

Bentley[®]
Advancing Infrastructure

Project Summary

Organization

RISE Structural Design, Inc.

Solution

Manufacturing

Location

Japan

Project Objectives

- Perform pipe stress analysis and deliver accurate assessments to meet the owner's safety and cost requirements
- Ensure that piping around furnaces could perform in temperatures ranging from 300 to 900 degrees Celsius
- Deliver synchronized structural and piping analysis and design through multi-discipline collaboration and data sharing

Products Used

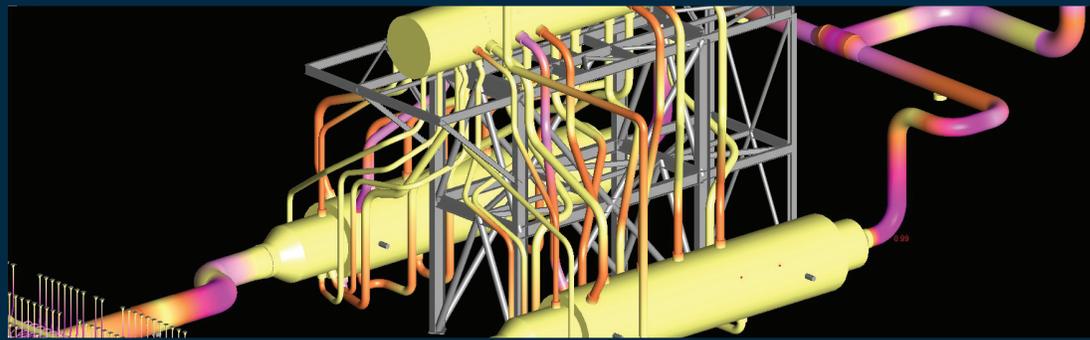
AutoPIPE[®] Advanced, STAAD[®]

Fast Facts

- Establishing effective coordination among the multi-discipline design team was critical to avoid delays.
- RISE used STAAD's pipelink format to create linked models of the piping and framework, automatically joining the beams at support points.
- Spring supports ensured that the piping was flexible enough to react to extreme temperatures.

ROI

- The application's processing speed enables the design team to analyze more complex models in a shorter amount of time.
- Using Bentley's ISM solutions reduced inefficient work processes, including checking differences in design policies among departments.
- Bentley applications reduced coupling analyses by 10 times, compared to using other software options.



RISE Structural Design Uses Innovative Technology for Methanol Plant's Pipe Stress and Structural Analysis

AutoPIPE-STAAD Integration Increased Productivity and Maintained Project Schedule

Broad Experience in Structural Design and Piping Analysis

Based in Tokyo, Japan, RISE Structural Design, Inc. specializes in structural design and analysis for overseas plant, building, and piping design. Known for its work in seismic diagnosis, the company identifies situations and formulates proposals based on its broad experience in providing safe and durable structural design and piping analysis.

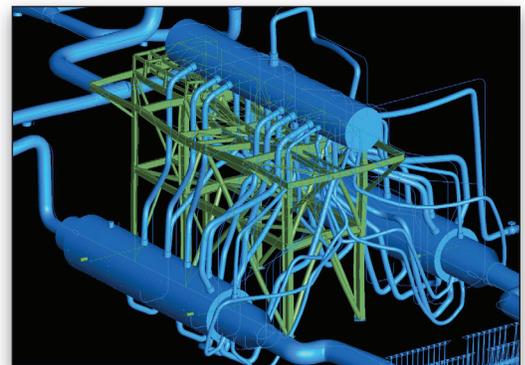
RISE took on a pipe stress analysis project at a methanol plant in Japan and was contracted to perform pipe stress analysis on the pipes near the plant's furnace, which ranged from 300 to 900 degrees Celsius. The organization was responsible for delivering accurate assessments and reduce costs for steel materials. Among the challenges was installing spring supports to ensure the piping system's flexibility to react to the furnace's extreme temperatures. Establishing effective coordination across various design teams, such as structural and piping, is critical to avoid delays. Traditionally, each discipline involved in a project conducts their analyses independently as well as uses in different conditions. This makes it nearly impossible to create 3D data and increases analysis time. The traditional, disconnected workflow would not work for RISE.

RISE needed a solution that would remove productivity barriers between departments, enabling each department to link the piping models. The coupling of piping and framework models allows a more accurate understanding of the behavior of frameworks that are connected to piping supports. This is highly effective for selecting the spring hangers and constant hangers. The combined effects enable designs that are simpler, safer, and more economical.

AutoPIPE Increases Design Analysis Speed

Consolidating models, however, came with challenges. The design team had to consider the thousands of intersections and connections from the different departments' models. To resolve this challenge and keep the design's progress on schedule, the project team used Bentley's AutoPIPE, which can manage thousands of nodes and segments. The application's quick processing speed enabled the design team

to analyze more complex models in less time. Additionally, the team used STAAD's pipelink function to create conjoined models of the piping and framework. This format also automatically joined the beams at support points, which will help reduce carbon dioxide emissions. While the design team uses AutoPIPE to conduct the coupling analysis, users can easily transfer the results of the piping load analysis to STAAD for structural analysis.



Piping and framework models allow a more accurate understanding of the behavior of frameworks that are connected to piping supports.

"We used pipelink's integration function between Bentley's AutoPIPE and STAAD to create piping and framework models in a short amount of time, which results in a substantial reduction in design costs," explained Nobuaki Koremoto, technical consultant with RISE Structural Design. "Since our company had analysis departments for both piping and frameworks, with extremely low barriers between them, we have an outstanding process for coupling analysis."

"Only Bentley applications provide us with reliable performance for the coupling analysis of piping and frameworks."

— Nobuaki Koremoto, technical consultant,
RISE Structural Design

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Bentley Solutions Eliminate Inefficient Work Processes

Using Bentley’s integrated structural modeling (ISM) solutions for coupling analysis, RISE reduced inefficient work processes. These processes included checking differences in design policies between departments, adjusting schedules, and reducing project delivery costs. Integrating the models helped improve analysis efficiency, which might have fallen behind if the project team had used traditional, disconnected data workflows. This decision led to a decrease in design costs. Koremoto added that when pipe stress analysis teams use software from a different

company to conduct similar coupling analyses, both time and cost increase by 10 times than when Bentley applications are used. “We are convinced that by overcoming, one by one, the practical and organizational issues faced by various engineering companies, making coupling analysis the standard design method will bring immense benefits to the plant engineering and construction.” Moving forward, Koremoto plans to perform coupling analysis with Bentley applications to provide quality designs. “We hope to use these strengths to continue actively conducting coupling analysis in the future and make coupling analysis the standard design method.”

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