

Bentley[®]
Advancing Infrastructure

Project Summary

Organization

Biuro Projektow "Nafta-Gaz"
Sp. z o.o.

Solution

Manufacturing

Location

Jaslo, Poland

Project Objectives

- To develop a modular plant for treatment of gas extracted from underground hydrocarbon deposits.
- To design reusable modules that can be disassembled, transported, and reassembled at different sites.
- To build in flexibility, allowing reconfiguration of modules to enable installation of single or multiple preliminary separators based on individual site conditions.

Products Used

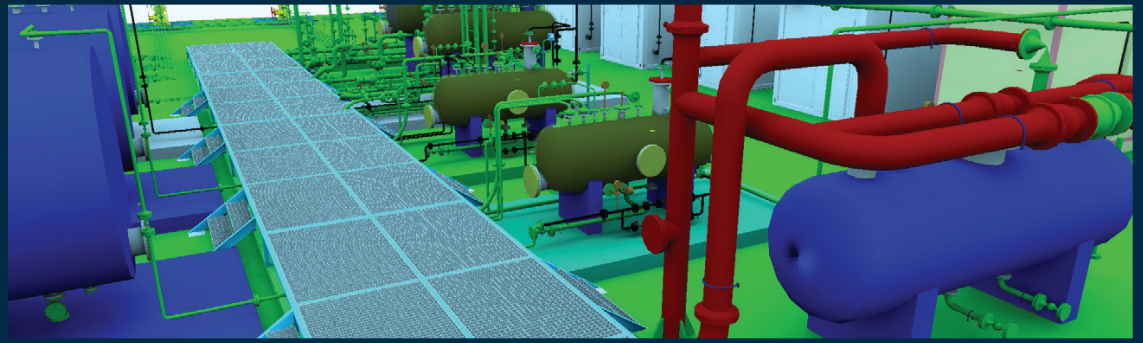
AutoPIPE, Navigator, OpenPlant PID, OpenPlant Modeler, OpenPlant Isometric Manager, ProStructures

Fast Facts

- Biuro Projektow "Nafta-Gaz" (NAFTA-GAZ) used Bentley's 3D plant design and modeling software to quickly design a flexible, modular natural gas treatment plant.
- A long-time user of Bentley applications, NAFTA-GAZ worked with Bentley Partner Centrum Systemów Softdesk (CS Softdesk) to expand the OpenPlant Modeler catalogs to meet the specific project needs.
- The project team used referenced drawings and iModels to collaborate on design improvements, delivering a flexible skid design that could be easily reconfigured.
- The portable, reusable design reduces the consumption of resources and has a minimal impact on the environment.

ROI

- Working with CS Softdesk, in conjunction with Bentley applications, improved project delivery performance by an estimated 60 percent, compared to using standard CAD and 2D technology.
- NAFTA-GAZ's innovative approach lowered on-site construction costs, and saved time on plant and equipment installation.



NAFTA-GAZ Develops Reusable Modules for Mobile Gas and Improves Project Delivery by 60 Percent

Bentley's Applications Help Project Team to Design, Coordinate, and Review 3D Models

Skids Simplify Construction

Biuro Projektow "Nafta-Gaz" Sp. z o.o. (NAFTA-GAZ) provides comprehensive design services for the oil and gas industry. The Jaslo, Poland-based company acquired specialized experience and technical knowledge through 36 years of operation. NAFTA-GAZ was established as a design department of oil mining, but became part of the mining projects office. Privatized in 1996, NAFTA-GAZ has advanced complex engineering designs for oil and gas field development, transmission and distribution systems, and facilities and installations. For this USD 12.5 million project, NAFTA-GAZ devised a modular plant for treating gas extracted from underground hydrocarbon deposits.

"Building 3D models and producing deliverables like isometric drawings has always been important to us."

— *Boguslaw Niemczyk*
Engineer, "Nafta-Gaz"

The reusable skids can be quickly and easily transported from site to site, simplifying installation and reducing construction costs. The project team used OpenPlant, AutoPIPE[®], and Navigator to design, coordinate, and review the 3D models and generate deliverables for the plant modules. Using Bentley technology improved overall project delivery time by 60 percent, compared to projects using standard CAD and 2D technology.

Flexibility to Reconfigure

The primary design requirements for the modular treatment plant were a flexible configuration and ease

of transport. The whole plant was to be assembled on a location at a gas field, then disassembled, transported, and reassembled at a different location. Each plant system would be self-contained in an individual module (skid). In an emergency, a compromised skid would be replaceable. The module configuration had to be adaptable so that changes could be made based on the specific physiochemical properties of the hydrocarbon deposits at individual gas fields.

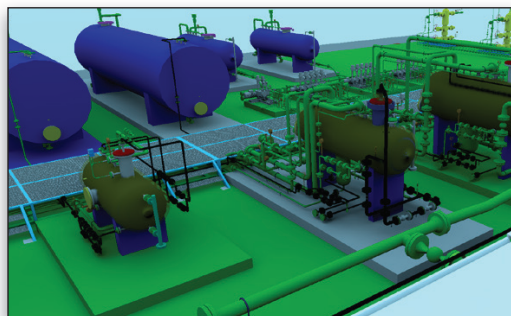
Designing the plant using traditional CAD and 2D technology would be too cumbersome, potentially preventing the project team from exploring multiple options for module design and configuration. Experience also showed that producing deliverables would take too much time. To comply with industry standards, NAFTA-GAZ opted to develop a 3D design that would produce reliable final documentation. As a long-time user of Bentley applications, NAFTA-GAZ relied upon Bentley's intelligent plant design software to generate a high-quality, flexible design in less time.

Modeling Site-specific Conditions

NAFTA-GAZ prepared 3D models for each of the plant modules using Bentley's OpenPlant software for interoperable 2D and 3D plant design. Bentley's software enabled the team members to build 3D models very quickly with the addition of necessary catalog elements provided by Bentley Partner Centrum Systemów Softdesk (CS Softdesk), Lodz, Poland. Moreover, interoperability with other software accelerated the design and review cycles.

The project team subsequently exported piping system designs

from OpenPlant to AutoPIPE for pipe stress and loading analysis based on the specific conditions of each site where the treatment plant was to be installed. Bentley software's



NAFTA-GAZ's innovative approach allowed it to lower costs and save time on the project.

"Building 3D models and producing deliverables like isometric drawings have always been important to us. With OpenPlant Modeler and OpenPlant Isometrics Manager, the process has exceeded our current expectations.

We like the intelligent isometrics documentation that allow us to read element data directly from the isometric drawing file, which is a milestone in comparison to former flat isogen files."

*– Boguslaw Niemczyk
Engineer, Biuro Projektow
"Nafta-Gaz"*

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built-in industry codes and standards simplified the process of compliance with applicable piping codes and local standards.

Using Navigator enabled team members from various disciplines to coordinate the models in 3D, review and share feedback in real time, and resolve any design issues. Models created with Bentley and non-Bentley software were joined to create hybrid models for review and resolution. The accuracy of the resulting plant model rapidly produced high-quality deliverables, such as 2D drawings and bills of material.

Collaborative iModel Review

OpenPlant allowed the project team to export the 3D designs as portable DGN files that included all the design data. This inclusion meant that the drawings for each discipline could be placed in a single folder and cross referenced. NAFTA-GAZ could also generate up-to-date iModels for review by team members responsible for various parts of the design. The referenced drawings and iModels were vital to the project team's collaborative design efforts. They also enhanced communication among team members.

Bentley products improved the quality and speed of the project team's design work, producing final documentation in less time than previous efforts on similar projects.

NAFTA-GAZ estimated that working with CS Softdesk, in conjunction with Bentley software, improved project delivery by an estimated 60 percent compared to prior projects using standard CAD and 2D technology.

Efficient Design, Effective Solution

Not only did NAFTA-GAZ complete a faster and more efficient project delivery, but it also successfully achieved the challenging design goals. The designed modular system provides the flexibility to transport single or multiple preliminary separators, depending on the on-site conditions of the gas reservoir. The treatment plant can be assembled on a concrete slab foundation laid directly on compacted soil and disassembled when the treatment process is complete. The modular design significantly reduces the construction cost and time required to erect a plant and install equipment on site. The ability to disassemble the plant, relocate the modules, and reconfigure and reuse components at the next location results in significant savings.

The modular design not only saves construction time and expense, but also shields the environment from contamination. The modules themselves are above the ground level and are hermetically sealed, presenting minimal danger of leakage compared to a permanent installation with underground pipes. Once the skids are removed, the area can be brought back to its original state. When the modules are transported to the next site, they leave no construction debris or equipment for disposal.

Using Bentley software allowed the NAFTA-GAZ project team to collaboratively design a flexible, environmentally friendly solution for this modular treatment plant and, at the same time, improve the company's project delivery time by nearly two-thirds.