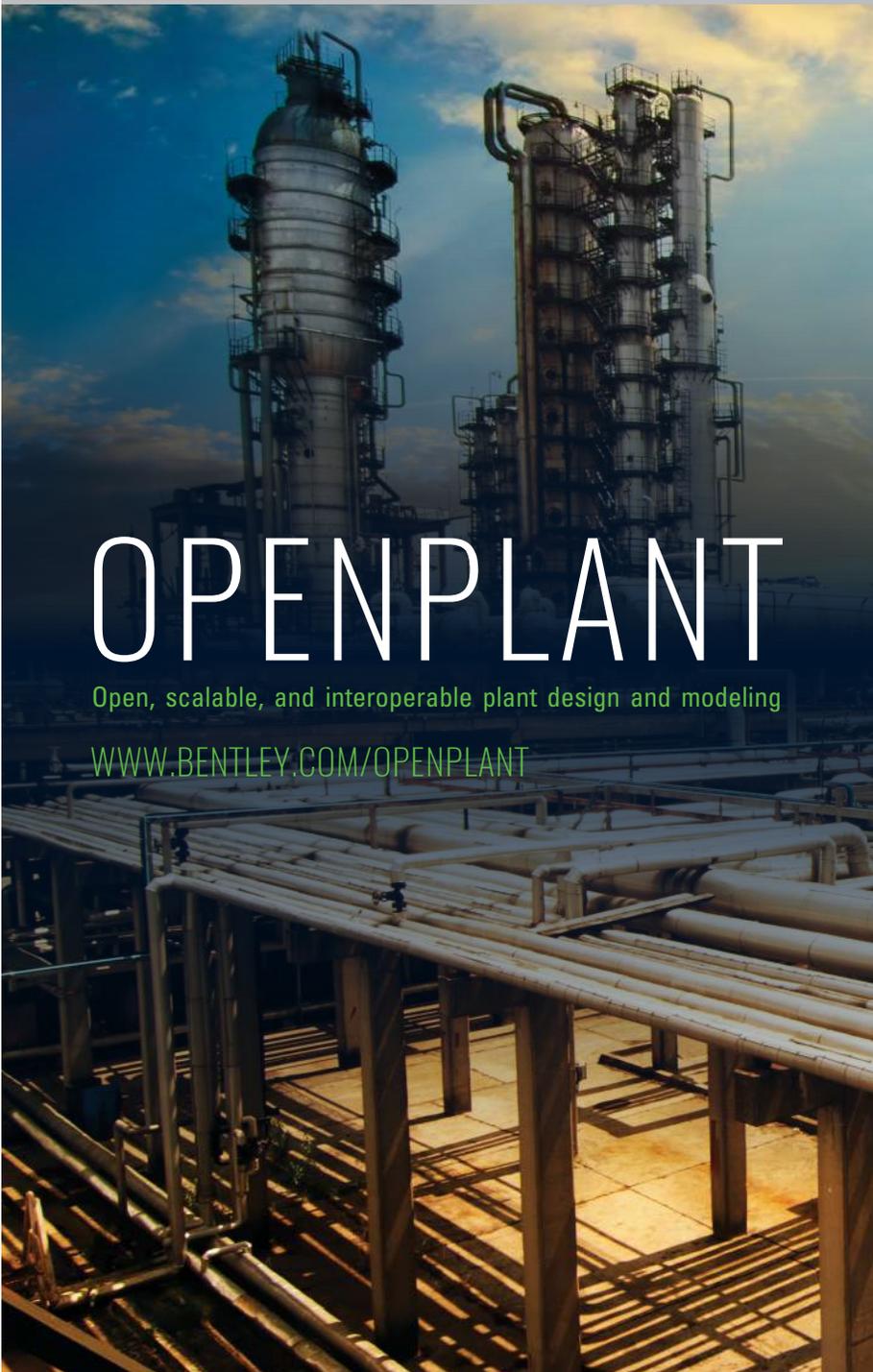


PROCESS
MANUFACTURING

Collaborative, Multi-discipline Plant Design with *OpenPlant*





OPENPLANT

Open, scalable, and interoperable plant design and modeling

WWW.BENTLEY.COM/OPENPLANT

OpenPlant uses a collaborative and intelligent plant design environment that provides users in the process and manufacturing industries advancements for multi-discipline plant engineering, from design and operations. Leading process and manufacturing plant owner-operators and engineering, procurement, and construction companies have adopted OpenPlant as a practical and scalable solution to comprehensively support project delivery. Using open data standards, users can share information across multiple disciplines and the infrastructure lifecycle.

OpenPlant CONNECT Edition improves multi-discipline plant design productivity by connecting to project collaboration services, supporting cloud-based asset tag management, and synchronizing lifecycle information with enterprise data stores. The application allows individuals and teams to collaborate and easily share information within the extended supply chain, while managing the exchange of plant design deliverables, including orthographics, isometrics, bills of material, and reports for pipe, supports, equipment, and instrument lists. Users can also resolve issues and act on insights through project metrics and KPIs without IT set-up or additional investments.

With the CONNECT Edition, OpenPlant now includes integration with Bentley's iModelHub. Introduced in 2017, this Bentley cloud service provides project changes on a timeline and notifies project participants, based on their ProjectWise® workflow configuration, about the availability of relevant changes. Participants can synchronize to and from specific timeline milestones, while measuring the impact of ongoing changes. Without requiring changes to existing BIM applications or processes, the iModelHub cloud service:

- » synchronizes and distributes changes made through discipline-specific BIM applications;
- » aligns semantically and physically their constituent digital components; and
- » maintains immersive visibility for comprehensive and continuous design reviews across all project disciplines and participants.



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In addition to the iModelHub integration, OpenPlant CONNECT Edition also improves plant design productivity and saves project time by enabling:

- » Faster multi-discipline design through an updated, streamlined interface that provides an optimized common workflow and is consistent across CONNECT Edition applications
- » Streamlined loading of data from other 3D design applications including PDMS, E3D, and Smart 3D into OpenPlant for fast production of isometrics and orthographics, as well as conversion into OpenPlant Modeler
- » Enhanced model interaction via multiple data access points through web or mobile platforms. Users can avail themselves to consistent and centralized tags, standard reports, web editing of data, and improved insights into project progress
- » Increased collaboration and improved consistency by enforcing common standards across disciplines and among owner-EPCs with common worksets

For more information on iModelHub, visit www.bentley.com

THE FOLLOWING EXAMPLES EXPLAIN HOW OWNER-OPERATORS HAVE USED OPENPLANT TO SAVE TIME AND RESOURCES ON PROJECTS.

GEA EQUIPAMENTOS E SOLUÇÕES LTDA.

The key objective of this project in Sao Paulo, Brazil was to develop and install a new, innovative process to evaporate creamed yeast previously considered waste from a sugar mill and recycle it for resale to animal feed and nutrition markets. The GEA Equipamentos e Soluções team needed to work with compact equipment to optimize the use of physical space on a client's premises and find an efficient, flexible, and affordable way to implement the project. Critical to the project's success was the development of a customized, reusable catalog of components for the industrial plant.

The project team used OpenPlant, as well as other Bentley applications, to better anticipate possible interferences and risks with respect to safety and cost escalation. Using Bentley technology allowed the team to compress project schedules by 20 percent. OpenPlant enabled faster extraction of isometric projections, cutting project delivery time by 10 percent and reducing construction time for the pasteurization plant by 20 percent.

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Bentley has been a partner of our company for many years, providing solutions and experience that help us exceed our objectives. The assistance and trust we receive as part of this partnership are fundamental to the success of our projects.

— *Willian Leite Avelino, piping designer with GEA Equipamentos e Soluções SA.*



CENTRAL PRODUCTION FACILITY, NOVOPORTOYSKOYE FIELD

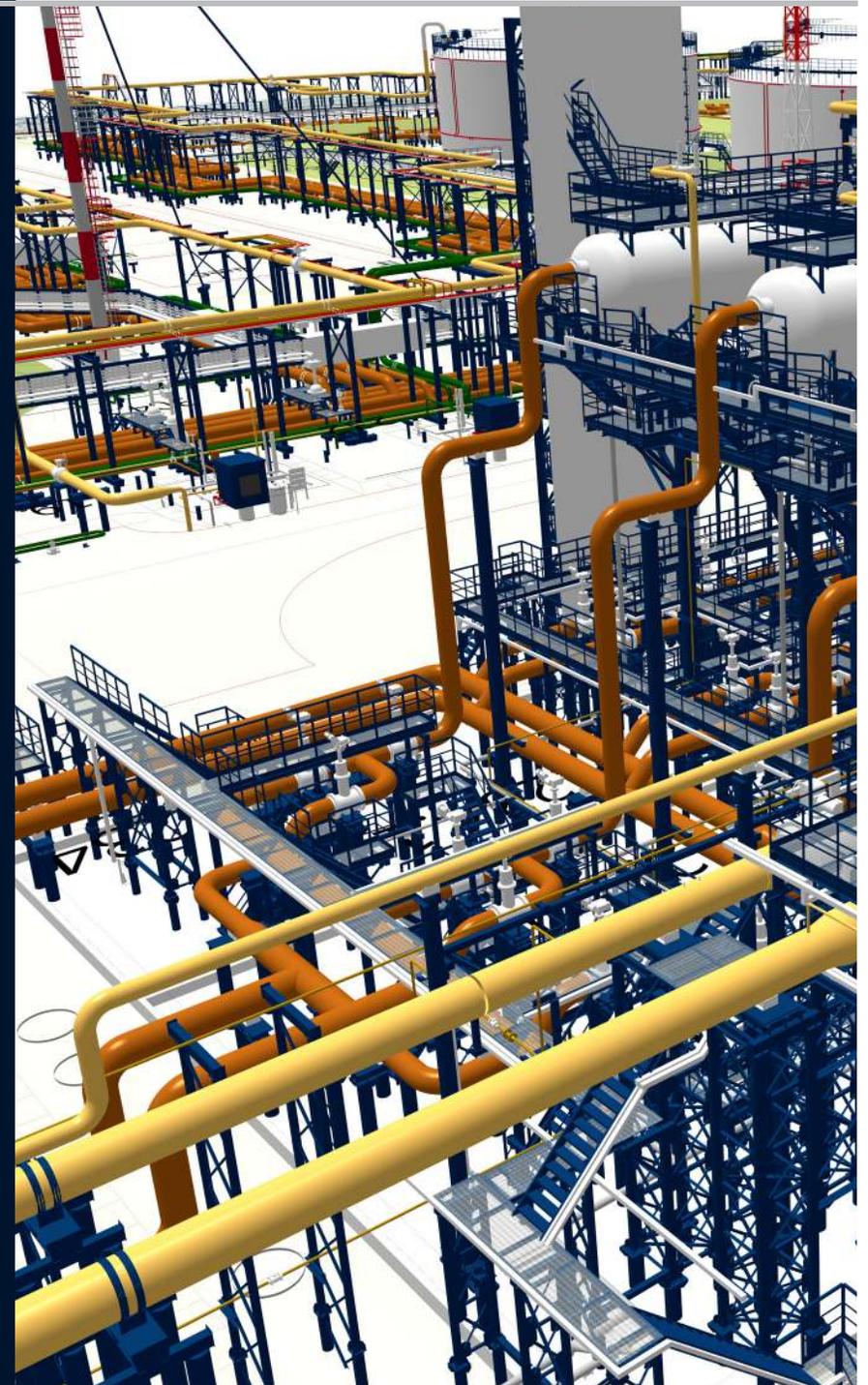
The owner-operator of the Novoportoykskoye Field retained PJSC Giprotyumenneftegaz to design a central production facility in the harsh conditions of the Siberian Peninsula, where the average temperature is 15.1 degrees Fahrenheit. To overcome the severe environmental conditions, PJSC used Bentley's OpenPlant to create a 3D design model of the CPF and the surrounding terrain. The model helped the team produce a high-quality design in less time and reduced costs by 15 to 20 percent.

Additionally, several analytical solutions applied to the 3D model saved the project team 20 percent in metal consumption on the facility's structure. Moreover, the team integrated the time schedules of the construction and installation works, making it possible to track the progress of construction work in detail. The process shortened delivery time and eliminated procurement errors. OpenPlant allowed the team to easily organize information from specialists within the multi-discipline team, creating a common data environment for all parties.

“

Introducing new Bentley products in the design of infrastructure objects for oil and gas fields represents a complete solution for all of the design stages, as well as for the construction and operation of industrial facilities. The solutions are based on a single data model that provides interoperability of applications through a common pool of information.

— *Aleksey Kruzhinov, head of the software design department with PJSC Giprotyumenneftegaz*



POLISHING SYSTEM FOR THE MERCURY ABATEMENT TOWER

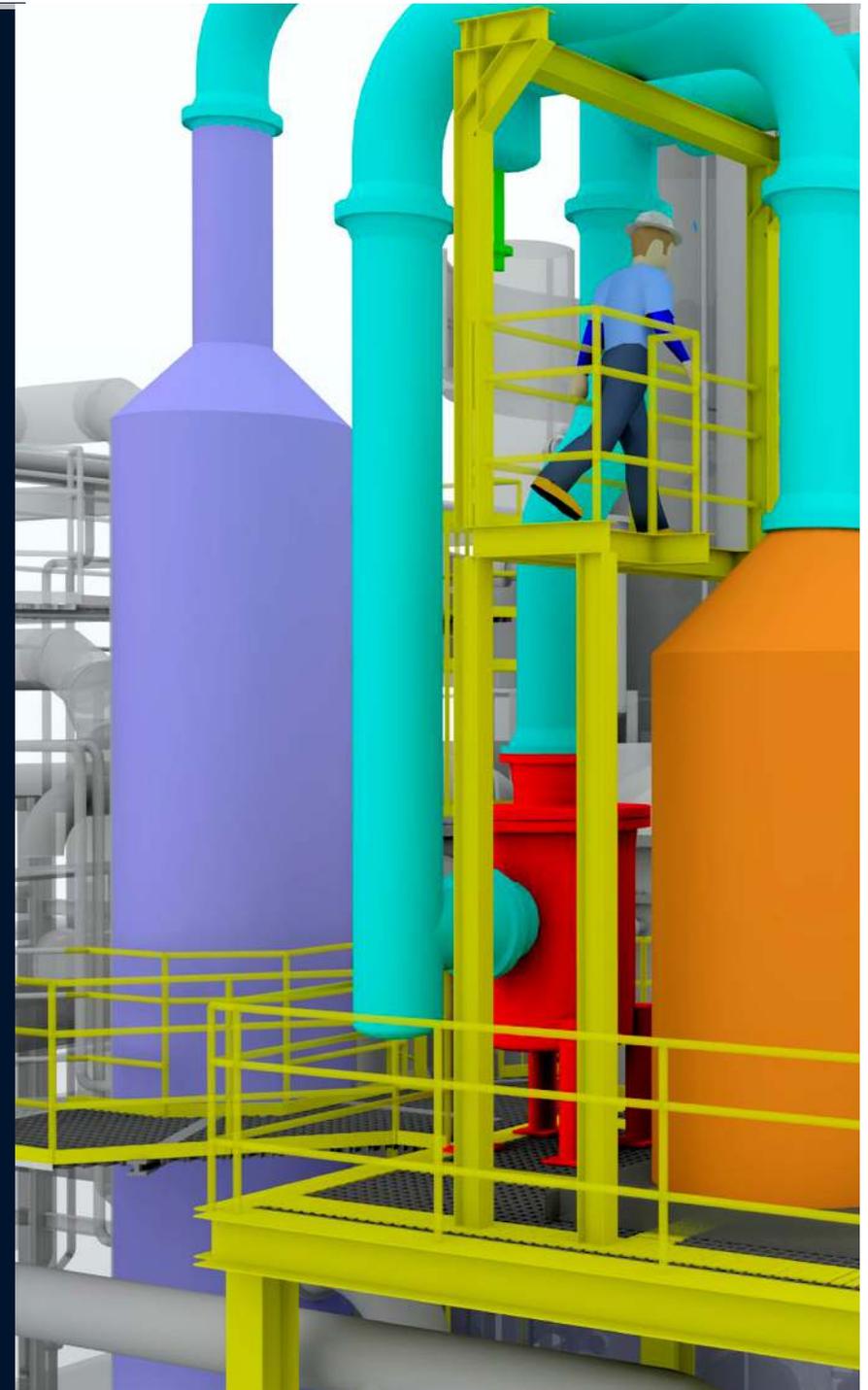
The Unipar project team on this BRL 1 million project in Cubatão, Brazil used OpenPlant to overcome the challenges it faced designing a polishing system for exhaust gas emitting from a mercury vapor abatement tower that would increase efficiency and further reduce gas emissions from a mercury vapor abatement tower. The system will increase efficiency and further reduce gas emissions to well below current international standards. The team used OpenPlant to create 3D models and streamline the process so that it would be easier to share key information across the project team.

With OpenPlant the team could carry out engineering design in-house rather than hiring an external engineering company, which saved 33 percent in design time, eliminated errors, and shortened the overall design time. The team also streamlined the flow of information between engineering and purchasing as materials lists were issued automatically according to the specifications in the 3D models. OpenPlant enabled Unipar to perform the 3D design of its new polishing system 33 percent faster than required by the project deadline. The software also improved project team collaboration, review cycles, and material specification processes, while ensuring that company project standards were consistently applied.

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Easy operation and flexibility of use were important reasons we chose to deploy Bentley applications.

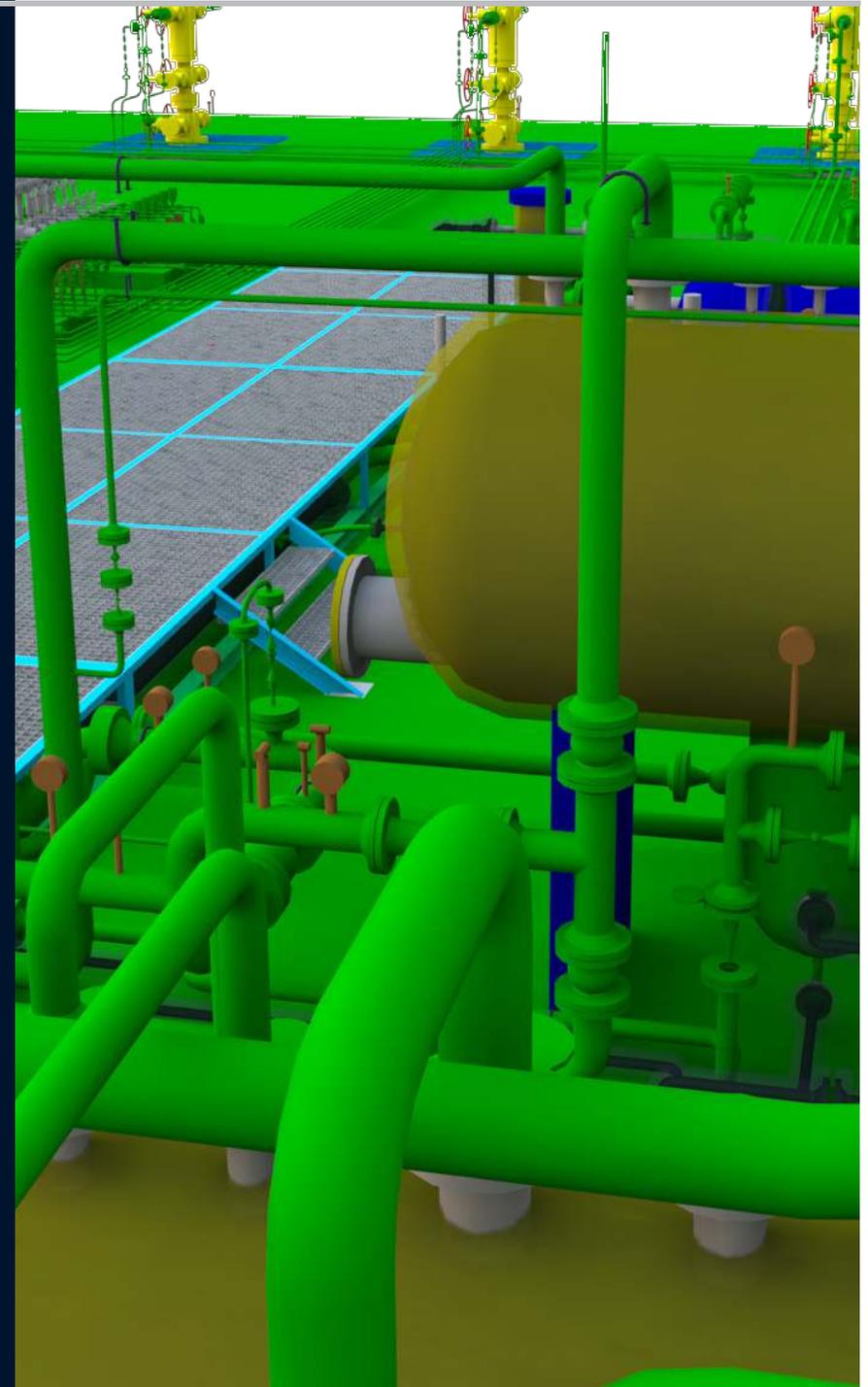
— Carlos Rodrigues, project engineer, Unipar Carbochloro.



MOBILE MODULAR SYSTEM FOR THE PURIFICATION AND TREATMENT OF GAS EXTRACTED FROM UNDERGROUND HYDROCARBON DEPOSITS

Biuro Projektow Nafta-Gaz's objective for the USD 12.5 million project in Jaslo, Poland was to construct a modular plant for the treatment of gas extracted from underground deposits of hydrocarbons that would offer easy and fast transport. The modules had to be designed so that the whole plant system could be disassembled and then reassembled in a different location and in different configurations depending upon the specific physicochemical properties of individual gas fields.

Using OpenPlant and other Bentley applications simplified and reduced the on-site plant erection time as well as equipment installation. The team prepared all modules as 3D models using OpenPlant and used AutoPIPE® for stress and support loading analysis. Using this technology achieved a 60 percent overall time improvement compared to projects using standard CAD and 2D technology.



“

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.

— Bogusław Niemczyk, engineer, Biuro Projektow Nafta-Gaz

ABOUT BENTLEY SYSTEMS



Bentley Systems is a global leader in providing engineers, architects, geospatial professionals, constructors, and owner-operators with comprehensive software solutions for advancing the design, construction, and operations of infrastructure. Bentley users leverage information mobility across disciplines and throughout the infrastructure lifecycle to deliver better-performing projects and assets. Bentley solutions encompass *MicroStation®* applications for *information modeling*,

ProjectWise collaboration services to deliver *integrated projects*, and *AssetWise* operations services to achieve *intelligent infrastructure* – complemented by comprehensive managed services offered through customized Success Plans.

Founded in 1984, Bentley has more than 3,500 colleagues in over 50 countries, and is on track to surpass an annual revenue run rate of \$700 million. Since 2012, Bentley has invested more than \$1 billion in research, development, and acquisitions.

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