longevity, durability, and cost-effectiveness. "Steel design utilizes finite element analysis modeled with beam elements; however, significant challenges arise due to the mismatch between the beam, the smallest unit in finite element analysis, and the physical member, the smallest unit in steel design," said Hyun-il Baek, manager at Hyundai Engineering.

As a result, designers must undertake tedious, time-consuming tasks to design in a consistent manner and create practical steel structures.

Automating repetitive processes

As digital technology has advanced, Hyundai Engineering wanted to find ways to automate the design development of steel structures. This capability would free designers from repetitive tasks and give them the chance to be more creative. Previous methods of automatically setting steel structure design variables proved unreliable. "This is because accurate judgment by an experienced engineer is required when setting design variables for complex structures," said Baek.

To overcome these difficulties, Hyundai Engineering developed the concept of the New Physical Model. This concept introduces stratification and categorization to steel structure design. "This model features automatic setting of design variables and is geared towards incorporating design automation functions that consider future constructability enhancements," said Baek. Designers would be able to create design rules that would enable their structural design platform to automatically place and match elements based on the specific needs of each project.

To bring this concept to life, Hyundai Engineering needed a platform that could accommodate how they envisioned the New Physical Model.

Project summary

Organization

Hyundai Engineering Co., Ltd.

Solution

Structural Engineering

Location

Seoul, South Korea

Project playbook

STAAD

Project overview

- Hyundai Engineering is a private company that provides global engineering solutions for chemical engineering plants, power generation facilities, infrastructure, green energy, and asset management.
- The company wanted to find ways to automate the design development of steel structures and free designers from repetitive tasks.
- They chose STAAD.Pro® to help them develop their New Physical Model system.

ROI

- In their first test case, STAAD and the New Physical Model program reduced the time for structural analysis by 70% and lowered the amount of steel needed by 2%.

Classifying components for rapid placement

The company determined they could use Bentley STAAD.Pro to help them develop their New Physical Model system. Using the OpenSTAAD API, they created in-house programs enabling them to expand and adjust automated processes based on specific project requirements. "STAAD.Pro is a highly reliable general-purpose structural analysis program that can design almost any type of structure," said Baek.

Hyundai Engineering designed this system to allow designers to classify structural components, assign them within a hierarchy, and explore potential options without having to meticulously design each one. The ability to apply bespoke automation rules from project to project will help designers meet unique needs while greatly improving efficiency.

Significant time and cost savings

With the New Physical Model software, created using OpenSTAAD's API, Hyundai

Engineering can now automate a variety of tasks. The software now automatically configures elements by inferring the physical members and the overall shape of the final structure based on geometry information. With a single click, users can alter the configuration as needed.

Once the configuration is set, moment and shear connections are automatically applied. The New Physical Model can also automatically set piping and cable tray loads and optimize the design with constructability in mind.

While Hyundai Engineering's new system can be applied to all steel plant structures, they used a pilot project to estimate potential cost savings. In that case, the New Physical Model program reduced the time for structural analysis by 70%. Additionally, they reduced the amount of steel needed by 2%. "If you utilize the developed design automation program, the burden of having to redefine all related design variables as you modify the structure is eliminated," said Baek.

"Steel structure design automation programs can lead to dramatic productivity improvements by freeing engineers from simple repetitive tasks."

-Hyun-il Baek, Civil Engineer, Hyundai Engineering Co., Ltd.

Bentley

Find out more at [Bentley.com](https://www.bentley.com)
1.800.BENTLEY (1.800.236.8539)
Outside the U.S.: +1.610.458.5000
Global office listings: [bentley.com/contact](https://www.bentley.com/contact)

© 2025 Bentley Systems, Incorporated. Bentley, the Bentley logo, STAAD, and STAAD.Pro are either registered or unregistered trademarks or service marks of Bentley Systems, Incorporated or one of its direct or indirect wholly owned subsidiaries. Other brands and product names are trademarks of their respective owners. TSK-3173